IIIEE Theses 2014:29

Steering towards more cycling in Tallinn

Assessing policy's role in promoting urban cycling in "new cycle cities"

Teve Kink

Supervisors

Dr. Peter Arnfalk

Mari Jüssi

Thesis for the fulfilment of the
Master of Science in Environmental Management and Policy
Lund, Sweden, September 2014

Published in 2014 by IIIEE, Lund University, P.O. Box 196, S-221 00 LUND, Sweden,
Tel: +46 – 46 222 02 00, Fax: +46 – 46 222 02 10, e-mail: iiiee@iiiee.lu.se.

ISSN 1401-9191

"Many cities are applying innovative ideas which will make the car-based transport system seem like an idea belonging to the last century. City life does not have to mean polluted air, congestion, noise and long travelling times. New ideas in urban transport are transforming many cities into more pleasant, healthy places to live"

(Hans Bruyninckx, EEA Executive Director).

Acknowledgements

First of all, I would like to express my huge gratitude to my wonderful supervisors Dr. Peter Arnfalk, Associate Professor at the IIIEE, and Mari Jüssi, Senior Expert in Transport planning and impacts at Stockholm Environmental Institute in Tallinn. They have provided me a great support and guidance throughout the whole research process and have opened up my eyes about the cycling advocacy. Peter's extensive knowledge in the area of Sustainable Transport Systems has been invaluable. In addition, he is a very punctual and accurate person with a good sense of humour that helped me easily overcome the shortcomings during the thesis process. Mari's extensive knowledge in the area of sustainable transport planning and impacts, especially in Estonian context were invaluable. Mari is one of the forerunners in advocating cycling in Estonian cities and her enthusiasm has encouraged and prepared me to contact and meet the key decision makers in Tallinn.

I would also like to express my gratitude to Dr. Thomas Lindhqvist and Dr. Naoko Tojo, Professor at the IIIEE. Both Thomas' and Naoko's extended knowledge about policy intervention and policy evaluation helped me to set the analytical focus. In addition, I would like to thank Batch 19 for making this year amazing and unforgettable! In addition, whenever you came across, for sending me interesting bicycle related articles, news, pictures and for suggesting me contact persons. Thank you, Yuliya Voytenko and Håkan Rodhe for introducing me to Anders Söderberg from Lund Municipality. Thank You, Anders Söderberg for explaining me in detail the success of Lund being nominated the Best Cycling City in Sweden in year 2014. In addition, I owe great gratitude to Michael Koucky, CEO of Koucky & Partners. Michael's extended knowledge in the area of utility cycling and sustainable transport management was invaluable. I would like to thank Malin Månsson cycling specialist from Gothenburg City who gave me a good insight to cycling management on the city level. Furthermore, James McGeever, sustainable transport and mobility manager in Lithuania, his experience and knowledge with Baltic States and cycling was a great value for my thesis. In addition, I would like to thank Rupert Fellinger cycling specialist from Vienna who kindly answered to my questions via email.

I owe my gratitude to all the decision makers in Tallinn City Administration that took time out of their busy schedule to have a discussion with me on cycling potential in Tallinn. I would also like to thank Jaan Tarmak traffic specialist at Estonian Road Administration, who is actively supporting the utility cycling in Tallinn and had time for an interview. In addition, Yoko Alender politician and city architect, and Jüri Ratas Vice-President of the Riigikogu and initiator of the Green Capital Award in Europe who provided me with information about the current situation and the potential future for cycling. Finally, I would like to thank Toomas Haidak Transport Department Manager at the Ministry of Economic Affairs and Communication, who gave an insight of the national level decision competence and situation. Special thank you to Nigel Kelly and Kristi Raidma, who volunteered to read my draft and comment on it.

Last but definitely not least! I would like to thank you Adrien Michenet-Delys for being such a supportive and understandable person during this thesis period. I owe special thank you to all my friends and family who have been very supportive throughout the thesis period and encouraged me to keep going!

Abstract

A growing trend in cities around the word is to promote cycling to make them a more livable place to live in. Many big cities in Europe such as London, Paris, and Vienna have started to consider cycling not only as a mode of transport but also as a way to reduce pollution and congestion problems. Cities with long cycling culture such as Copenhagen and Amsterdam started decades ago a shift from a car dependent mobility culture towards more urban cycling, and they have now high quality cycling infrastructures in place and a modal share of cycling of 36 –38 %. On the other hand, the rapid growth of private car ownership in Western Europe in 60s and 70s, was in the Eastern European cities such as in Tallinn postponed until the end of 90s, resulting in a high use of cars but also of public transport, the latter a mode of transport inherent to the Soviet Union.

In Tallinn, where the cycling culture is weak and the modal share of cycling is as low as 1 %, politicians are reluctant to promote bicycling at the expense of private car accessibility. As a consequence, car traffic is increasing in the city and Tallinn suffers from lack of space, traffic congestion, as well as air and noise pollution. However, the city has a high cycling potential mainly due to frequent traffic congestion, lack of space in the city centre, high levels of noise and air pollution. A major challenge is to carefully plan cycling policies in Tallinn, containing the necessary policy instruments and including both soft and hard measures. Such measures should advocate utility cycling but also provide safe and comfortable cycling infrastructure for its residents. In addition to the 'old cycling cities', knowledge and policy transfer from so-called cycling 'starter cities' are becoming increasingly common. Successful policy transfer requires an understanding of the current situation in the receiving city and evaluating the transferrable policy, which helps to identify policy implementation process barriers and expected benefits. The key to more cycling in Tallinn is a well-designed policy package that integrates all stakeholders in overcoming the various barriers.

Keywords: Utility Cycling, Policy Instruments, Cycling Policies, Policy Evaluation, Policy Transfer

Executive Summary

Background

A major share of transport is from private car users where almost half of the car trips in Europe are shorter than five kilometres, which gives a high potential for a shift to cycling as a mode of more clean, energy efficient and healthy means of transport (EC, 2014e). However, the number of car users is increasing in many cities, and although emissions per vehicle are reduced because of technological improvements, the growing number of cars still results in increasing emissions in urban areas due to lack of space and resulting traffic congestion.

An increasing attention is paid on how to make the cities more liveable in Europe. The main drivers are environmental concerns due to excessive urbanization, population growth and increasing living standards (Giles-Corti et.al, 2010, p.122). Furthermore, potential benefits include significant economic and health benefits, which could be gained if cycling is taken on as a mode of transport in the cities (Handy et.al. 2014, p.16). The many benefits can explain why an increasing number of cities such as London, Paris, Brussels, and many Eastern-European cities expand their cycling infrastructure and launch pro-cycling programs (Pucher et.al. 2011, p.451; Transport Learning, 2014). In addition, European Cycling Federation identifies EUR 6 billion worth of EU funding that is available to be used on cycling-related initiatives during the next funding period (2014-2020) in Europe (EFC, 2014a).

In response, cycling has become very topical among transport researchers that are increasingly focusing their efforts on cycling. Not long ago cycling research was primarily focused on the safety and engineering questions but now it is addressing a wider variety of questions, which are more likely to motivate cities that require sound evidence before they will increase urban cycling (Handy et.al. 2014, p.4). More and more cities' governments that are looking for a policy improvement to make the city more liveable are likely to be looking into solutions abroad (Dolowitz and Marsh, 2000, p.21). This is mostly resulting from globalization and technological advantages that have accelerated and made it easier for policy makers to communicate with each other, which in turn has increased the policy transfer overall (Dolowitz and Marsh, 2000, p.6).

Justification

About 50 % of trips up to 7 km are made by car in Tallinn (Stat, 2013). The allowed EU 11 % of increase in GHG emissions "growth limit" up to 2020 has already been exceeded in transport sector in Estonia before year 2014 (Jüssi and Sarv, 2011, p.1). During the last decade, there was 15 % of increase in the private car owners in Tallinn (Stat, 2013) and the public transport users have decreased 20 % (Jüssi and Rannala, 2014, pp.4-5). Main reason for the increase in private car users is the urban sprawl, and decrease in public transport and connections (Jüssi and Rannala, 2014, pp.4-5; MKM, 2013, p.21). The fuel tax has been raised 10 times in the past 17 years but it has no significant impact on the number of private car users (Jüssi et.al. 2014, p. 37). Since the last 15 years the petrol use has risen more than 33 % and 90 % of the petrol used by the cars. Considering that Estonian GDP has risen 26 % (Stat, 2014a) within the past decade and around 60 % of the gross domestic product is created in Tallinn (Stat, 2014b), most of the cars are owned by Tallinn's residents.

Despite, the 20 % decrease, public transport is still a successful mode of mobility in Tallinn but it does not solve the whole transport related problems such as traffic congestion, air and noise pollution. The modal share of cycling in Tallinn is very low today; only 1 % (TTÜ, 2012, p.18). If all the important areas are improved the cycling modal share could reach up to 15-20 % in next 10 years (Jüssi et.al. 2014, p. 24). According to Castillo-Manzano (2013), policy plays

a major role in promoting cycle development in urban areas (Castillo-Manzano et.al.2013, p.1011). Therefore, it is of interest to investigate what role policies could play in promoting cycling in Tallinn and to learn from the experiences gained by other cities in a similar situation.

Research Aim, Research Questions, and Relevance

The main aim of this research is to find out how to promote utility cycling in cities such as Tallinn, where the modal share of cycling is low in urban areas. The idea is to assess the drivers and barriers behind the pro-cycling policies in the cycling cities within Europe. Therefore the first research question to guide this paper is:

RQ1: What policies play a role in increasing the modal share cycling in urban areas?

Second aim is to assess Tallinn's current situation to understand the main barriers and drivers towards cycling in Tallinn. The expected outcome of this thesis is to present possible policy solutions for Tallinn's decision makers. Thus, the second guiding research question is:

RQ2: How could policies successfully increase cycling in Tallinn?

Research Methods

This thesis investigates what urban cycling is and outlines the main drivers for cycling advocacy. In addition, it examines the potential barriers that are often stated in literature and various cycling strategies. Based on already existing studies and statistics that include cycling such as Estonian Labour Force Survey by Statistical Office; Harju County Public Transport Study by Stratum Ltd. and preliminary analysis for CIVITAS MIMOSA Project in 2009, Tallinn Cycling Strategy Phase I (TTÜ, 2012, p.17), Endomondo Cycling Challenge data and Transport, Environment and Quality of Life in Tallinn research (Uljas, 2007; TTÜ, 2012), the barriers are outlined for Tallinn and further analysed by taking into account the best practices from other cycling cities. Because there are currently no cycling policies or development plan in Tallinn, the share of responsibilities and measures implemented are somewhat unknown. Therefore, BYPAD audit carried out by Rein Lepik in 2007 is taken into account when analysing the shortcomings in cycling (Lepik, 2007).

The methods used in this research are mainly desktop research, which include the academic journals, different strategies, and plans on local and national levels such as development plans and transport strategies. The study makes use of already existing corresponding statistics. In addition, the literature analysis further clarified policy transfer, policy evaluation, policy interpretation and its importance from learning from others. The main stakeholders were identified by concentrating on the local, regional and national reports and throughout the institutional web pages. Second, the study includes interviews with key stakeholders and with experts in field, which are all listed in Appendix I. The purpose of interviews with key stakeholders was to identify the current political perception of the cycling in Tallinn. Interviews with experts in fields gave an additional input to this study. Third, it takes into account an individual observation of the cycling conditions in Tallinn. In order to properly carry out the policy analysis the multiple stream framework was used to evaluate the policy stream, problem stream, and politics stream (Weber, 2014, pp.132-133). In addition, policy input, output and outcome were considered (Mickwitz, 2003, p.415).The evaluation criteria also involve Dolowitz and Marsh (2000) framework of the policy transfer in order to identify the policies that should be prioritized (Dolowitz and Marsh, 2000, p.13). The sequence of successful cycling initiatives is used as a basis for recommendations and indicators for potential policy transfer (PRESTO, 2010, p.8).

Key Findings and Conclusions

It is not very often that a single policy can play a significant role in increasing the modal share of cycling. Therefore, successful policy consists of many policy instruments and forms in a policy package. There are three main types of policy instruments: regulative, economical and informative policy instruments. To advocate cycling, another type of policy instrument is necessary, that is infrastructure policy instrument. Thus, policies that are part of carefully chosen policy mix are successful. Furthermore, all the policies do not have the same effect in different cities. Thus, it is hard to generalise what policy can play a role in increasing the modal share of cycling. Therefore, policies transferred from one city to another should be carefully implemented. In order to successfully transfer the policy, it requires the export policy evaluation, the understanding of the current situation in policy improving country by identifying the existing barriers to cycling and potential drivers. Ideally, the successful policy integrates all the stakeholders, which would have input from all, which makes it easier to accept the outcome of the policy. There are identified three main types of stakeholders; those are key stakeholders, primary stakeholders and intermediaries. Furthermore, a successful policy is also integrated into relevant strategies, plans, which often requires the integration of national, regional and occasionally European Union policies. Cycling policies when included in the strategies should include the action plan with timeframes. Therefore, policies that can play a role in increasing the modal share of cycling in urban areas should include all the stakeholders in decision-making.

There is a room for flexibility to design a right city specific policy mix but yet there are several challenges in Tallinn that prevent the modal shift from happening. Those challenges are lack of political willingness, where cycling clearly is not considered as priority number one. Furthermore, it is not only the political willingness but also the lack of common vision among different political parties. Above all, the current decision makers are stuck in business-as-usual approach and are reluctant to change. Therefore, the first challenge is to change the business-as-usual approach that it is in favour of changing the current way of doing things. In order to successfully promote cycling in Tallinn the policies should be based on common vision because individual policies can be conflicting. In addition, all the stake holders should be involved in policy making especially in the beginning. Furthermore, it is important to regularly monitor the cycling, to record the accidents and complaints in order to improve further the cycling conditions in Tallinn. Finally, because the share of public transport is high in Tallinn, in order to raise the share of cyclists, reduce noise and air pollution it is advisable that the policies also discourage the use of the public transport for the short distances that could be walkable or cyclable such as distances up to 5 km. Therefore the cycling policy should be targeted to give an economic incentive that discourages price-sensitive car users, and then regulates remaining car users to share roads more safely with cyclists, who also benefit from better journey times and cycling infrastructure. This could possibly reduce also already overloaded free public transport users to cycle. In addition, the economic incentives for public transport users are reasonable such as fee per month. Furthermore, apart from pollution issue there is a problem with space.

Table of Contents

List of Figures

List of Tables

Abbreviations

BAU- Business-as-usual

BMVI- Federal Ministry of Transport (Bundesministerium für Verkehr und digitale Infrastruktur)

CIVITAS- Cleaner and Better Transport in Cities

CHAMP-CyclingHeroes Advancing sustainable Mobility Practice

CO2- Carbon Dioxide

EEA- European Environmental Agency

EC- European Commission

ECF- European CyclingFederation

ECMT-European Conference of Ministers of Transport

EGCA-The European Green Capital Award

EEK- Estonian Kronor (former Estonian currency, until 2012 January)

ELTIS- European Local Transport Information Service

EPOMM- European Platform on Mobility Management

ERR- Eesti Rahvusringhääling (Estonian Public Broadcasting)

EU- European Union

EUR- Euro (currency)

GHG- Greenhouse Gas

IGO's- International Governmental Organizations

IMF- International Monetary Fund

KB- Knowledge-based

Km/h- kilometre per hour

MKM- The Ministry of Economic Affairs and Communication (Majandus- ja Kommunikatsiooni Ministeerium)

Mt- metric tone

Mobile2020- "More biking in small and medium sized towns of Central and Eastern Europe by 2020"

LI- Low-interference

NGO's- Non-governmental Organizations

NOx- Nitrogen Oxides

OECD-Organization for Economic Co-operation and Development

People per km2- people per square kilometer

PM- Particulate Matter

PRESTO-Promoting Cycling for Everyone as a Daily Transport Mode

SEIT- Stockholm Environmental Institute Tallinn Centre

SUMP- The Platform on Sustainable Urban Mobility Plans

TAI- National Institute for Health Development (Tervise Arengu Instituut)

UN- United Nations

USA-United States of America

VOC- Volatile Organic Compound

1 Introduction

1.1 Background

Transport is a large contributor to the CO_2 emissions. It is the second biggest greenhouse gas emitting sector after energy sector, being responsible for around 25 % of European Union Greenhouse Gas emissions (EC, 2014a). They also emit NOx, PM, VOC and other harmful emissions. A major share of transport is from private car users where almost half of the car trips in Europe are shorter than five kilometres, which gives a high potential for a shift to cycling as a mode of more clean, energy efficient and healthy means of transport (EC, 2014e). However, the number of car users is increasing in many cities, and although emissions per vehicle are reduced because of technological improvements, the growing number of cars still results in increasing emissions in urban areas. There are several plans, goals and legislation set but the outcome does not look promising if there is no shift to more sustainable transport. Cars, especially in the cities, also create other health, safety and local environmental problems, such as congestion, and accidents. Therefore, many cities are actively promoting a shift from private cars to alternative modes of transport and accessibility to public transport, car sharing and teleworking (Transport Learning, 2014). Furthermore, walking and cycling are often seen as the most preferred transport options (MKM, 2013, p.30), having the potential to satisfy more than a quarter of the passenger's transport needs in cities.

In Europe, an increasing attention is paid on how to make the cities more liveable. Various projects, programmes and platforms such as EPOMM, CIVITAS, Champ-cycling, ELTIS, SUMP encourage cities to get involved in sustainable mobility management in order to change the business-as-usual attitudes towards more sustainable ones (EPOMM, 2014; CIVITAS 2014; Champ-cycling, 2014a; ELTIS, 2014). The main drivers are environmental concerns due to excessive urbanization, population growth and increasing living standards (Giles-Corti et.al, 2010, p.122). In addition, potential benefits include significant economic and health benefits, which could be gained if cycling is taken on as a mode of transport in the cities (Handy et.al. 2014, p.16). The many benefits can explain why an increasing number of cities expand their cycling infrastructure and launch pro-cycling programs (Pucher et.al. 2011, p.451).

The European Commission offers financial assistance via e.g. the Structural and Cohesion Funds for projects that are improving the cycling infrastructure, and promoting the exchange of experiences and supporting the cycling policy making (EC, 2014d). In response, cycling has become very topical among transport researchers that are increasingly focusing their efforts on cycling. Not long ago cycling research was primarily focused on the safety and engineering questions but now it is addressing a wider variety of questions, which are more likely to motivate cities that require sound evidence before they will increase urban cycling (Handy et.al. 2014, p.4). More and more cities' governments that are looking for a policy improvement to make the city more liveable are likely to be looking into solutions abroad (Dolowitz and Marsh, 2000, p.21). This is mostly resulting from globalization and technological advantages that have accelerated and made it easier for policy makers to communicate with each other, which in turn has increased the policy transfer overall (Dolowitz and Marsh, 2000, p.6).

1.2 Problem definition

The number of cars is increasing in Tallinn. About 50 % of trips up to 7 km are made by car in Tallinn (Stat, 2013), whereas in Copenhagen the percentage of trips made by car in less than 10 km is only 10 % (City of Copenhagen, 2011, p.9). In addition, during the last decade, according to the statistics, there was 15 % of increase in the private car owners in Tallinn (Stat, 2013) and the public transport users have decreased 20 % (Jüssi and Rannala, 2014,

pp.4-5). Main reason for the increase in private car users is the urban sprawl, and decrease in public transport and connections (Jüssi and Rannala, 2014, pp.4-5; MKM, 2013, p.21). In addition, the allowed EU 11 % of increase in GHG emissions "growth limit" up to 2020 had already been exceeded in transport sector in Estonia before year 2014 (Jüssi and Sarv, 2011, p.1) (Figure 1-1). The fuel tax has been raised 10 times in the past 17 years but it has no significant impact on the number of private car users (Jüssi et.al. 2014, p. 37). Since the last 15 years the petrol use has risen more than 33 % and 90 % of the petrol is used by the cars. Considering that Estonian GDP has rose 26 % (Stat, 2014a) within the past decade and around 60 % of the gross domestic product is created in Tallinn (Stat, 2014b), most of the cars are owned by Tallinn's residents.

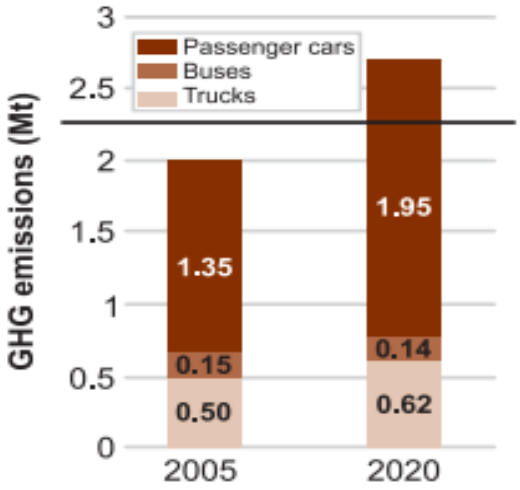


Figure 1-1Allowed EU 11% of increase in GHG emissions "growth limit" up to 2020 has already been exceeded in Estonia (Jüssi and Sarv, 2011, p.2).

The recent citizen questionnaire shows 7 % increase in the use of public transport in Tallinn during 2013, which means that the passenger km rose from 55 % to 62 % from the past year (Tallinn, 2013a). Therefore, public transport is a successful mode of mobility in Tallinn but it does not solve the whole transport related problems such as traffic congestion, air and noise pollution. In addition, the overall satisfaction is according to the survey only 32 % due to various reasons such as cleanliness, overcrowding and are not regular enough or the stops are far from the destinations (Tallinn, 2013).For instance, around 46 % of the bus stops near new development areas are located more than 1 km away, which would be the maximum distance people are willing to walk to use public transport (Jüssi et.al, 2010, p.14). Furthermore, in the last decade, the population of Tallinn rose 7.5 % (Tallinn, 2014a) and it is expected to grow more because of urbanization trend, which proves that the provision of free public urban transport in the future for all the residents for free is quite challenging and definitely not cheap because extra vehicles (e.g. buses, trams) are required to meet the higher demand.

The modal share of cycling in Tallinn is very low today; only 1 % (TTÜ, 2012, p.18), which could be compared to e.g. Brussels where the modal share of cycling is 1.5 % (City of Brussels, 2014a). Despite, Tallinn has, however, set a goal to raise the modal share of cycling up to 10 % by 2020 (Mobile 2020, 2014, p.3) and cycling is included in various strategies and plans both on city and national level. If all the important areas are improved the cycling modal share could reach up to 15-20 % in next 10 years (Jüssi et.al. 2014, p. 24). According to Castillo-Manzano (2013), policy plays a major role in promoting cycle development in urban areas (Castillo-Manzano et.al.2013, p.1011). Therefore, it is of interest to investigate what role

policies could play in promoting cycling in Tallinn and to learn from the experiences gained by other cities in a similar situation.

1.3 Research aim and questions

The main aim of this research is to find out how to promote utility cycling in cities such as Tallinn, where the modal share of cycling is low in urban areas. The idea is to assess the drivers and barriers behind the pro-cycling policies in the cycling cities within Europe. Therefore the first research question to guide this paper is:

RQ1: What policies play a role in increasing the modal share cycling in urban areas?

Second aim is to assess Tallinn's current situation to understand the main barriers and drivers towards cycling in Tallinn. The expected outcome of this thesis is to present possible policy solutions for Tallinn's decision makers. Thus, the second guiding research question is:

RQ2: How could policies successfully increase cycling in Tallinn?

1.4 Research process and methodology

This thesis investigates what urban cycling is and outlines the main drivers for cycling advocacy. In addition, it examines the potential barriers that are often stated in literature and various cycling strategies. Based on already existing studies and statistics that include cycling such as Estonian Labour Force Survey by Statistical Office; Harju County Public Transport Study by Stratum Ltd. and preliminary analysis for CIVITAS MIMOSA Project in 2009, Tallinn Cycling Strategy Phase I (TTÜ, 2012, p.17), Endomondo Cycling Challenge data and Transport, Environment and Quality of Life in Tallinn research (Uljas, 2007& TTÜ, 2012), the barriers are outlined for Tallinn and further analysed by taking into account the best practices from other cycling cities. Because there are currently no cycling policies or development plans in Tallinn, the share of responsibilities and measures implemented is somewhat unknown. Therefore, BYPAD audit carried out by Rein Lepik in 2007 is taken into account when analysing the shortcomings in cycling (Lepik, 2007).

The methods used in this research are mainly desktop research, which include the academic journals, different strategies, and plans on local and national levels such as development plans and transport strategies. The study makes use of already existing corresponding statistics. In addition, the literature analysis further clarified policy transfer, policy evaluation, policy interpretation and its importance from learning from others. The main stakeholders were identified by concentrating on the local, regional and national reports and throughout the institutional web pages. Second, the study includes interviews with key stakeholders and with experts in the field, which are all listed in Appendix I. The purpose of interviews with key stakeholders was to identify the current political perception of the cycling in Tallinn. Interviewees were selected each from the corresponding Tallinn Administration departments to understand how the cycling development responsibilities are shared within the Tallinn City Administration. Interviews with two politicians were included to have a perception of the decision makers. Furthermore, the officials working with public sector institutions were included to understand the cycling advocacy process even deeper. Interviews with experts in the field gave an additional input to this study. The experts were chosen by their profession and experience in this field. Third, it takes into account an individual observation of the cycling conditions in Tallinn. In order to properly carry out the policy analysis the multiple stream framework was used to evaluate the policy stream, problem stream, and politics stream (Weber, 2014, pp.132-133). In addition, policy input, output and outcome were considered (Mickwitz, 2003, p.415).The evaluation criteria also involve Dolowitz and Marsh (2000)

framework of the policy transfer in order to identify the policies that should be prioritized (Dolowitz and Marsh, 2000, p.13). The sequence of cycling efforts is used as a basis to recommendations and policy transfer initiative indicator (PRESTO, 2010, p.8).

The work has four main steps (Figure 1-2): urban cycling, cycling policy, cycling in Tallinn, and suggestions for Tallinn. First step gives background information on urban cycling and outlines its main barriers, drivers and benefits. Second step, explains the role of policies and strategies to cycling, emphasise the importance of stakeholder integration, and illustrates with example cities policies. Third step is based on steps 1 and 2: the barriers and drivers in Tallinn context are analysed similarly to step 1, and existing policies and strategies and their effect on cycling in Tallinn with identified stakeholders are explained. Step 4 is based on previous steps and suggests the policy instruments, analyses the applicability of example policies to Tallinn context, and discusses the next steps and challenges.

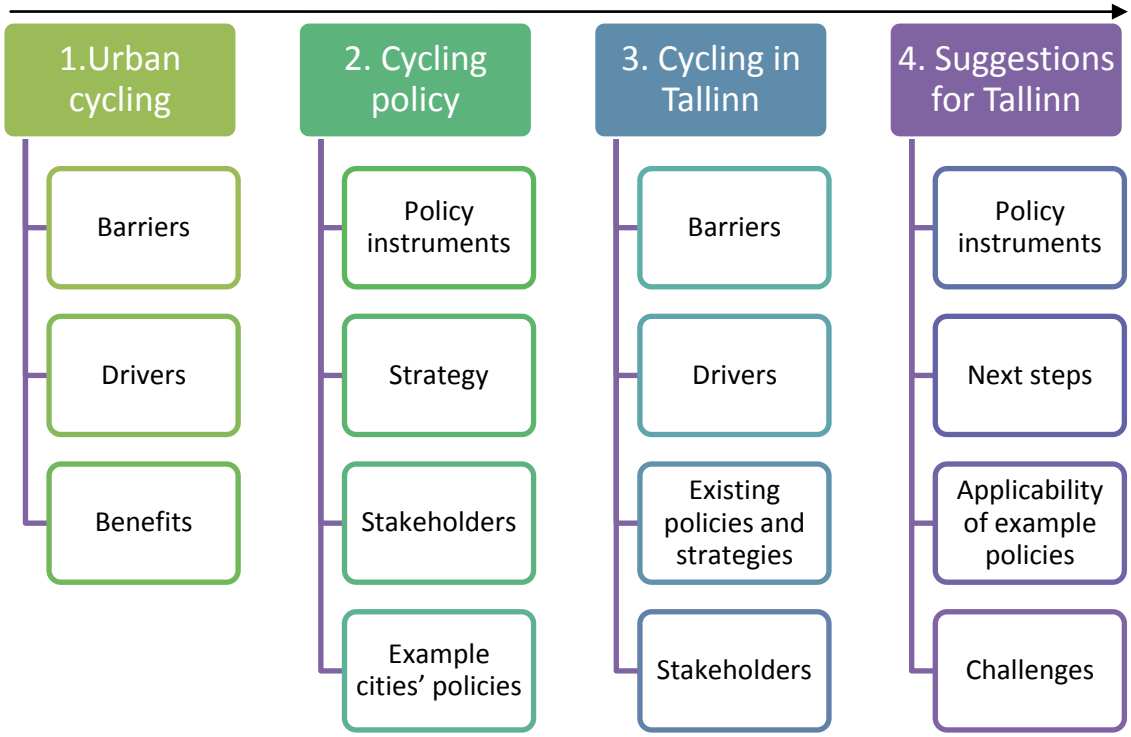


Figure 1-2 Approach and work flow

1.5 Limitations and scope

Because urban cycling is not so common yet in Estonia, there are very limited possibilities for national benchmarking (only Tartu, second biggest city in Estonia) to find out the real situation in the Estonian context in Tallinn. Therefore, the study is making use of examples from other cities abroad that might have the same characteristics to Tallinn in terms of climate, size, population density, economy or other aspects but they can lack the similarity in legal and political system (Chapter 3 and 5). All in all, the study intends to find the right mix of successful policies and turn them into one or two good potential ways to go further in developing urban cycling in Tallinn. Furthermore, there is not much research directly done in this field yet in Estonia. In addition, the confidential information that policy-makers might have but which is not available for public and further analysis and discussions for academia e.g. budget allocation.

Cycling has been indirectly addressed in various studies such as Estonian Labour Force Survey by Statistical Office; Harju County Public Transport Study by Stratum Ltd. and preliminary

analysis for CIVITAS MIMOSA Project in 2009, Põhja-Tallinn Mobility Study (Positium, 2014) and Tallinn Cycling Strategy Phase I (TTÜ, 2012, p.17). Despite the fact that there are no published studies carried out directly about the cycle traffic volume, frequency and goals before 2012, Tallinn's Cycling Strategy Phase I clearly shows that there is unused potential that has not been used in order to increase the modal share of cycling in Tallinn (TTÜ, 2012). There are many relevant stakeholders and all have their own perspective and role to play. However, this study has taken an approach to analyse and discuss cycling from the public policy perspectives, where the mobility management efforts are directed towards larger employers and private sector. The study is taking into account the political development documents that are influencing (or influenced) cycling in Tallinn such as local and national strategies, policies and legislation, as well as, policies on European Union level. The study makes a use of secondary statistics sources about cycling in Tallinn. Unfortunately, there are no comprehensive surveys conducted yet until now. Thus, the surveys used for the study are somewhat imperfect in their content and in their credibility considering the small number of people questioned and the socio-spatial characteristics of those respondents.

It is much harder to encourage people to cycle in cities with little cycling than to motivate non-cyclists in the cities where there is already substantial level of cyclists (Pucher et.al. 2010, p.121). Therefore, this study is primarily focusing on the examples of the "new cycling" cities with lower levels of cycling than in the traditional cycling cities such as Amsterdam and Copenhagen. However, some best practices are drawn from the best cycling cities. The study is using examples for recommendations from Europe, leaving out other examples from the cities of other continents because the study relies largely on EU policies, legislation, strategies and plans. In addition, examples from Europe might ease the process of getting funding later on because those ideas are proved to work in order to increase cycling. The geographical scope of this study is Tallinn, excluding the rest of Estonia and also Harju County. The focus is on Tallinn because pro-cycling policies and projects are very topical at the moment in Tallinn and there is a need for a change towards more sustainable transport in Tallinn because more than half of Estonian people live there. Furthermore, as cycling can be divided into three, according to the purpose; those are leisure, sport and transport (PRESTO, 2010, p.15). This study is mainly concentrating on purpose of transport cycling and how to encourage it. Another division of cycling is whether it is to do with private bikes or rental bike system (JCDecaux, 2014). Most of the advanced biking cities such as Copenhagen and Amsterdam have both systems worked out, which is not difficult if the cycling infrastructure and incentives for residents to take up cycling are in place. However, the current study's main focus is on how to raise the private bike use for transport purposes and only includes briefly bike rental systems in chapters that concern recommendations and potential future steps on integrated transport mobility. It is important also to note that this study does concentrates only on societal impacts, excluding the wider ecosystem.

1.6 Audience

The expected outcome of this research is to gain a better insight into the role of policy in promoting urban cycling in "new cycle cities" and how it would steer towards more cycling in Tallinn. The current thesis idea is also to support the active groups (e.g. NGO's and different associations) and politicians that are prioritising sustainable life styles and whose aim is to change Tallinn to a more liveable city, but are not currently in power to have a necessary influence on policy making in Tallinn. Altogether, the main idea is to prove that cycling is considered as a mode of urban transport and more and more cities are looking into urban cycling as a solution to many issues. The analysis of this study could be used as a basis of evidence of the need to develop sustainable transport plan or strategy in Tallinn. Thus, the primary targeted audience is Tallinn City Administration and other public sector organisations.

In addition, this work can be of interest for academia, where this study could be used for further research.

1.7 Disposition

Chapter 1 presents the background of the study. In this chapter, the problem is defined and research aim is highlighted. In addition, it briefly describes the method used to collect and analyse the data in order to address the research questions. Furthermore, the research limitations are outlined together with the targeted audience.

Chapter 2 defines what is urban cycling. The main drivers, challenges and benefits are brought out in this chapter.

Chapter 3 explains the role of policy and strategy in promoting urban cycling. Also it assesses the interconnection of the strategy and policy. This chapter is introducing different types of policies on local, national, and European levels, which influence cycling. In addition, the Chapter outlines the hard and soft measures and the sequence of using those measures based on the cycling share in the city and explains the policy package and stakeholder integration. Furthermore, the chapter is covering the policy evaluation, policy intervention, policy transfer and the examples from successful new cycling cities, which are corresponding to the barriers identified in Chapter 2.

Chapter 4 describes the cycling situation in Tallinn as of now. Where the main drivers and barriers are identified and analysed based on the findings. In order to clarify the system the overall urban transport management is evaluated together with the existing policies and strategies that affect directly and indirectly cycling.

Chapter 5, considering the outcome of the previous Chapters, it is explaining the possible ways of what and how to promote in order to increase modal share of urban cycling in Tallinn. The recommendations are based on the lessons from other cities and the applicability of the best practices in Tallinn by taking into account the suggested framework criteria based on the outcome of Chapter 3. The policy target, vision, mission, objectives and strategic approaches are formed in this Chapter.

Chapter 6, is discussing the main challenges in Tallinn such as political perception of cycling, business-as-usual approach and infrastructure planning. In addition, the expected outcome is outlined in this chapter together with potential timeframes.

Chapter 7 is recommending the future steps for the decision makers in Tallinn. Furthermore, this chapter concludes the outcome of the current study by answering to the research questions.

2 Urban Cycling

2.1 The nature of urban cycling

Urban cycling is referring to the mobility done by riding a cycle for certain distance in the city. According to PRESTO (2010), there are four types of cyclists (Figure 5-1) depending on the purpose of the cycling and the habit; those are competitive cyclists, regular or utility cyclists, recreational cyclists, and potential cyclists. Competitive cycling means the cycling for athletic reasons and it is mainly done for the purpose of exercising and sporting, which are depending the least on the cycling conditions and do not need direct encouragement from the policies and they pose the smallest target group among all the types. Despite, it is always beneficial to improve the utterly courageous recreational cyclists' safety and conditions because they are usually moving very fast on the roads where they put themselves and others in danger. Regular or utility cycling encompasses cycling that is done primarily as a means of transport not for fitness or recreation, which is an extra side benefit, and it includes more people. Utility cycling also means that the bike is used often (daily, weekly), where bike is chosen over other modes of transports for commuting from point A to B e.g. going for a shopping or work. Recreational cycling is done occasionally for leisure purposes in the persons' free time. People that are using cycle for leisure purposes represent a huge potential for the cities to encourage them to become the utility cyclists. The fourth group of cyclists are the potential or non-cyclists, which represent the biggest group in the starter cities. Those cyclists are the main target group for cities who want to increase the level of cycling (PRESTO, 2010, p.15).

Cycling cities can be divided into three categories, which are starters, climbers, and champions' cities, according to their modal share of the cyclists (Figure 2-1). Starter cities are cities where the modal share of cycling is less than 10% and the cycling conditions are incomplete for instance Tartu, Budapest, Stockholm and Seville. Climber cities are cities where the modal share of cycling is in between 10 and 30% and the cycling conditions are moderate, cities such as Oulu, Munich, Cambridge, Ghent and many other cities (Copenhagenize, 2014a). Champion cities are cities where the modal share of cycling is higher than 30% and the cycling conditions are very good (PRESTO, 2010; SFMTA, 2013, pp.11-12) for example Copenhagen, Amsterdam, Lund and Malmö (ibid).

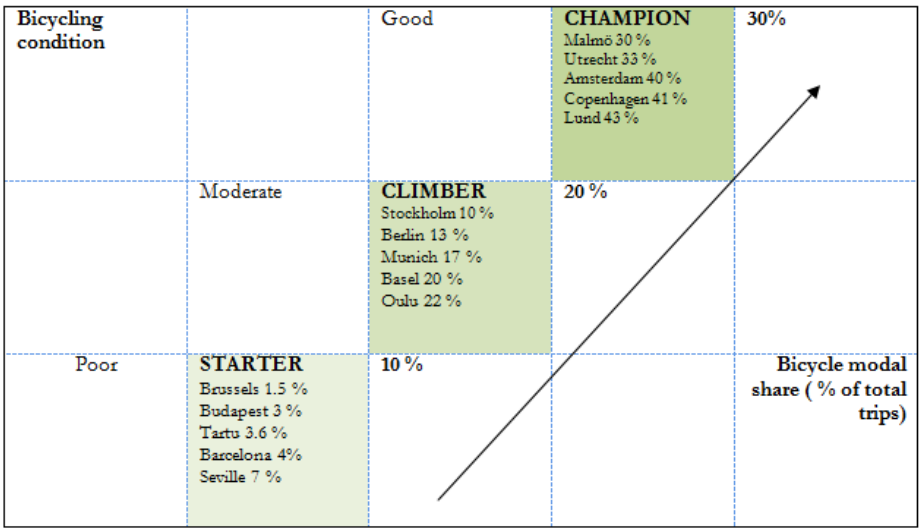


Figure 2-1 Starters, Climbers and Champion city (PRESTO, 2010; SFMTA, 2013, p.6; Copenhagenize, 2014a).

Furthermore, the cities can be grouped according to their traditions as old and new cycling cities. There are cities where there has been traditionally high modal share of cyclists such as Amsterdam (40 %) and Copenhagen (41 %) among the most famous and successful cities in Europe where the share of cyclists is over 30 % (Copenhagenize, 2014a). In those cities there was already a high share of cyclists before the car culture in 1960's and 70's when it suddenly decreased to very low levels of cycling and started to slowly increase again after the oil crisis in 1970s (Fietsberaad, 2009, pp.8-9). Apart from the old cycling cities there are new cycling cities that have relatively low not more than 15 % of modal share of cyclists, such as Vienna with around 13 % of cyclists (Appendix I). Those cities do not have a historic background of high levels of cyclist and the cycling has become a popular new means of transport recently (Fietsberaad, 2009, pp.9, 11). There are several drivers for utility cycling such as lack of space in the city, traffic congestion, energy efficiency, air pollution, noise pollution, and road maintenance and building costs with facilities such as provision of parking places for cars. Those drivers are the main reason why big influential European cities such as London, Paris, Brussels, and Berlin with strong car driven cultures are looking for policy instruments to shift the modal share to cycling (ECF, 2014b, p.1). Cycling has become increasingly popular in Europe especially the cycling share system, in 2000, there were just 5 cycling schemes in Europe, in 2013 there are 636 schemes in 49 countries (Woodcock et.al, 2014).

2.2 Drivers

Cycling is a clean urban transport, which allows efficient ways of using already limited city space (EC, 2014e). It is considered as a mode of transport in a modern world, which has a various social, economic and environmental benefits. The main drivers for urban cycling are among the others the need to improve individual health, to reduce air and noise pollution, carbon emissions, traffic congestion and dangers (Pucher et.al. 2010, p.107).In addition, it is healthier than driving, it reduces the congestion and space problem, as well as noise and air pollution and it helps to make the city more attractive (EC, 2014d,e; Martens, 2004, pp.281-282).Therefore, by opening up an opportunity for urban cycling fulfils the social equity and offers an additional mode of city transport also for those that cannot afford car or are not eligible to drive a vehicle (Thinking Cities, 2014, p.41). Thus, the main drivers for the cities to increase the cycling share are the sustainable urban development and the gains won through such approach (see 2.4 Benefits). In addition, the drivers are much interconnected with the major barriers to the cycling (see 2.3 Barriers), because the drivers indicate the evidence of the need to overcome those barriers. According to Koucky (2013) the main drivers for pro-cycling policies are (Koucky, 2013; Appendix I):

Traffic congestion

Traffic congestion is a situation in which transport participants are not able to move in a usual or desirable speed. There are various reasons why the traffic congestion happens such as reduced road capacity due to an unplanned event (accident) and or due to construction or maintenance works. Another cause of congestion is a higher traffic demand than the maximum flow capacity (OECD, 1999, pp.13-14). The latter is mainly influenced by the increasing population growth in the cities as more people wanting to get from point A to point B and the trend is to own a private car but the (historic) city centres initially designed for less cars become too small and cause traffic congestion, which increases the travel time, and the fuel consumption. It is also a common excuse for the decision makers to build more roads, whereas instead it would be beneficial to reduce the traffic because it is very expensive to build and maintain even more roads (OECD, 1999, p.15; EEA, 2013, p.37; Giles-Corti et.al, B, 2010, p.123). According to TomTom (2013), the average congestion index level in Europe is 21%, which equals an average 24 min delay per hour driven and 65 h delay per year with 30 min commute (TomTom, 2013, p.10). The higher the percentage the longer the delay is per

hour and per year. The congestion is divided into three categories, which are stand-still with stop-and-go, where the speed is in between 0 and 10 km/h, then critical phase between 10- 25 km/h and pre-critical phase with speed over 25 km/h (OECD, 1999, p. 15). Traffic congestion and frequent journeys by car can increase fuel consumption about 30 % and further emits more emissions per kilometre. In addition, it is estimated that around 100 billion EUR, which is approximately 1 % of the EU's GDP, are lost as a result of traffic congestion annually (EEA, 2013, pp.37, 39; ECF, 2014b, p.10). According to Teschke (2013) traffic congestion can save up to 3 % of GDP for many cities (Teschke, 2013, p.7). Traffic congestion is considered one of the main reasons why big cities such as London and Paris have implemented bike rental systems (de Hartog et.al, 2010, p.1109). Thus, replacing the short journeys by car with cycling in busy urban areas can help to improve the quality of urban environment by reducing the traffic congestion which contributes towards a low carbon economy (Jones, 2012, p.138; Jüssi and Rannala, 2014, p.8).

Energy efficiency

The CO_2 emissions and oil consumption are the two major indicators on how energy efficiency is measured in the city. Transport sector contributes to the total greenhouse gas emissions with around 25 % in Europe, and it is the sector where the emissions are increased the most; 36 % (EC, 2014a). The major 2/3rd of the impact is caused by road transport, of which cars alone are responsible for 12 % of total GHG emissions in EU (EC, 2014g). Today 1/3rd of the world's population lives in the cities (Koucky, 2013; Appendix I), which means the cities could have a very positive impact on the overall emission reduction in Europe. In order to move towards low carbon-economy by 2050, transport sector has to decrease the GHG emissions around 60 %, below the 1990 levels (EC, 2014b). Cycle is emitting about 21 grams of CO_2e per passenger kilometre travelled, which is compared to car that emits about 271g CO_2e per passenger-kilometre (EFC, 2011, pp.11, 14; Figure 2-3). If all the European Countries would have the same modal share of cycling as in Denmark today, there would be 12 to 26 % of decrease in transport sector of GHG emissions by 2050; depending on the mode of transport the cycle would replace. In addition, such levels would reduce the EU oil importations by 9% and it is estimated that 50 % rise in cycling share from 2010 to 2020 can save up to 24 mln t of CO_2 (ECF, 2011, p.5, 17; EFC, 2014b, p.2).

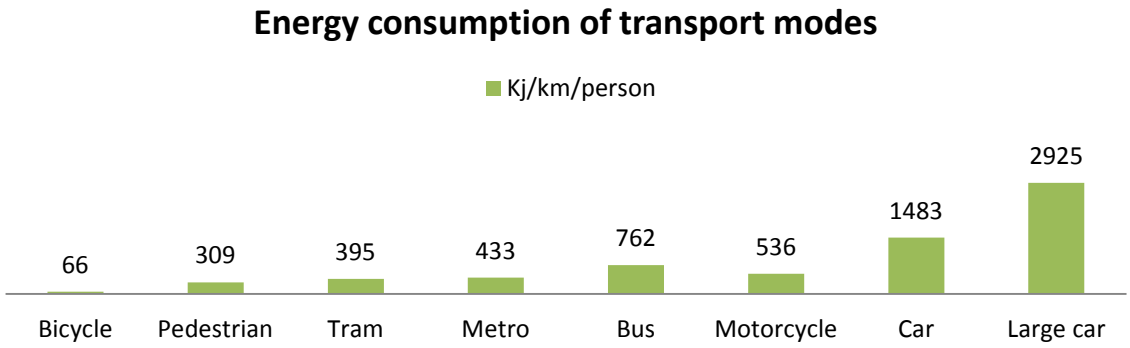


Figure 2-2 Energy consumption of different means of transport (Junta de Andalucía, 2014, p.20).

Air pollution

Currently, transport is contributing significantly to CO_2 emissions and is one of the largest contributors to climate change and about 40 mln people in EU "are exposed to air exceeding WHO air quality guideline values for at least one pollutant" (WHO, 2014c). Transport sector is a major contributor to excessive levels of GHG and to air pollution in EU (EEA, 2014a) and urban transport accounts for around 25 % of the CO_2 transport emissions that are

causing the climate change (EEA, 2013, p.40; see 2.2.2). Apart from CO_2 there are dangerous substances such as NO_x, PM and VOC, which affect the human health by causing cardiovascular, heart and lung diseases, heart attacks, arrhythmias, affects the central nervous system, and cause headache, dizziness, fatigue and also cancer (EEA, 2011, pp. 34-35; Jüssi, et.al., 2010) and premature death (EEA, 2013, p.41). Air pollution is responsible for over 400 000 premature deaths in 2010 and the external costs were between 330-940 bln EUR, which had direct effect on the economy with 100 mln lost working days with direct cost of about 15 bln EUR lost in productivity. During European Mobility Week and Car Free days, the air quality has been significantly improved (ECF, 2014b, p.12). Therefore, cycling has become popular because it does not emit emissions in use phase and has low lifecycle greenhouse gas emissions, but in order to have a significant improvement in air quality, cycling needs to substitute for a high proportion of motorized transportation (Teschke, 2013, p.7).

Noise pollution

The noise pollution is measured with A-weighted decibels, which is based on "the sound pressure scale adjusted to conform to the frequency response of the human ear" (EEA, 2014b). As mentioned previously, most of the European's population live in cities (i.e. about 75 %), where the traffic volumes are on the rise, so are the residents' complaints related to increased environmental noise levels (EEA, 2014c,f). According to the EU Green Paper Future Noise Policy, around $1/5^{th}$ of Europeans suffer from unacceptable noise levels, which cause several health effects (EC, 1996). The levels exceeding the lower EU benchmark level of 55dB (A) can cause health problems both long and short term, such as sleeping disturbance, cardiovascular effects, poorer work and school performance (e.g. worsened behaviour and diminished quality of life), annoyance, hearing impairment, elevated hormone levels, psychological problems, premature death. It is estimated that about 40 % of the EU population is exposed to road traffic noise at levels exceeding 55 dB (A), and more than 30 % are exposed to such levels also during the night (Figure 0-1). Furthermore, the impact on health is likely to increase when noise pollution interacts with other environmental stressors such as air pollution, particularly in urban areas (WHO, 2014a; EEA, 2014e, d; Teschke, 2013, p.7). In order to reduce the noise levels in urban areas the noisiest vehicles (e.g. trucks and buses) should be targeted first and the busiest roads where the reduction of at least 40 % of traffic would be needed to achieved to be effective (EEA, 2014e).

Lack of space in the city

The urbanisation is a growing trend in EU, which encompasses also the increased population density (EEA, 2014c). Even though a lot of attention is on the pollution mitigation, the cars also take up a lot of already limited city's space (Figure 0-2 and Figure 2-3).

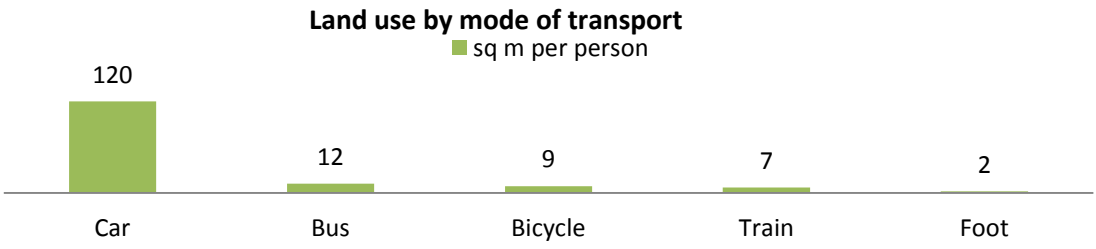


Figure 2-3 Land use by transport mode in m2 per person (PRESTO, 2010, p.4).

Car requires minimum two parking places and 99% the cars are standing still and require relatively expensive infrastructure for that 1% (Appendix I). Currently, cities are giving tax exemptions for electric cars and vehicles that use bio fuels but this is just one part of the solution because the energy efficiency of the cars does not mitigate the issue of land use by car, which according to Figure 2-3 is 13 times more than bicycle requires land. Therefore, cities are seeking to increase transport choices for its residents that have smaller land use (Giles-Corti et.al, B, 2010, p.123).

Road maintenance and building costs

It its much cheaper to create a capacity for more bicyclists than for drivers (Flusche, 2012, p.2). Supposedly 1 km of road construction costs around 10 times more than 1 km of cycle path and 26 times more than 1 km of cycle lane (City of Copenhagen, 2014). Furthermore, the EU funds are very important for cycling because they can co-fund the different projects, which include different measures. There are various forms of EU funding available for cycling in Europe. For example, European Cycling Federation identifies 6 billion EUR worth of EU funding that is available to be used on cycling-related initiatives during the next funding period (2014-2020) in Europe, which is compared to last funding period (2007-2013), where the EU budget was just 600 mln EUR, is ten-fold higher. The 6 billion EUR for cycling is a campaign that is aimed to be used in a various ways, which help to stimulate and enlarge the market for cycling advocacy in European cities. Because urban cycling can improve many environmental impact areas there are various funds where the money could be applied from. The funds could be enough to construct 50 000 km of new cycle paths, to paint 1 000 000 km of new cycle lanes, or to train 100 000 000 European citizens. The reason for such a significant difference is that national and regional governments lacked the knowledge and awareness of the benefits of the urban cycling before. As EU data shows, just 4 EU countries requested funds for cycling (ECF, 2014a).

In order for the city to be eligible for getting the fund, it has to identify key stakeholders, to summarize the current situation in transport sector, define the objectives for 2014-2020 that includes necessary actions both mandatory and optional measures together with estimated costs with potential funding source and impact. The evidence of proper and accurate planning assures EU and ECF that the money allocated for the applicant city is spent for improving the cycling conditions. Thus, in order to convince the relevant authorities for funding, the local authorities need to ensure that their Operational Programs refer to cycling, and they construct a realistic plan for the funding period, which includes the potential economic, environmental, and/or social gains to be won (ECF, 2014b). According to ECF (2014) states that 10 % of all transport budgets should be earmarked for cycling (ECF, 2014b, p.6).For instance, Vienna invests every year 6 mln EUR for the roads improvement to meet the goal of 8 % cyclists by 2015 (Wien International, 2014) and Munich has spent 33 million Euros between 1992 and 2010 to provide cycle facilities and traffic measures in Munich (Landeshauptstadt München, 2010, p.9). Nantes has invested 40 mln EUR during 2009-2014 and developed 400 km more cycle infrastructure, which increased the cycling modal share from 2 % in 2008 up to 4.5 % in 2012 (Copenhagenize, 2014 f).

2.3 Barriers

European Union resident is cycling an average of 275 km per year. This number is close to 1000 km per year in traditional cycling cities such as Amsderdam and Copenhagen but inversely it is lower than 100 km per year in car dominant countries such as Greece, England, Spain and others (TTÜ, 2012, p.9), which indicates that there are some barriers to urban cycling in those countries where the average cycled kilometres is lower than EU average, which entails the low bicycling share and prioritisation of other modes of transports in those

countries. Likely, Figure 2-1 and Figure 3-1 shows that the cycling share in cities varies substantially (Rietveld and Daniel, 2004, p.531). Even though the main drivers for shift in modal share are justified (see 2.2 Barriers), there are many challenges that are making it more difficult to implement cycling policies, cycling infrastructure development and communication with public. The following challenges are interconnected and most often mentioned in academic journals. Off course one of the most common barriers is lack of finances to support cycling projects (Appendix I). Thus, money is taken into account in all the barriers but in certain cities it is not the primary focus, but rather prioritization issues.

Infrastructure

Provision of interventions such as bike lanes and parking are among the most common challenges in the urban areas but also the main drivers to increase the number of cyclists (Pucher et.al. 2010, p.106). The city's potential to become a cycling city is also depending on the population density, which means that the larger cities have lower cycling levels than more compact cities where the distances are shorter. However, the high densities in the cities can also act as a barrier to the cycling due to high traffic levels and limits space for cycling infrastructures (Pucher et.al. 2011, p.458; Pucher et.al. 2006, p.265). The cycling infrastructure should be systemized rather than individual parts built here and there with no connection, in order to have a maximum effect to increase the cycling (Pucher et.al. 2010, p. 122). Often, it is not likely that there will be investments to improve cycling meanwhile most of the money is allocated to repair the deteriorating roadways, and providing new roads to reduce increasing traffic congestion (Handy et.al. 2014, p.4), that is usually very inherent in places where there is small share of cycling and where the cycling infrastructure have to be compromised at the expense of the car infrastructure both physically and financially (Handy et.al. 2014, p. 12). Although, compared to the sums spent on new road schemes, the provision of segregated cycle lanes are much cheaper and those in long term can be beneficial for all the road users (Pooley et.al. 2013, p.71; Castillo-Manzano et.al. 2013, p.1011; ECMT, 2004, p.11). All in all, lack of physical cycling infrastructure poses the most influential barrier to increase the cycling in the cities (Daley and Rissel, 2011, p.211). In order to increase cycling share, the land-use planning and infrastructure investments are crucial (Giles-Corti et.al, 2010, p.124). Despite the factors such as the size of the city, climate conditions, topography, car ownership, students percentage and peoples income, there is clear correlation between the levels of cycling and the availability of the cycle infrastructure. Therefore, also considering the successful cycling cities in Europe and the USA, improvement of cycling facilities is essential to raise the cycling levels (Pucher et.al. 2011, p.464), as "each additional mile of bike lane per square mile […would approximately increase] one percentage point in the share of workers regularly commuting by cycle " (Pucher et.al. 2010, p. 107). Another factor is the proximity of the cycling infrastructure, which matters, as it is proven by the US scientists, where 20% of people would be more likely to cycle if the cycle lanes are less than a kilometre away from their homes than if they were located further away (Pucher et.al. 2010, p.107). Even though, there is not much evidence on how the access to the cycle maintenance facilities might affect the levels of cycling, they appear to be important for everyday cyclists (Handy et.al. 2014, p.8).

Mindset

Taking into account Schneider (2011) Conceptual Framework for Data Collection and Analysis (Figure 2-4), shows the main characteristics, which are travel, socio, attitude, perception, and shopping district characteristics that affect the modal choice of getting from one place to another (Schneider, 2011, p. xi). Thus, considering those aspects, in order for the non-cyclist to take up cycling, the characteristics must be in favour of cycling. Thus, all the policies should be designed accordingly by using appropriate measures. Otherwise, the residents are more likely to not cycle.

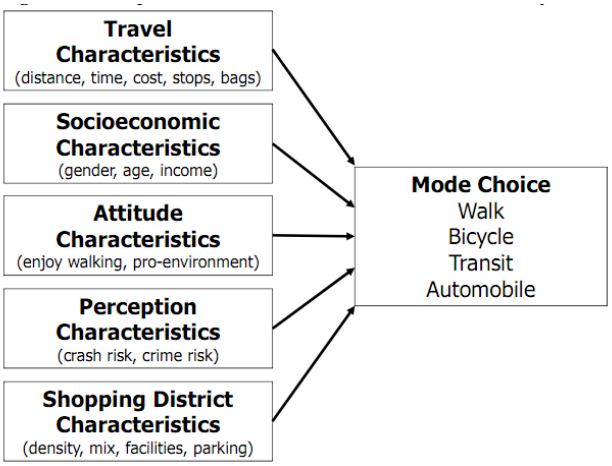


Figure 2-4 Conceptual Framework for Data Collection and Analysis (Schneider, 2011, p.xi).

As mentioned previously, cycling is not popular in all the European cities, which can be connected to the way the public sees cycling in those countries (TTÜ, 2012, p.9).If the cycling is seen as a part of urban transport modes then it is encouraging the residents to cycle. In turn, if the cycling is seen as leisure or sport activity it is less likely that residents would be taking up cycling as a mode of transport (Handy et.al. 2014, p.9). The cities where there are universities and many students ought to have higher share of cycling than cities without a university or educational institution. This is because they are more likely to take up cycling like in Lund, Sweden, where the share of cycling is between 40-50% (Pucher et.al. 2011, p. 458; Rietveld and Daniel, 2004, p.531; Appendix I). In addition, cycling can be seen differently, sometimes it poses a barrier when the public opinion about cycling is that it is "foolish", "inconsiderate" or "hazardous" can influence a non-rider's choice of whether to ride or not in different contexts, but sometimes when it is seen as "brave", "fit" and "environmentally friendly", it encourages non cyclists to cycle (Daley and Rissel, 2011, p.211).For instance, some of the common "excuses" that non-cyclists have that prevent them to take up cycling are that it is too slow mode of transport, cycling is only for the young people, it is not possible to transport anything with cycles, and overall cycling is not safe mode of transport. Such mindset, however, is justified if there are no adequate cycling facilities and infrastructure, traffic calming or segregated lanes for cyclists, bad connectivity and access to places, poor weather conditions, and poor interconnection with other modes of transport such as public transport (Transport Learning, 2013, p.34;). In addition, if there are no traffic jams, compared to other modes of transport, cycle is also slower and the carrying capacity is said to be around 20 kg, where the load is not as well protected as it would be in a car. Although, there are already existing special trailers that accommodate two kids and *Christiana* bikes (Christianabikes, 2014) that take up even more load and fit more children in them (Möller, 2007, p.9). The high rates of car ownership can be associated with lower rates of cycling (Pucher et.al. 2011, p.458), thus, it is challenge to change the mindset of car as a luxury and status symbol to mindset of car as a mode of transport to get from point A to point B. In some societies, cycle is just a symbol of low status in a society (ECMT, 2004, pp.9, 25). Furthermore, according to Jones (2012), people are more likely to cycle and walk than to purchase the more fuel efficient car (Jones, 2012, p.138).

Safety

Personal safety

The obvious reason why people are afraid to take up cycling in cities with low levels of cycling is the fear and risk to be injured or get killed in traffic crashes. Cyclists have higher risks of

having an accident per trip and per distance travelled than cars (Teschke et.al, 2012, p.7; de Hartog et.al, 2010, p.1112). The higher the bike mode shares the higher the safety of cycling is. Therefore, the cities with low share of cycling are the most dangerous for cyclists. All in all, if the cycling conditions are safer it encourages people to cycle. And on the other hand if there are more cyclists it is safer overall to cycle (Pucher et.al. 2011, pp. 462-463; Pucher et.al. 2006, pp 266-268; Teschke, 2013, p.7), as the number of cyclists grows; they are more visible for the motorists (Pucher et.al. 2010, p.121). For instance, "in the Netherlands, where almost 30% of trips are by bicycle, the fatality risk was 1.1 per 100 million km cycled, versus 3.6 [...] per 100 million km cycled in the UK [...,] where about 1% of trips are by bicycle" (Teschke, 2013, p.8). In addition, the size of the city can also affect the cycling safety; the larger the city the assumption is that there is higher density of motor vehicles traffic than in the smaller cities (Pucher et.al. 2011, p.463).

It is clear that segregated cycling infrastructure is safer than sharing road space with motor vehicles. According to Pucher (2011), there is a strong preference for separate cycling paths and lanes over sharing road space with cars. In this case, it is important to also consider the gender, age and experience differences when designing the cycling infrastructure in order to meet the expectations of all. Considering safety and cyclist' experience, it is common that cyclists are rather increasing the trip distance and travel time by choosing longer but better cycling infrastructure than sharing the roads with motorists (Pucher et.al. 2011, p.464; Jones, 2012, p.139). Therefore it is important to provide for the cyclist fully segregated cycle lanes on all busy roads and urban areas in order to make all the cyclists feel safe and protected from the dangers of road traffic and without feeling they are exposed to undue risk (Pooley et.al. 2013, p.70-71; ECMT, 2004, p.9). Although, on the other hand by letting cyclists on the roads make them visible to the car drivers, which in long run would improve the mindset of the motorists (Pucher et.al. 2010, p.106; Appendix I). In addition, Munich's experience shows that separate cycle tracks along the roads proved to be an insufficient measure to encourage more cycling in Munich (Landeshauptstadt München, 2010, p.7). Around 50 % of the fatal accidents in the cities are happening with pedestrians and cyclists involve cars at speeds of around 50km/h, which is contributing to the accidents about 1/3rd. Thus, it is important to reduce the motor vehicles' speed in urban areas in order to get more people to cycle, especially non-cyclists (ECF, 2014b, p.8).

Security

One of the other barriers that discourage people to use cycle as a mode of transport is the lack of safe or guarded parking places for cycle s near the important institutions such as schools, shops, and other destinations. It is likely that the poor parking facilities at home discourage people to own and use the cycles. On the other hand, there are a lot of cycle thefts and vandalism happening, which discourages people to buy new and perhaps more comfortable bikes, or even to not cycle at all (ECMT, 2004, p.9). It is also much easier to steal a bike than a car, as thieves are often only taking parts of the cycle with them. Apart from the theft, it is important that the cycle can lean onto something to not fall over because of wind or some other reason (Möller, 2007, p. 33). In addition, fear of travelling at night may discourage the people to cycle (ECMT, 2004, p.25). Rental cycles are less likely than private cycles to be stolen or vandalized, even though they are in public places and they have a distinctive appearance, because they are relatively well guarded. Thus, even this system is said to be beneficial in reducing the private car users, it has dark sides, for example in Seville 62% of the rental bikes were stolen in first 15 month after installing them and other vandalism was carried out (Castillo-Manzano et.al. 2013, p.1014). It is essential to provide a sufficient number of safe, sheltered and easily accessible cycle parking facilities near people's homes, which would enable the quick and easy bike use at all times. Thus, the construction of new residential areas

should take into account the predicted parking facilities in long term and those requirements should be stated in the building permissions (Landeshauptstadt München, 2010, p.7).

Climate and topography

Both climate and topography have an effect on cycling levels. The bad weather conditions such as frequent rainfall, heat and very cold weather are the factors that discourage people to cycle. In addition, the ideal for cycling is flat surface, however some cities are located in geographically very hilly areas, where in order to avoid the steep gradients the cyclist must take a longer route or push the bike (Pucher et.al. 2011, p. 458; Pucher et.al. 2006, p.270; ECMT, 2004, p.25). Therefore, using cycle as a mode of transport does not guarantee the good weather. Furthermore, it requires an extra effort from the cyclists such as the existence of specific clothes to protect cyclist against the wind, rain, snow, and other weather conditions, and winter tyres and certain accessories (e.g. lights) that may affect the normal cycling, which is an extra expenditure for the cyclists. In addition, cyclists are more vulnerable to the weather conditions that affect the cycling infrastructure such as ice and snow in autumn and winter periods (Möller, 2007, pp.12-13).

Communication

Communication is as essential as any other aspect when planning the urban mobility. It is a complex message transmission between the sender and receiver. Thus, the communication is effective if the receiver understands the content of the message and somewhat agrees with that. In order for the communication to be effective it is important to have on board all the relevant stakeholders and ideally involve them in planning process and decision-making (Transport Learning, 2013, pp. 42-43). People are not aware of the availability of the existing cycling routes (e.g. no cycling map) (Möller, 2007, p. 33). Failure to communicate the importance of cycling and related activities can reduce cyclists due to negative media coverage and misunderstanding. For instance, Budapest reallocated space for cycling on four congested main streets, but before such a radical experiment was done, the media had already presented it in a negative light resulting in unnecessary public criticism. The main lessons learned for Budapest were that the negative focus on road space allocation should be changed to positive aspects to promote the alternative modes of transport including cycling and environmental aspects such as less noise and better air quality. In addition, before going to public the relevant stakeholders should be convinced and the purpose well perceived (Schöller-Schwedes, 2010;Eltis, 2014).Another example is for instance bike helmet regulation. In some countries it is mandatory to wear helmet, as in USA and Australia, but in most of the European countries it is voluntary for over 15 year-olds. Such on-going debate centres on whether the helmet protects you in some weather conditions you or if it is just a way of making money of fear (Fubicy, 2014; Cycle helmets, 2014). Therefore, cycle helmet laws are somewhat controversial and instead of encouraging people to cycle they tend to frighten away many and therefore, reduce cycling (Pucher et.al. 2010, p.116).

Political support

Political support is essential to start to increase the low cycling levels. To get the share of cycling up to 5 % it is harder than to get cycling from 5 % up to 15 % but more political will is required because investment and vision go hand in hand (Copenhagenize, 2014 e). In many European urban centres, the full potential for cycling has not been used due to towns and cities are still car driven and therefore, primarily accommodate car users and neglect cyclists because for both there are not enough room (ECF, 2014c).

Legislation

Legislation can also pose a barrier to the cycling but this is further explained and analysed in Chapter 3 under Section 3.1 "Policies' role in promoting urban cycling".

2.4 A Sustainability perspective of cycling

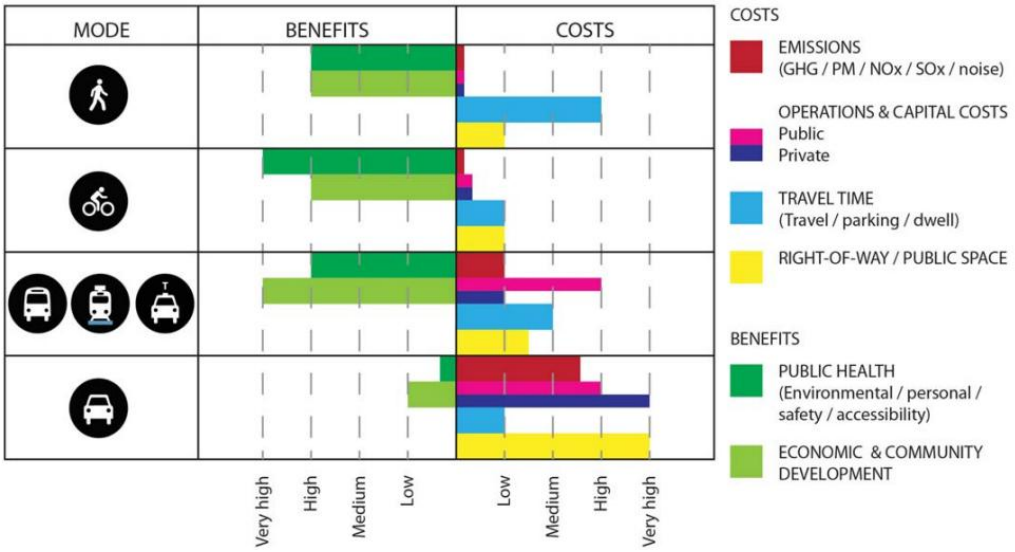


Figure 2-5 Cycle costs and benefits compared to other modes of transports (SFMTA, 2013, p.8).

Compared to other modes of transports, cycling has many advantages (Figure 2-5)such as it does not depend on the age and income, it is healthy, cheap, environmentally friendly, quiet, and takes a little space(TTÜ, 2012, p.7; Transport Learning, 2013, p.34). In addition, cycling as a mode of urban transportation has many obvious advantages for cyclists and also for society because it is low-cost means of transport, low- polluting, and good for health (Handy et.al. 2014, p.4; Daley; Rissel, 2011, p.211; Jones, 2012, p.138; Castillo-Manzano et.al. 2013, p.1011; Piet and Daniel, 2004, p.531; ECMT, 2004, p.9). Although, the benefits of cycling cannot be easily quantified, as for some the cycling can improve the weight management and cardiovascular fitness but for others they can be exposed to air pollutants and be in danger of running into accidents (Handy et.al. 2014, p.13; Rietveld and Daniel, 2004, p.532; de Hartog et.al, 2010, p. 1109). Despite this, "a high share of cycling traffic always stands for a high urban quality of life" (Landeshauptstadt München, 2010, p.21). The benefits of the cycling in this study are divided into three categories considering the three sustainability pillars into social, environmental and economic benefits:

Social

Cycling is considered to be healthy, which means that the health benefits are higher than the health risks of traffic injuries (Figure 2-5; Table 0-1) Moreover, when the modal split of cycling is increasing the rate of accidents is falling, which increases even more the overall health benefits of the cycling because if there are more bicyclists they are more visible to the motorists (Pucher et.al. 2010, p.106). According to the research done in New Zeland (Macmillan, et.al. 2014a), for every Euro spent in new separated bike infrastructure, can potentially save around 8 EUR in health care costs thanks to the reduced air and noise pollution resulted from the less traffic (Fastcoexist, 2014; Macmillan, et.al. 2014a).However, the health benefits can be somewhat reduced if the cycling for transport purposes is substituting for other forms of physical activities. Furthermore, cycling by the busy roads makes cyclists inevitably breathe exhaust fumes (ECMT, 2004, p.25). Despite this, there are proven economic benefits derived from the health benefits in the form of reduced health care

costs and fewer off sick days taken by employees and better work productivity (Handy et.al. 2014, p.13). Furthermore, it is estimated that by reducing car speed limits 10 %, it reduces the number of accidents 37.8 %. In addition, dropping an average speed by only 1 km/h on all roads in the EU can save more than 2200 lives (ECF, 2014, pp.8-9).According to de Hartog et.al. (2010) people who cycle have higher benefits of all-cause mortality rates than car drivers (de Hartog et.al. 2010, p. 1113). Provision of cycling-friendly neighbourhoods facilitates contacts between people, helps to form networks, trust and natural surveillance (Giles-Corti et.al, 2010, p.123). In addition, cycling is much more accessible and affordable for all the people than owning a car. Although, that requires the cities to be designed and made as safe as possible especially for the children and elderly people who are not car drivers themselves (TTÜ, 2012, p.7; Giles-Corti et.al, 2010, p.123; Appendix I). Also, considering that the growth in car users is rising on behalf of parents taking their children to schools and other institutions, which also makes the children more car dependent in the future (Mackett, 2001, p.296). One way of helping those groups of people to get safely from point A to point B is to concentrate on improving the conditions for pedestrians and cyclists; design city got 8-80 (i.e. for 8 and 80 years old) (8-80 cities, 2014; Appendix I).

Environmental

In addition, cycling has also environmental benefits such as reduced energy consumption, air pollution, and it causes the roads to deteriorate less (Teschke et.al, 2013, p.6). However, those benefits depend highly on the degree to which cycling is substituting for driving (Handy et.al. 2014, p.12). It is likely that, cycling is not using the fossil fuels and therefore does not emit GHGs (Transport Learning, 2013, p.34). According to ECF Vision for 2020 (2012), the cars require fossil fuels but the cycles need people in order to function (ECF, 2012). The environmental benefits are mainly depending on the length travelled and the number of cars that are replaced with cycles (Martens, 2004, p.282). Cycling is an ideal means of transport for short-distance travel because it is fast, produces no noise and air pollution, requires little space for travel and parking and is accessible for almost everybody because it is much cheaper than a car (Landeshauptstadt München, 2010, p.5).

Economic

Apart from health and environmental benefits there are direct economic benefits derived from savings on urban public transport costs, where residents pay less for the transit and spend more on other things and top of that the city saves money on infrastructure and instead can invest to other projects. Riding a bike saves the companies paying for expensive car parking for their employees (Appendix I). Apart from that it allows better access to the businesses as the cycling requires shorter distances and therefore opens up an opportunity for local businesses, as it has been proven that cyclists spend more money by visiting businesses more often. Steering towards more cycling, increases the economic viability of local business for instance, cafes, corner stores (Flusche, 2012, p.2; Giles-Corti et.al, 2010, p.124). The bike is often the fastest means of transport for trips up to a distance of 5 km, as cycling makes it possible to make short-cuts and on-the-way stops. It also saves the time and expense of parking and traffic congestion delays. Cycling can also increase the tourism by enabling the tourists to visit places more flexibly and more enjoyably (Handy et.al. 2014, p.13; Transport Learning, 2013, p.34). In addition, the well-developed connected cycling network ensures the growth in cycling tourism that is economically beneficial for the city as it also increases the overall city's reputation (e.g. European Green Capital Award). In addition, the increase in modal share of cycling creates new jobs for cycling industry, services and other related employment areas (TTÜ, 2012, p.7; Transport Learning, 2013, p.34; EC, 2014d). It is likely that cycling is robust, and not easily disrupted by the energy supply challenges (Koucky, 2013).

3 Cycling policies

3.1 The role of policies in promoting urban cycling

The policy is referring to decisions, plans and actions that are undertaken to achieve specific goals within a society. Policy helps to define a vision for the future which in turn is helping to establish targets and points of reference for both short and long term strategies and plans. In addition, policy outlines the priorities and the expected tasks of the relevant stakeholders (WHO, 2014b; COWI, 2013). There are number of thematic policies such as transport, road use, construction, funding, company's, and health policies that have connection and impact on the urban cycling both directly and indirectly because cycling is not just a transport issue, because it has also significant benefits for health, the environment and tourism, as well as having positive local impacts in connecting communities (Shepherd et.al, 2006;Queensland Government, 2014b). Urban cycling share depends on if the relevant policies such as transport, construction, and planning policies are integrating cycling into their policy processes (Queensland Government, 2014a). Policies that have taken cycling into account and accompanied the policy by necessary measures are more likely to have expected benefits such as improved public health and safety (de Hartog, 2010, p.1115).The analytical framework (Figure 3-1) of factors explaining cycle use, outlines the main barriers to cycling (Rietveld and Daniel, 2004 p.533). This framework gives a good overview of the factors that have an effect on the cycle use. Those are individual features and socio-cultural factors that directly have an impact on cycling share, but also local authority initiatives and policy variables, which have a direct impact on the generalized costs on cycling and indirect generalized costs of other transport modes. Those factors can identify the gap in the policy making that prevents the increase in cycling share (Rietveld and Daniel, 2004 p.533).

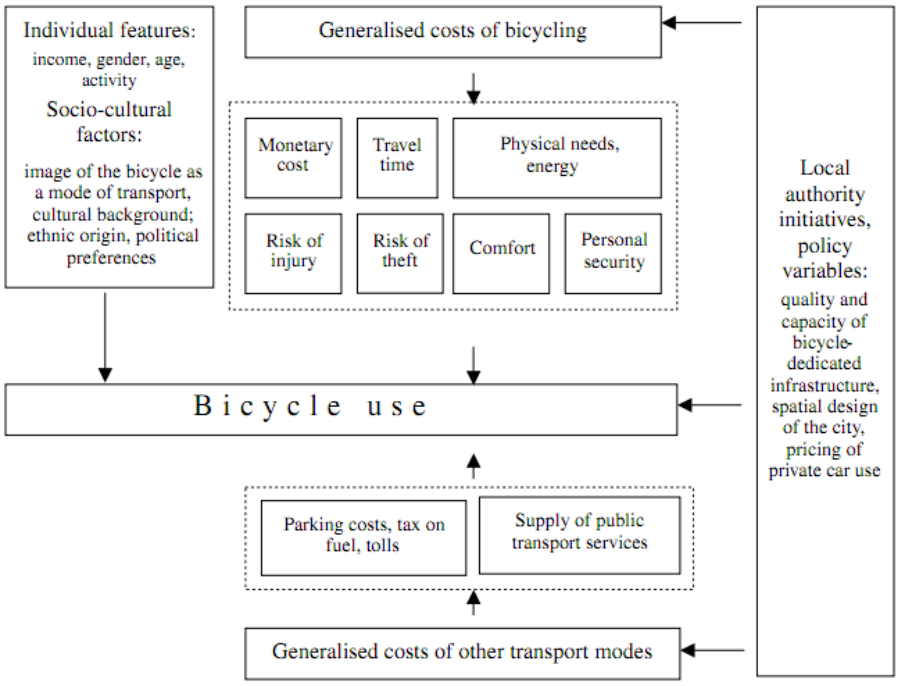


Figure 3-1 Analytical framework of factors explaining cycle use (Rietveld and Daniel, 2004 p.533).

Generalized costs of cycling (direct impact)

The possible pro- cycling policies that are helping to raise the share of cycling directly can be grouped into several categories such as travel-related infrastructure (i.e. quality of

infrastructure), end-of- trip facilities (e.g. cycle maintenance facilities such as air pumps and repair stations), transit integration (e.g. cycling integration with public transport system), promotional and various programs (e.g. educational programmes and incentives for encouraging residents to take up cycling), regulations (e.g. bike lights and helmet) and access to the cycle s (e.g. supporting schemes and programs to reduce social inequality) (Handy et.al. 2014, p.7).

Generalized costs of other transport modes (indirect impact)

There are factors that indirectly influence cycling levels such as congestion charge, gasoline taxation, and car parking policies (Pucher et.al. 2010, p.107). It is evident that charging car users for petrol or access to the areas with high level of mobility can reduce the car use. For instance, introduction of the congestion charges and workplace parking levies would have a significant impact on the number of short trips in the city (Mackett, 2001, p.296). Availability and cost of parking is also another aspect that should be considered and used as a tool to reduce the private car use (Pucher et.al. 2006, p.265). In addition, it is becoming very clear that car drivers will have to adapt to new conditions in the future. Thus, restrictions on car use such as higher cost of car ownership, limited car parking, car-free zones, and traffic calming throughout lower speed limits all affect cycling levels in the cities (Pucher et.al. 2010, p.121; Thinking Cities, 2014, p.41). In addition, speed reduction for motor vehicles, has a significant influence on the speed of cycling and cyclists' safety (Pucher et.al. 2010, p.116). Thus, the streets with speed limit higher than 30 km/h pose a barrier to increase the cycling share, and can have potential risk for the cyclists if the cycling lanes are not segregated from the motorist and if the infrastructure is not appropriate.

3.2 Types of policies

Policy instruments are techniques used by government authorities to ensure their attempts to support or prevent certain changes (Vedung, 1998, p.21). There are wide range of policy instruments that can be used for designing transport strategies to reduce congestion, car use, and emissions. Depending on their nature and purpose, the policies vary from "more conventional instruments such as land use regulation, vehicle regulation, infrastructure investment, and pricing schemes, to newer instruments such as application of information technology to improve resource allocation and service quality, as well as attitudinal changes" (Hajinasab, 2014, pp. 348-349). Therefore, policy instruments are divided into three categories according to the nature of the policy: Sticks, Carrots and Sermons (Table 3-1). In addition, those categories are in turn grouped based on the degree of authoritative force involved (Mickwitz, 2003, p.419). Sticks are the regulative instruments, which mandate receivers to take certain actions stated in the rules, regulations, norms, standards and directives. Regulative policy instruments are backed by the negative sanctions or threats of negative sanctions (e.g. fines, imprisonment, bans, zoning). Thus, regulative policy instrument is an attempt by the government to control the behaviour of policy receivers and to limit the choices and options available to individuals within society (Vedung, 1998, pp.30-32). Regulative policy instruments are the most commonly used policy instruments for public intervention approach, which is also called *command-and-control* approach (Mickwitz, 2003, p.419). Carrots are economical instruments, which are handing out or the taking away of material resources, by making the certain actions more expensive or cheaper in terms of money, time and effort. The economic instruments work as an incentive to encourage certain action or extra cost in order to discourage certain actions. Economic instruments are for example grants, subsidies, taxes, charges, and market creation (Mickwitz, 2003, p.419). Sermons or *suasive instruments* (Mickwitz, 2003, p.419) are the informative instruments that include knowledge, emotional persuasion, recommendations, propaganda, which are a transfer of knowledge, education, counselling and persuasion in order to encourage or prevent certain behaviour (Vedung, 1998, p.27).

Informative policy instruments are for example communication campaigns, advertising, advising, and recommendations including measures such as brochures, pamphlets, booklets, folders, fliers, bulletins, posters and labelling, audits, inspections, demonstration programs, training programs and other. Information policy instrument does not only transmit the knowledge but also should inform the citizens but should also judge what is good and what is bad and how citizens should act and behave. It is voluntary for the residents to follow the recommendations (Vedung, 1998, p.33). Contrary to informative policies, the policy instruments that are demanding the receivers to act in a certain way are more conflicting than the policy instruments that give an incentive to change the certain action. Thus, in starter cycling cities, where the cycling is relatively new, the least coercive instruments policy instruments should be introduced first to gradually weaken public resistance and change the peoples' mindset to avoid communication related issues (Chapter 2) like happened in Budapest (Vedung, 1998, p.40). In addition, to sticks, carrots, and sermons, because this study has assessed that cycling policies and infrastructure are vital parts of cycling, it is important to differentiate infrastructure instruments (Santos et.al, 2010; Durham, 2011; Pruetz, 2013; Blue, 2013; dell'Olio et.al, 2014;).

Regulative instruments (Sticks)	Speed limits, traffic regulation, land use regulation
Economic instruments (Carrots)	Charges: Congestion charge, fuel excise, car tax, parking fees Incentives: (Cyclists) rewarding, tax benefits, bike-to-work schemes
Informative instruments (Sermons)	Campaigns, education
Infrastructure instruments	Cycling infrastructure, bicycle parking, bicycle sharing scheme

Table 3-1 Policy instruments (Vedung, 1998).

3.3 Policy package

Policy package (Figure 3-2) is:

A combination of individual policy measures, aimed at addressing one or more policy goals. The package is created in order to improve the impacts of the individual policy measures, minimise possible negative side effects, and/or facilitate interventions' implementation and acceptability (Taeihagh et.al. 2013, p.596).

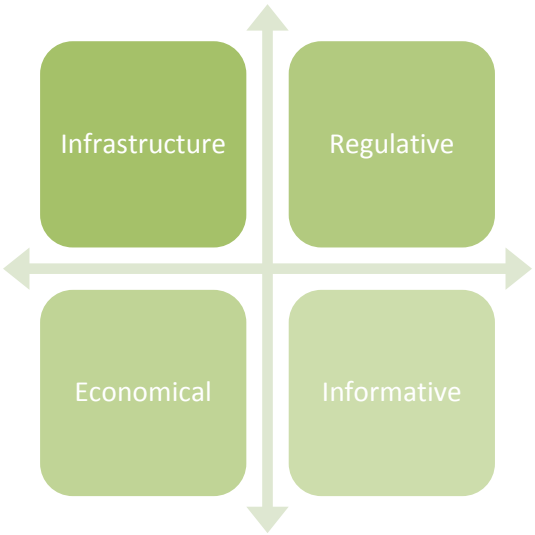


Figure 3-2 Policy package include more than one policy instrument

Overall, it is difficult to set the clear priorities when designing the pro-cycling package but there are underlying themes such as the need to facilitate cycling by provision of appropriate traffic infrastructure through effective planning and land use; regulation of motor vehicles such as traffic calming; and supportive measures such as pro-cycling programs and campaigns, education and training programmes (Pucher et.al. 2010, p.107). Those three should be balanced and developed equally because a single cycling policy instrument alone is not effective enough and often fails due to lack of integration with other policy instruments. For instance, by implementing a congestion charge but not providing information and infrastructure, the cycling is not likely to increase. Thus, the combination of policy instruments is required in order to steer towards more cycling (Vedung, 1998, p.52; Hajinasab, 2014, pp. 348-349) because one policy instrument cannot exist without another and policy package can have a much greater impact on cycling than not coordinated individual measures (Pucher et.al. 2010, p.122; Smart travel, 2008, p.5). It is important the policy instruments are using both soft and hard measures to achieve the expected goals (Arnfalk and Brandt, 2010).

Soft measures

The soft measures are promotion by encouraging, convincing and rewarding the cyclists and non-cyclists. Soft measures are interlinked with the hard measures and vice-versa because it is not likely that people take up utility cycling after encouragement because if there are no facilities and a basic cycling infrastructure they are not likely to be convinced (Table 0-2). Thus, it is important especially in starter cities to put effort on the cycling infrastructure and then advertise the efforts for improved cycling conditions through cycling activities and events (e.g. cycle festivals, car free days), which allow people to try out cycling and be personally involved in experiencing it. It is beneficial to include the public in designing the cycling infrastructure. There should be information tools available to raise the public awareness of the existing cycling infrastructure and conditions such as cycle guide, a regularly updated cycling map and inaugurations for new infrastructure. It is important to specify the target group when trying to encourage certain group of people to cycle for instance kids to school, or car drivers to shift the mode of transport, it is difficult to make a campaign that all target groups would receive the same way (Figure 5-4). Soft measures also include training and education (e.g. cycling traffic education), safety campaigns to alert all the road users, financial and tax incentives given for the people to motivate them to use bike as a mode of transport, and awards to recognize those who have taken up the cycling (PRESTO, 2010, p. 17; EPOMM, 2013).

Hard measures

The hard measures are infrastructure related and the efforts should consist of the provision of safe, direct, coherent, comfortable and attractive infrastructure. To achieve the ideal cycling network the cycling infrastructure should be mixed with calmed traffic routes and specifically designed cycling lanes and paths, which can be done through traffic calming by narrowing streets, building speed humps and speed tables, small roundabouts, by *pedestrianizing*, shortcuts through parks, and home zones. Another way of doing it is through traffic reduction, by the

car traffic deviation and installation of a bollard in the middle of a road, which is blocking access to cars but allowing cyclists and pedestrians to pass. In addition, those routes should be as short and quick as possible and connected with important destinations, which can be done by expanding the cycling network by tackling the difficult and busy road links. This requires the high quality and high-profile links' development by the major routes in order to provide faster cycling over longer distances. In addition, there should be a continuous road improvement especially where there are spatial barriers, which require safer crossing, cycle bridges and tunnels. The lower cost hard measures such as cycle lanes, advanced stop lanes, shared bus/cycle lanes, and shortcuts through parks are also an option to make the cycling infrastructure more cohesive. The infrastructure requires regular maintenance in order to be smooth and preferably it should take the cyclists through parks, and other milieu valuable areas. Ideally, the city centre should be open more for pedestrians, which requires the reconstruction of the urban space. Hard measures are also the provision of the bike facilities such as safe parking (e.g. storage and lockers) and air pumps. With the rise in cycling share the costs are rising as well because there is a need for more regular maintenance of the cycling infrastructure and facilities, as well as the provision of the new tracks and widening the existing infrastructure, which would help to increase the average speed of getting from point A to point B (PRESTO, 2010, p.11; Central Meet Bike, 2014; EPOMM, 2013).

Sequence of cycling efforts

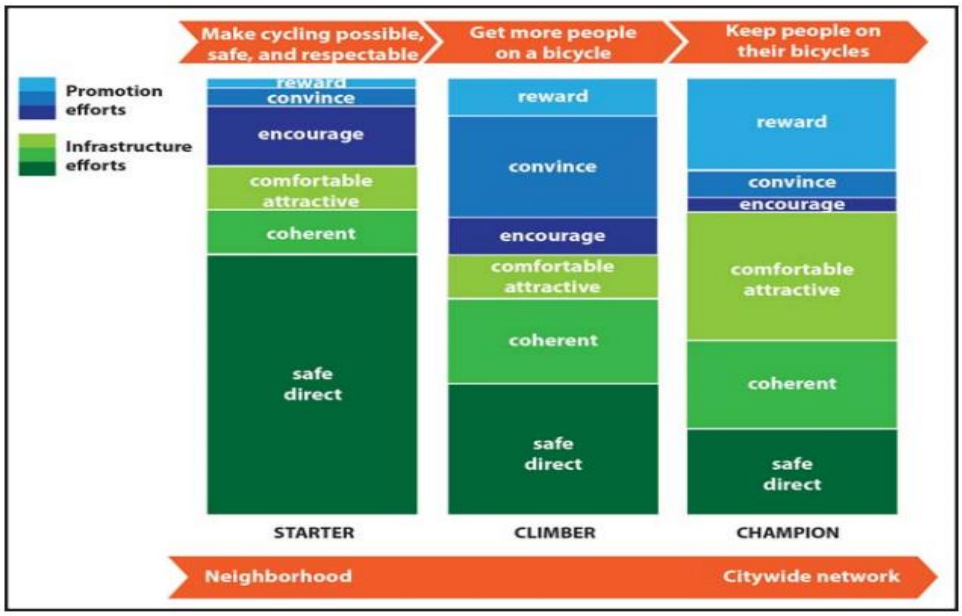


Figure 3-3 Sequence of cycling efforts (PRESTO, 2010, p.8).

Depending on the cycling conditions and cycling share in the cities as previously mentioned in Chapter 2 the cities are divided into three categories: starters, climbers and champion cities. The Figure 3-3 shows how and to what extent the soft and hard measures should be used to increase the cycling levels in the city in each category. Although, it is important to mutually reinforce the soft and hard measures, the Figure 3-3, reflects the levels at which specific efforts are likely to be most effective. In addition, it indicates that the cycling policy at each level has different aims, from making cycling possible, safe and respectable in starter category. Second, climber category requires getting people on a cycle and finally, the champion level to keeping people on their cycle s (top). Different aims require different policy mixes of hard and soft measures, for example in starter cities there should be greater efforts made on infrastructure, because usually the low levels of cycling is due to the poor cycling conditions,

and in climber cities there is a need for more promotion. The figure also shows the scale of cycling policy (down), where starting cities should have a policy on neighbourhood level and champion cities on a city-wide cycling network level (PRESTO, 2010, pp.8-9).

Stakeholder integration

At the same time, policy package should integrate all relevant stakeholders. Otherwise the policy would not be successful, because the policy makers tend to establish correlation with cycling but not causality. Often, policies are not directly showing that by changing one of the factors associated with cycling can lead to an increase in cycling. In addition, as a result of uncertainties involved in environmental issues, by showing the change in one of the factors does not necessarily mean that it can lead to an increase in cycling. In addition, by reducing one problem, for instance allowing cyclists on bus lanes, on the other hand requires public transport integration to policies to avoid conflict between two alternative modes of transport (Mickwitz, 2003, p.422; Hull, 2008; Appendix I). Rather, the strategy changes the factor and then the change in the factor should change the behaviour (Handy et.al. 2014, p.11). For example, the idea of transport policy is to create the conditions for efficient transport system, which is able to handle the increasing public demand through provision of adequate transport infrastructure networks and at the same time its aim is to reduce the adverse impacts of transport activities (EC, 2014c).

For instance, often companies' transport policy for employees is providing its employees with company car, which account for roughly 50 % of all the new car sales in the EU, the reality is that the car is used for business purposes just 20-30 % and rest of the time it is used for private purposes. This clearly shows how the policy encourages the use of private car over other modes of transport (ECF, 2014b, p.10), which in turn causes a conflict between different policies, where one policy encourages cycling and other does not. Another example is the health policy, for instance WHO health policy is encouraging people to move "at least 150 minutes of moderate-intensity physical activity throughout the week or at least 75 minutes of vigorous activity or an equivalent combination of moderate and vigorous activity" in order to achieve better health and reduce health care costs. Thus, sustainable transport policy is clearly interlinked with health and environmental policies and cycling policies could have co-benefits such as increased cycling share and improved public health (ECF, 2014b, p.13; Giles-Corti et.al, 2010).Therefore, successful policy connects different sectors such as transport, safety, health, environment and other departments, which would enable the necessary input from all of the stakeholders (Figure 3-4) at all levels (ECMT, 2004, p.9; Lah, 2014; Champ-cycling, 2014a). Thus, "cycling policy should progressively become institutionally integrated in urban management […] planning and taken into account in all relevant public departments at all levels, especially transport infrastructure, traffic management, land use planning and urban design" (PRESTO, 2010, p.15).In order to increase the share of cyclists and reduce commuting by car the cycling policies must be linked to the policies that make car driving less attractive and comfortable (Mackett, 2001, p.295).

Figure 3-4 Stakeholders involved in cycling advocacy (SUMP, 2011, p.32; BMVI, 2012, p.69).

3.4 The role of strategies in promoting urban cycling

Cycling policy is very complex because on the one hand it helps to reduce environmental impacts but on the other hand serves as economical tool to raise city's attractiveness and boost the economy. In addition, cycling advocacy requires land planning, change people's mindset that can only happen gradually and involves integration of different departments such as health, environment and economy. Therefore, there are many conflicting objectives not only directly environment related but also health related and economic related that cycling is not the only alternative and solution for such issues. Compromises and trade-offs between different departments and stakeholders are required, which results in delays in policy formulation. Strategy is a multidimensional phenomenon, which encompasses the dimensions of content, process and context of the policy goals. Overall, strategy is a solution for deploying resources to establish a favourable position, which helps to direct and guide behaviour. Strategy intentionally improves the management of problems that are difficult to solve. Strategic planning is an important boundary-spanning concept between different policy fields as well as between different disciplines such as health, environment and economy.

Strategy is a lot about policy intervention and defining priorities and formulation conclusions on how to allocate attention to various issues. A strategy should answer two questions: where do we want to go, and how do we get there? Thus, strategy includes both short and long-term goals, aims, and measures, which should be based on the three sustainability pillars: society, economy and environment. Strategy can consist of plans, which help to achieve the set goals. It is difficult and time consuming to change the strategy; it often also requires the change in power structures (FloodSite, 2007). Therefore, strategy provides direction and timeframes for measures, which are to be used to increase the cycling. Strategy also anticipates that all the relevant stakeholders incorporate cycling initiative within their existing policies and consider the strategy's priorities. In order to fully achieve the targets set in the strategy there is a need of regular continuing investment by all levels of government (Figure 3-5). Strategy includes the initiatives set by the cycling policy and the direction for cycling and how to achieve this vision (Queensland Government, 2010). Cycling strategy can be national, regional and local. Figure 3-7, outlines the connection of the strategies and policies. Cycling can be advocated by creating a separate cycling strategy or by including cycling in the general sustainable transport strategy. In both ways the strategy must have a common long term vision that is not affected by the political party change such as LundaMats in Lund, Sweden, where the vision has remained the same since 1986 regardless of the political party in power (City of Lund, 2014;

Appendix I). In addition, the strategy or plan should not have conflicting goals such as on the one hand the strategy supports development of cycling but on the other hand it favours the improvement of the conditions for car users in the city. Therefore, cycling strategy whether part of transport strategy or separate should integrate all the stakeholders in order to achieve the goal faster and unanimously (Durham, 2014; City of Lund, 2014).

Policy levels

Usually, there can be three main levels of policies, programs and projects identified: those are local, national and international (Dolowitz and Marsh, 2000, p.12). All the policies are also affected by the laws and fiscal measures. In this study the levels of policies are divided into: local, national and European policies and strategies:

Local

Even though, the funding is coming partially from national or international organisations, most of the policies and programs are implemented at the local level where often cycling is the responsibility of regional and local authorities with limited commitment at a national level. This is also because the cycling as a mode of transport is for short distances; thus, it is used locally, which means the local authority is responsible for the design and implementation of pro-cycling measures (ECMT, 2004, pp.9, 71). Therefore, it is very important to examine the local policies, programs and strategies (Pucher et.al. 2011, p.457). Local policies are corresponding to the more specific measures. For instance, Copenhagen cycling policy advocates cycling on the city level.

National

Many countries such as Germany (BMVI, 2012) and Ireland (Smart travel, 2008) have developed national cycling plans, strategies and policies. The approach to encourage the cycling share varies among countries. Some countries prefer to have cycling plan apart from other national policies, whereas other countries might include cycling policies to national transport, environment and/or health plans and strategies (ECMT, 2004, p.9). All in all, the examples from successful biking countries such as Denmark and the Netherland show that the national cycling policy framework is a successful tool in advocating cycling equally in all urban areas of the certain country, which also contributes to cycling culture development. In addition, it provides common, integrated starting point and basis to develop and implement transparent cycling policies in different sectors and on all levels of governance. For that it is essential that the national cycling policy framework involves all the relevant stakeholders from different sectors and on different levels (Smart, 2008, p.7). The main purposes of the cycling policy on national level are to set out the necessary legal and regulatory instruments to ensure efficient and safe use of cycle and to support the important projects that improve the cycling infrastructure and the availability of the facilities financially in relation to the country's specific circumstances. In addition, the benefit of developing a national cycling plan is for having a common vision, targets and co-ordinated action and effective collaboration between stakeholders from different sectors and levels of politicians (ECMT, 2004, p.11).

European

International governing organizations (e.g. IMF, OECD, EU and UN) are increasingly spreading ideas, programs and institutions. IGOs are influencing national policy makers through their conditions on the loans and policies directly and indirectly by sharing information and policies in organized conferences and their reports. For instance, EU has various continuous and integral cycle policies of European principals (Fietsberaad, 2009) and other options for knowledge exchange between member states and provides funding streams for multi-national projects. Likely, NGOs are increasing their global influence in policy

making by spreading ideas and information internationally (Dolowitz and Marsh, 2000, pp.6, 11; O'Dolan and Rye, 2012, p. 273). Until the EU Financial period of 2007-2013 only 600 mln EUR was invested for cycling infrastructure from the total 82 bln EUR fund for transport infrastructure, this 0.7 % of funding dedicated previous decade for cycling, which very clearly shows that Europe transport funding policy has favoured less sustainable projects, which in turn stimulates a similar investment policy by the EU Member States. This situation is expected to change during the next funding period because the funding for cycling is increased up to 10 % for the years 2014-2020 (ECF, 2014b, p. 6). In addition, ECF (2014), recommends the Member States to reduce 50 km/h speed limit to 30 km/h in built-up areas (ECF, 2014b, p.8). Apart from informative policy instruments European Union also uses regulative policy instruments in form of directives such as Environmental Noise Directive (2002/49/EC), Air Quality Directive 2008/50/EC, and strategy such as European White Paper 2050.

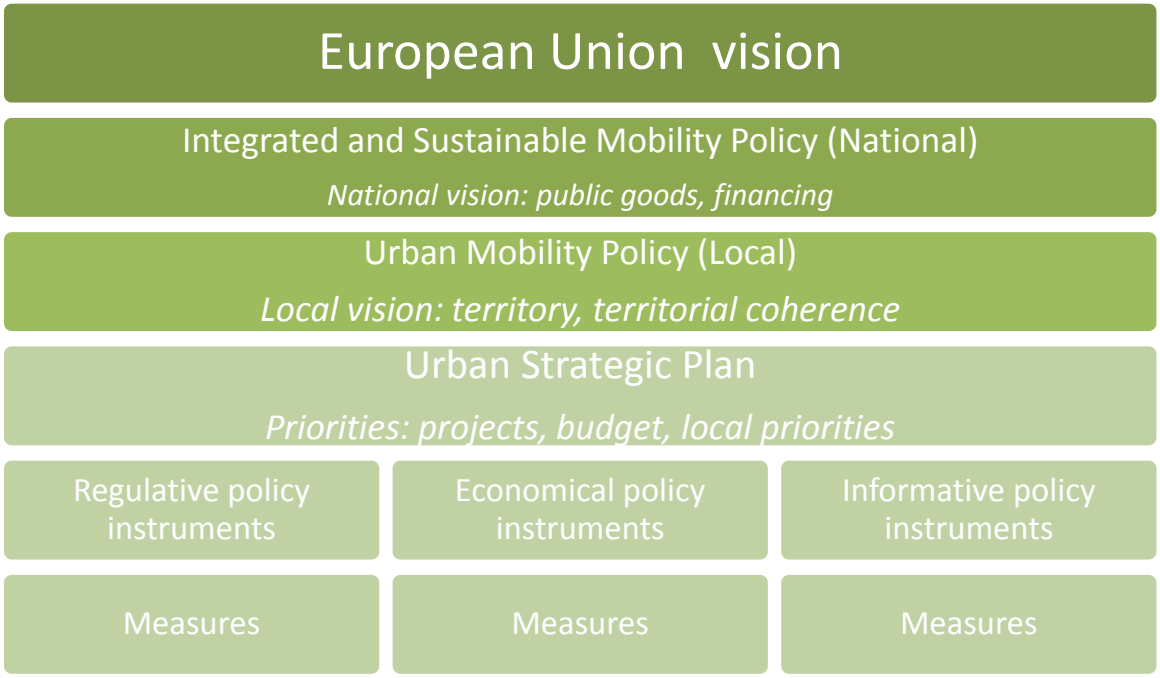


Figure 3-5 Interconnection of policy and strategy on different levels (ISU, 2013, p.6; Champ-cycling, 2014b).

3.5 Examples and lessons from successful new cycling cities

Examples and lessons from other cities can "provide important insights into the conditions that can lead to investments in cycle infrastructure and the adoption of cycle friendly policies" (Handy et.al. 2014, p.16). Studies show that that countries and cities that have safe and high modal share of cycling have done more pro-cycling programmes and developed more extensively the cycling infrastructure and facilities (Table 3-1). Those cities have equally developed the infrastructure (e.g. expansion and improvement of bike lanes and paths), created pro-cycling policies and programmes (e.g. parking reduction, bike-transit integration, bike-sharing, educational programs and promotional campaigns) and improved the cycling safety (e.g. traffic calming, distribution of bike lights)(Pucher et.al. 2011, p.451; PRESTO, 2010). Unlike successful cities with high levels of cycling, the cities and countries with low levels of cycling evidently have done very little or nothing to improve the cycling conditions or encourages people to cycle (Pucher et.al. 2010, p.107). Cycling infrastructure development is gradual and time consuming, therefore, the effort made now, can pay off in years to come (City of Lund, 2005). Taking into account, the successful cycling cities, cycling infrastructure development requires a well-planned strategy or action plan that helps to balance the

maintenance of the already existing strategies and allows better allocation of the resources that enable the building of new infrastructure (Pucher et.al. 2010, p.121-122). For instance, more parking facilities and cycle integration with public transport is a key to a rise in the modal share of cycling (Pucher et.al. 2010, p.115). Taking into consideration the main challenges of urban cycling identified in Chapter 2, based on literature analysis, there are various examples of solutions in new cycling cities, which show the evidence of the feasibility to tackle those issues in the cities (Table 3-1). Examples were chosen through ELTIS (2014) case studies. The best practices from European cities are corresponding to the barriers identified in Chapter 2. Examples are mainly from starter and climber cities except Malmö (Table 3-1). All the examples are aggregated to Table 3-1, where the policy is outlined together with the drivers, soft and hard measures. Finally, the outcome of the policy as a main indicator of the effectiveness and the approximate cost of the policy measures is shown.

Super highways in London

London's infrastructure policy to develop 12 cycle super highways was with the purpose to connect the inner city with the suburbs. Although the policy is infrastructural it also requires informative policy instruments such as cycle parking, training and maintenance, as well as marketing and promotional support to raise driver awareness of cyclists (Transport for London, 2010, p.12). In addition, London uses regulative policy instrument to ensure the cars (and motorbikes) are not allowed to drive or to park on those lanes (Transport for London, 2011, p.14). Although, there are no economic policy instruments that are directly complementing this policy, it is important to note that London introduced congestion charge in 2003 (Transport for London, 2014, p.1) that reduced car use about 16 % (Transport for London, 2008, p.12). In addition it is important to consider that London has Cycle Hire Scheme, with 6000 bikes, 400 special docking stations, and 40 000 cycle trips per day. The driver for such policy is to improve cycling conditions, encourage non-cyclists to take up utility cycling, to reduce air and noise emissions and relieve overcrowding on public transport. The main objective of the policy is to increase cycling share up to 5 %. The expected cost of one super highway is between 10 and 12 mln EUR including cost of all soft measures (Transport for London, 2011, pp.4, 22).

Redesign of Andrássy Avenue in Budapest

Budapest infrastructure policy to redesign the busy central bike path in Andrássy Avenue was with the purpose to provide safer cycling conditions for cyclists (BKK, 2013; Velo City, 2013). The cycle lane is passing through historic centre. The previous cycling lane was inconvenient and dangerous for cyclists due to portioning of road space was particularly dangerous with many complaints. Therefore, the cycle lane was repositioned from between the pavement and parking lane to between the parking lane and road. In addition, the lane was resurfaced and painted red to make it more visible for the car users (Eltis, 2014). Currently, it is monitored that around 1200-1400 bikes are using the improved lane per day (BKK, 2013).Although the policy is infrastructural it also requires informative policy instruments, for instance the new Andrássy Avenue was opened with an event, that had a lot of positive media feedback. In addition, the infrastructure policy required revision of the dangerous intersections based on the peoples' complaints and observation and cyclists monitoring system. Budapest goal is to achieve 10 % of cycling share by 2020 (BKK, 2013; Catch-MR project, 2013). It is likely that such cycle lane requires regulative policy instrument to prevent cars to park and drive on those lines similarly to London's super highways.

Congestion Tax in Stockholm

Stockholm's Congestion Tax, introduced in 2006, is an economic policy instrument to reduce traffic congestion in Stockholm city centre. The annual maintenance cost is around 11 mln

EUR and the net revenue per year is around 55 mln EUR1 (Eliasson et.al, 2006, p.4; Palma and Lindsey, 2011, p.2). Depending on an area it costs car driver up to 6 EUR per day maximum to pass the toll cordons (Swedish Transport Agency, 2014). Congestion Tax is resulting around 21 % trips by car across the cordon is decreased and there are 30-50 % less time in queues (Börjesson, 2012, p.3).Despite it is an economic policy instrument to give incentive for car drivers to change to more sustainable modes of transports, the policy also requires complimenting policy instruments. For example, inclusion of regulative policy instrument that would allow fining the car user who has refused to pay the congestion tax. In addition, it requires infrastructural policy instruments such as implementation of tolls and installation of the optical character recognition technology that reads the car number plate. Informative policy instruments are important to avoid the conflict and misunderstanding of such policy. The price list and the area have to be communicated. Those policy instruments are in addition to reduce car use and raise the awareness of the motorists. In order to promote, there is a need for additional safe infrastructure, promotional campaigns and/ or economic incentives.

"No Ridiculous Car Trips" in Malmö

Malmö's campaign "no ridiculous car trips" is an informative policy instrument with the purpose is to reduce the trips shorter than 5 km made by car. The main drivers are to mitigate both air and noise pollution and reduce traffic congestion after the questionnaire showed that nearly half of the trips in Malmö are made by car. The campaign directly involved the target group by asking them to write about their most ridiculous car trip. The policy is informative and therefore optional for the receiver. The campaign, which included measures such as live billboards, competitions and cyclists' actions, ads, banners, brochures and give-away bike accessories, at a cost of 73 262 EUR. The campaign was overall successful as most of the residents knew about it and 15 000 residents shifted the mode of transport and 21 000 people changed the outlook on car trips. Because the cycling share in Malmö prior to "no ridiculous car trips" was already 23 % then the current policy is suitable for the cities that already have a cycling infrastructure in place even if there are low levels of cycling. For most of the starter cities, the policy also requires infrastructural policy instruments (City of Malmö, 2014; City of Malmö, 2011, Eltis, 2014).

Barrier	City	Policy	Driver	Soft measure	Hard measure	Outcome	Cost (EUR[2])
Mindset	Malmö	Prioritisation of cycling for trips shorter than 5 km	Air and noise pollution and traffic congestion	The campaign included live billboards competitions and cyclists in rush hour traffic The campaign included ads, banners, brochures give-aways		15 000 residents drive less and 21 000 campaign made them change the outlook on car trips	73 262
Infrastructure	London	Development of 12 Cycle Superhighways connecting the London centre	Improve cycle conditions; encourage non-cyclists; reduce traffic congestion; reduce emissions and relieve overcrowding on public transport;	Annual spring marketing campaign to exploit the surge of interest in cycling that comes with the warmer weather; RideLondon Festival; City Hall cycling blog; cycle training, maintenance	Approximately 15km in length infrastructure per highway; painted blue; and parking.	61% of cyclists surveyed said that the blue coloured surfacing made them feel safer and encouraged them to use those roads; and will connect the outer boroughs to inner London	10 000 000-12 000 000/ per highway including supporting measures

[1] The payback time for the start up investment is expected to be around 4 years, which costs around 60 EUR per Stockholmer for 4 years and after would change as benefit (Eliasson, 2006, p.4; Palma and Lindsey, 2009,p.2).

[2] The currency is converted where needed to EUR (GoogleConverter, 2014).

Barrier	City	Policy	Driver	Soft measure	Hard measure	Outcome	Cost (EUR[2])
Safety	Budapest	Redesigned central Budapest bike path in Andrássy Avenue to provide safer cycling	Inconveniences and dangerous situations for cyclists due to partitioning of road space	The new cycle lane was opened with a promotional event.	2.5 km cycle lanes were moved, resurfacing the tarmac and painted red	The modal split of cycling in Budapest keeps increasing (target is 10 % by 2020)	167 500 (~67 000 per km [3])
Security	Tartu	Promote anti-bicycle theft by promoting secure parking facilities, locks and awareness raising activities	Reduce the bicycle thefts and resulting economic loss for individuals	Registration of the stolen bikes and identification of areas with risk of theft; competitions flyers and posters explaining how to lock the cycle; give-aways (helmets; locks)	Free of charge parking facilities;	63 % of decrease in bicycle thefts in Tartu	Vary depending on the cycle rack (e.g. open or with shelter)
Climate and topography	Oulu	Oulu is promoting winter cycling	Finland is inside the Arctic Circle and has 170 thermal winter and 150 snow days in a year.	Winter Cycling Congress	Maintenance of the bicycle infrastructure	An average cycling share per year is 22 %	Vary depending on the method used
Communication	Munich	City's intention to be and to remain Germany's most bicycle-friendly city	to make an important contribution to improving the safety of cycling by increasing cycling	A bicycle safety check; fashion shows; film festival; competitions; photo shoot; school activities modifying landmarks with cycling emblems		The cycling share rose 7 % from 2002-2012.	0.7 EUR per resident per year
	Stockholm[4]	Congestion charge	To reduce traffic congestion, air and noise pollution	The cost of entering the city centre vary depending on the hour from 1 EUR – 6 EUR maximum per day	System consists of a toll cordon around the inner city; automatic photograph of number plate being taken by Optical Character Recognition technology; signs	21 % trips by car across the cordon decreased; 30-50% less time in queues;	10 889 420 maintenance cost per year/ 206 898 973 investment and start-up cost/ 70 781 228 revenue per year[5]

Table 3-2 Examples and lessons from successful new cycling cities

Tartu Anti-bike theft campaign

Tartu's bicycle anti-theft informative policy purpose was to promote anti-bicycle theft by promoting secure parking facilities, locks and awareness raising activities. The policy was implemented based on the data from police about the bike thefts. The campaign managed to reduce 63 % of the bike thefts in Tartu (Eltis, 2014). Although, it is informative policy measure; it also required infrastructure measures in order to provide the cycle parking. In addition, the policy shows a good collaboration with police, local cycle shops and the primary stakeholders were involved directly in policy improvement process (City of Tartu, 2014; Politsei, 2014; Eltis, 2014).

Winter cycling promotion in Oulu

Oulu's policy is to promote the winter cycling. It is an informative policy instrument, which promotes the annual Winter Cycling Congress. Oulu is currently capital of winter cycling with

[3] Cycle lane construction costs approximately 67 000 EUR per km (City of Copenhagen, 2014).

[4] Stockholm Congestion Tax is economic policy instrument, thus cannot be marked as legislation as in Chapter 2, despite it is used as an example both in Chapter 3 and 5.

[5] The payback time for the start up investment is expected to be around 4 years, which costs around 60 EUR per Stockholmer for 4 years and after would change as benefit (Eliasson, 2006, p.4; Palma and Lindsey, 2009,p.2).

modal split of cycling around 22 % (based on average thermal winter and snow days). Even though, Oulu is using informative policy instrument and promotes the winter cycling, then the complementary infrastructure policy instrument is required especially because of the snow clearance. The policy may require additional economic policy instrument to give an incentive for cyclists. For example, tax benefits from the snow tyres or the subsidized equipment (ibikeoulu, 2013, 2014; Eltis, 2014; City of Oulu, 2014).

Cycling capital campaign in Munich

Cycling capital campaign in Munich is an informative policy instrument with the goal to be/remain the most bicycling friendly city in Germany. The campaign costs around 1 mln EUR. The main aim of the policy is to also contribute to cycling safety improvement through increased cycling. The idea is to get more people to cycle and the main message is "Just get on your bike and move off!" The policy instrument involves several measures such as bicycle safety check; fashion show; film festival; competitions; photo shoot and school activities, bicycle exchange markets; bike exhibitions; event calendar; and modification of landmarks with cycling emblems that help to advocate cycling in Munich. The cycle share increased from 10 % in 2000 up to 17 % in 2012 (Eltis, 2014). Considering that the annual cycling budget of 10 mln EUR is allocated 95 % for infrastructure efforts and the remaining 5 % for promotional efforts, the policy requires a complementary infrastructure policy instrument. In addition, the car lanes reduction and space allocation for cyclists in areas with lack of space in Munich has also required regulations (Landeshauptstadt München, 2010; Radlhauptstadt, 2014).

3.6 Policy transfer

The policy makers wishing to develop cycling policy should first identify the barriers to cycling and then analyse the potential trade-offs and solutions to those barriers before looking for an answer from the other countries (Handy et.al. 2014, p.15). In addition, it is important to understand the social and political forces that have the car dominant in society, before attempting to understand the possibilities for moving further with sustainable mobility management (Castillo-Manzano et.al. 2013, p.1012). Although policy-makers often move forward without solid evidence as to the likely effectiveness and possible benefits of proposed strategies, an evidence-based approach can help to avoid waste of limited resources as well as failures that would reduce public support. Investments in cycling research can pay off by providing a basis for identifying the most effective strategies for increasing cycling and providing more accurate estimates of the benefits that could be gained. There is enough evidence of the existing policies that they make a difference (Pucher et.al. 2010, p.122; Tuominena and Himanen, 2007; Table 3-1).

The same policy or program that perfectly works abroad can have a totally different impact on cycling in other contexts. Thus policy makers have to be careful when generalising about the effectiveness of any individual measures abroad (Pucher et.al. 2010, p.121; Handy et.al. 2014, p.15). Therefore, policy evaluation is essential process to prevent inaccurate assessment of nature of certain policies and the way they operate in the exporting political system, which usually results incomplete policy transfer to the policy importing country (Dolowitz and Marsh, 2000, p.14; Mickwitz, 2003, p.432). In addition, transferring cycling policy from another country, it is important to recognize already existing policies in the policy importing country in order to prevent the conflict between the new and old policies (Dolowitz and Marsh, 2000, p.21; Mickwitz, 2003, p.430). Thus, learning from others starts with the process of scanning the different effective programmes elsewhere and ends with conventional policy evaluation together with assumptions of effectiveness of the certain policy after it has been transferred to another country (Dolowitz and Marsh, 2000, p.14).

Policy transfer is not "an all-or-nothing process" (Dolowitz and Marsh, 2000, p.12), policy transfer has to be a very carefully planned process and ideally should include citizen input (Pucher et.al. 2010, p.122). There are identified four different ways for policy transfer those are copying, emulation, combinations, and inspiration. Copying the policy refers to the direct one-to-one transfer. Emulation means that the ideas behind the policy are transferred only. The third way of transferring the policy is to combine the several different policies to have a right mix of policies. Inspiration is a transfer of the idea that inspire policy change but where the outcome can be slightly different from the original policy (Dolowitz and Marsh, 2000, p.13). By applying the policy from one setting to another is allowing the policy makers to prevent the mistakes that have been made (O'Dolan and Rye, 2012, p. 273). But if it is done in hurry it can lose the main purpose and work against the system. For example, there are considered to be three common mistakes when transferring the policies, which are uninformed transfer, incomplete transfer and inappropriate transfer. The uninformed transfer refers to the policy take over without the sufficient information about the policy and institutions and the way it is operated in the country, region or city from which it is transferred. Incomplete transfer means that there is a lack of crucial elements, which made the policy or institutional structure work in the originating country. Inappropriate transfer is not taking into account the economic, social, political and ideological differences when borrowing the policy from another country (Dolowitz and Marsh, 2000, p.17).

Even though it is essential to learn from one another, it does not necessarily mean that transferring policies from other countries is the sole opportunity to develop the policies (Dolowitz and Marsh, 2000, p.21). Overall, it is important to take into account and consider the motivations behind the policy transfer, in order to fully understand the necessity for a particular transfer (Dolowitz and Marsh, 2000, p.8, 16). In order to understand the process of policy transfer there are seven key questions developed by Dolowitz and Marsh (2000) that should be answered and understood. First, it is important to understand how the key stakeholders are engaged with the policy transfer. Thus, it should be identified whether policy transfer is coercive or voluntary and to estimate the possible impacts of the transfer. Second, all the involved actors should be identified together with information about the profession and organization. Third, to describe what is transferred including policy content, goals, policy programmes, ideas, attitudes and also lessons learned. Fourth, to identify the origin of the policy and lessons learned whether they are locally, nationally, or internationally sourced policies. Fifth, is to make sure the degree of transfer whether it is copying, combination or inspiration. Sixth, to identify the factors those restrict or facilitate the policy transfer. Finally, to evaluate how successful the certain policy transfer was (Dolowitz and Marsh, 2000, p.8; O'Dolan and Rye, 2012, p. 273).

Another way to distinguish the policy transfer is whether it is lesson-drawing, voluntary or coercive transfer (Figure 3-6).

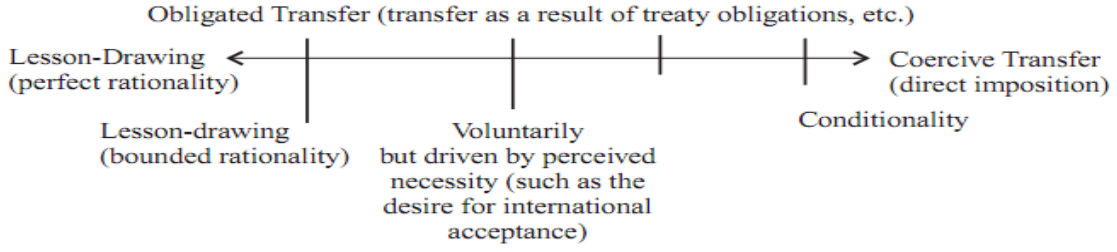


Figure 3-6 Lesson-drawing, voluntary or coercive transfers (Dolowitz and Marsh, 2000, p.13).

In order to understand where the policy falls in the scale it is important to identify all the key actors. According to Dolowitz and Marsh (2000), there are nine key categories of political actors involved in the policy transfer process and those are political parties, elected officials, civil servants, pressure groups, policy entrepreneurs, consultants and nongovernmental institutions. Also, it is clear that policy makers in order to develop any sort of policy are relying on the advice of the experts in field whose task is to help to develop programs, policies and manage institutional structures. Furthermore, international organizations (e.g. IMF and the World Bank) usually require consultants to be hired for certain projects and plans (Dolowitz and Marsh, 2000, pp.10, 16). It also depends on the timing of the policy transfer. There are certain social, political and economic aspects such as political elections, economic crisis and other influences that have an impact on the nature of the policy transfer (Dolowitz and Marsh, 2000, p.17).

3.7 Policy evaluation

Policy evaluation cannot resolve all the uncertainties and to what extent the evaluated polices can have in cycling development. Rather, policy evaluation is "a learning process that can contribute to improving the choices and implementation of policy instruments [...] by bringing forward new aspects and explanations of observed outcomes" (Mickwitz, 2003, p. 433). Taking into account the policy cycle (Figure 0-6), the policy set-up starts with agenda-setting and problem definition, policy formulation, decision and adaptation of policy, following with policy implementation and finally policy evaluation. Policy evaluation is divided into ex-ante evaluation and ex-post impact assessment. Policy evaluation is necessary prior to cycling policy agenda setting (Mickwitz, 2003, p.430). It is important to look at the bigger picture when evaluating the policies because different cycling policies can result from national strategies and legislation, or form part of the local policy package to achieve certain goals. In addition, it is beneficial to understand why certain policy instruments and measures are used and what they are based on, what are the drivers for the certain policy, is it voluntary or coercive policy in the policy-exporting city (Mickwitz, 2003, pp.422-423).

In order to evaluate the effectiveness of the policy it is essential for the public organizations to gather data (i.e. measure cycling) before and after implementing interventions on cycling (Pucher et.al. 2010, p.122). Some policy makers are in favour of CBA because it accurately matches to the practical process of specific policy implementation for municipalities and other governing organisations in order to justify budget spending (Weber, 2014, p.132). CBA allows "calculating all the effects and all the costs in the same unit – money – it is easy to develop very clear decision rules [...and] the procedure makes explicit assumptions and judgements that are often otherwise only implicit" (Mickwitz, 2003, p.426). Despite CBA, it is important to see the hidden costs and benefits that cannot be measured in money. For instance, the economic benefits of cycling are obvious and should not be questionable if they are worth to invest, perhaps only specific instruments are maybe too expensive for certain cities. Although problems involved with economic criteria in evaluating problems does not mean it should be excluded, at this point it is important to consider also the three pillars of the 'sound' policies, which are effectiveness, efficiency, and equity of cycling (Handy et.al. 2014, p.15; Mickwitz, 2003, p.247). When it comes to the cycling policies, multiple streams framework (MSF) would be more suitable for understanding decision making by also considering the behavior, the implementation of policies and projects, the conditions needed for policy change, non-economic and non-quantitative variables that all affect policy. MSF is based on three independent concepts problems, policy solutions, and politics (Weber, 2014, pp.132-133). In addition, the cycling policy evaluation, because it has several economic, environmental and social benefits (Chapter 2), should consider the legal legitimacy and stakeholder acceptance to

justify the need for certain policy instruments are used. The evaluation should use democracy related criteria that consists of legitimacy, transparency, and equity (Mickwitz, 2003, p.247).

3.8 Policy intervention

"Decision-making is a rational or bounded rational process of weighing options and trade-offs to maximize positive and minimize negative outcomes" (Weber, 2014, p.132). Policy intervention is not a description of how the certain policy instrument works but rather a theory that describes how the policy has been implemented and what effect it has had in practice or how the policy is intended to be implemented together with the function of the policy, where the policy intervention itself is based on expectations (Mickwitz, 2003, p.424). Policy interventions include decision-making entities such as authorities, companies, non-governmental organizations, and individuals that are the main target group when it comes to cycling. Furthermore, it is important to identify the policy's input, outputs and outcomes. Policy input is the resources such as labour and finances in order to produce outputs. Policy output is the intended effect of certain policy instrument for instance speed limit on a certain street. The outcome of the policy is the consequence of the policy output for instance if the law has been violated there will be punishment and calmed traffic in the certain street to increase cycling safety (Mickwitz, 2003, p.424). Policy intervention theory is important because it helps to establish the intended effects of the policy instruments and determine the target area for each instrument. In addition, policy intervention facilitates the collection of required data on inputs, outputs, and outcomes. However, some aspects can be based on scientific evidence for instance level of noise and air pollution in order to measure the effectiveness of the policy outcome. In addition, taking into account the sequence of cycling initiatives, there are three phases starter, climber and champion cities that could be considered as quantitative data to measure the effectiveness of the policy instruments in achieving certain levels of cycling share. Intervention theory enables assessment without quantitative data by simply comparing the logic to "intervention theories of other possible instruments and research findings from other instances" (Mickwitz, 2003, pp.424-425). Even if the main focus of the evaluation is concentrating on specific policy instruments, their effects cannot be considered without taking into account other policy instruments and due to the complexity of barriers to cycling, the external factors such as such as economical, demographical (e.g. population density), climate (e.g. an average temperature and precipitation), and the modal split (e.g. public transport modal share) that can affect the outcome of the policy. In addition, cycling policies are also affected by the market signals and technological development for instance electric cars also mitigate air pollution (Mickwitz, 2003, pp.425; 429). Another part of policy intervention is the valuation of the outcome, for instance how much are the car drivers willing to accept that the road space is reduced and allocated for cyclists. On the other hand, how much would the car drivers pay to have reduced noise levels and better air quality in the cities they live (Mickwitz, 2003, p.427).

4 Cycling in Tallinn

4.1 Current situation in Tallinn

Tallinn is a starter city, where the current share of cycling in Tallinn is only 1 % (Tallinn, 2013b, p.14;Figure 4-2), some sources give 4 % (TTÜ, 2012, p.10; EPOMM, 2014; Figure 4-5) The variation may depend on the climate in winter, which means there are slightly more cyclist during the summer months (TTÜ, 2012). The situation in Tallinn is in reverse to the "cake wedges"[6] implemented in Netherlands that made it impossible for cars to pass from one are to another through city centre and instead gave an accessibility advantage for cyclists (Fietsberaad, 2009, p.18). Tallinn does not have a cycling strategy, but cycling has been mentioned in various strategies. Bicycle Policy Audit [7](BYPAD) that assesses 9 modules (Table 4-1) essential for balanced cycling policy was carried out in 2009 in Tallinn. According to BYPAD levels those are ad-hoc oriented approach (level 1), isolated approach (level 2=50%), system-oriented-approach (level 3= 75%), and integrated approach (level 4= 100%) (BYPAD, 2014), Tallinn scored 40.6 %, which is level 1.6 according to level categorization (Figure 4-1). That refers to the cycling policy, which has not been integrated with other policies, that and is on a low quality level due to low and irregular investments and limited knowledge of the users' needs and "know how" among the key stakeholders (BYPAD, 2008, p.11; Lepik, 2007).

.

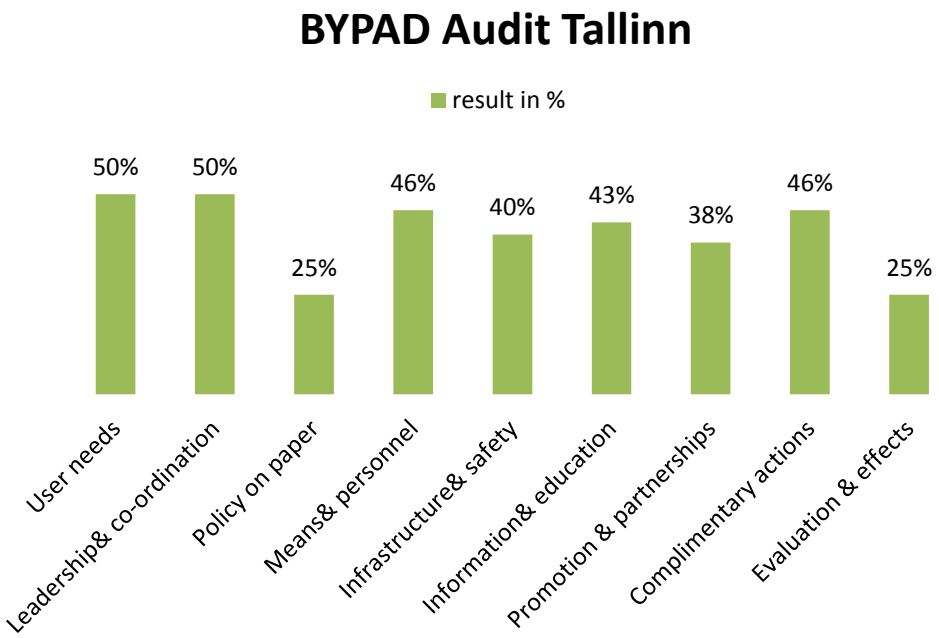


Figure 4-1 BYPAD Audit in Tallinn (Lepik, 2007; BYPAD, 2008).

Potential for utility cycling

BYPAD Audit confirms that there is unused cycling potential in Tallinn, where there is a very good geographical setting for cycling such as wide roads, flat surface and relatively short distances between the residential areas and working places. The surface of Tallinn is about 160

6 "Cake wedges": inner city division into sectors where passing from one sector to another is impossible through the city centre for cars but possible for cyclists(Fietsberaad, 2009, p.18).

7 BYPAD Audit is "based on international Best Practice methods and provides an overview of the applied measures and structures in local cycling policy" (BYPAD, 2014).

km^2 (Tallinn, 2011) and there are ca. 430 000 inhabitants (Tallinn, 2014c), which gives the population density of around 2711 people per km^2. Which is alike to cities such as Bern with population density of 2590 people per km^2 (Swiss world, 2014) and with 15 % share of cycling (Copenhagenize, 2014a) and Helsinki with population density of 2800 people per km^2 (City of Helsinki, 2012, p.4) and with 11 % share of cycling (City of Helsinki 2014) that have already achieved the substantial level of utility cycling in their cities. Thus in Tallinn where about 24 % of citizens live up to 2 km away, and 10 % of citizens 2-4 km away from their working places, which is within walking or cycling distance for around 35 % of the citizens (Stat, 2014c) it is very positive basis for encouraging the level of cycling. However, due to urban sprawl, many people often commute to work, school or other purposes to Tallinn centre by car (Ahas and Silm, 2006, p.31), which means there are need for regional cooperation and development of an integrated transport system that includes cycling and public transport is additionally needed and somewhat exists already. It is expected that the cycling share in transportation could reach up to 10 % and considering the assumptions in knowledge based scenario[8], there could be 75000 people who are regularly walk or cycle in 200 days a year 10 km an average per day in Tallinn (Jüssi and Rannala, 2014,p.27).

4.2 Drivers in Tallinn

Most of those drivers outlined in Chapter 2 are more general reasons why modal shift in cities is important and a necessity. Drivers such as lack of space in the city, resulting traffic congestion and in turn causes air and noise pollution and energy inefficiency are also relevant in Tallinn. In addition, road maintenance and building costs are taking up approximately 33 % of the city's budget annually (Tallinn, 2014o). Apart from those drivers, Tallinn also have goal to become European Green Capital (EGCA)[9]in 2018 and more attractive city (Uustal et.al. 2013, p.9; EC, 2014f). The unused potential of utility cycling could be one solution and driver that helps Tallinn to achieve this Award but in order Tallinn to be eligible to apply for the EGCA in 2018, there is a need to lower the car share in modal split and increase the cycling and walking. In case Tallinn would not be elected as a Green Capital in 2018, it can help to enhance the reputation of Tallinn. All drivers for utility cycling are explained in Tallinn context and are based on the existing scientific research conducted in Estonia.

Traffic congestion

Tallinn streets are mostly with speed limit of 50 km/h. An average speed during the rush hour in the city centre has decreased from 20, 4 km/ h in 2003 to 14, 8 km/ h in 2007. Near the city centre an average speed is approximately 23, 9 km/h and in suburbs it is 35, 6 km/h, which means that more than 60 % of the journey in the city centre during the peak hours in the morning, afternoon and evening the average speed is less than 15 km/h, which also affects the public transport despite the public transport lanes (Stratum, 2009, p.8). Traffic congestion is causing air and noise pollution and also it is not energy efficient (Figure 4-2).

Energy efficiency

The total CO_2 emissions in Tallinn' transport sector were 620 362 t, where only 8. 3 % is due to public transport and in total it is 1.55 t per resident and 0.5 t per car (Hendrikson & Ko,

[8] In order to estimate the future energy consumption and efficiency in transport sector, Arengufond8 in collaboration with Stockholm Environmental Institute in Tallinn have developed three future energy efficiency scenarios for Estonia. Those scenarios are business-as-usual (BAU), low-interference (LI), and knowledge-based (KB) scenarios. The BAU scenario does not require any restrictions on emissions and the use of energy in transport sector. The LI scenario has set partially expected transport measures to reduce energy consumption. The KB scenario requires a set of requirements that are proved to improve the long term energy efficiency in transport sector (Energiatalgud, 2014; Jüssi and Rannala, 2014; Jüssi et.al. 2014).

9 European Green Capital. The European Green Capital Award (EGCA) is given out to the city that has good environmental achievements, is committed to reach ambitious goals goes beyond the compliance and can act as a role model to inspire other cities with its best practices (EC, 2014f).

2011, p.40). Transport sector forms around 25 % (of which 94 % is due to car use) of the energy consumption in Estonia and the allowed EU 11 % of increase in GHG emissions "growth limit" up to 2020 has already been exceeded in transport sector in Estonia before year 2014 (Jüssi and Sarv, 2011, p.1) (Figure 1-1). In Harju County (Tallinn region) the registered cars emit an average of 185 CO_2 g/ km, and there are more than 51 % of E-G energy class cars in Estonia, most of them are registered in Harju County (Jüssi et.al, 2010).

Air pollution

Air pollution is mainly due to transport in Tallinn (Tallinna Keskkonnaamet, 2012, p.50). According to Central Lab (2010) Air Pollution Management Plan for Tallinn, the car use should be reduced and alternative modes such as public transport, walking and cycling should be prioritised (Central Lab, 2010, p.111). An average reduction of the life expectancy resulted of air pollution is 5 month and more than 8.6 month in Tallinn. There are around 600 (296 in Tallinn) premature deaths and overall 8312(3859 in Tallinn) deaths per year in Estonia. Compared to other European countries, PM emission (Figure 0-3) is higher in Estonia (and Tallinn) and is causing an average 312 respiratory and 555 (229 in Tallinn) cardiovascular health issues per year. The socio economical loss was around 378 mln EUR in 2009, which was 2.7% of the GDP and the highest was in Harju County (Tallinn region), where 38, 5 mln EUR per 100 000 people was lost. In Tallinn the health care cost has raised from 291 306 EUR in 2007 to 620 000 EUR in 2011 (Orru, 2011, p.51; Orru, 2007, pp. 49, 53-54; Jüssi et.al, 2010, p.7).

Noise pollution

The noise pollution resulted from cars is in most places over the normal limit of 55 dB (WHO, 2014a; KIK, 2010) especially near the densely populated areas forming all together around 43 % of Tallinn area and affecting around 67 % of the residents (KIK, 2012). There are currently 41 kindergarten, 30 educational institutions, and 16 hospitals and nurseries affected by the noise pollution in Tallinn (Akukon, 2012, pp.1-11; Tallinna Keskkonnaamet, 2012, p.52). In addition, a lot of residential buildings are situated in areas with noise levels higher than 55 dB (Figure 0-4). So far the solutions suggested and changes made are road improvements with the use of materials that reduce noise but cycling has not been used as solution but it is mentioned in Noise Management Plan 2014-2018 for Tallinn (ELLE, Keskkonnaamet, KIK, 2013).

Lack of space in the city

The car ownership in Estonia has risen significantly since 2000. Families having more than one car have risen 8.5 % from 2000 till 2006 (Uljas, 2006, p.58). As of August 2014, there are 173 529 cars registered in Tallinn, which is 16532 cars more compared to year 2004 August (Maanteamet, 2014). Considering the space one car requires (Chapter 2) is 120m^2, it is around 21 km^2 is alone taken up by cars that are registered in Tallinn, which is around 33 % of Tallinn's surface. In addition, there are only around 11 km^2 roads of those 6.6 km^2 have asphalt and 1.7 km^2 parking places (Tallinn, 2010). Since 2003 as seen from Figure 4-2, car use for going to work has risen significantly, at the same time the use of public transport and walking have decreased. In 2001 there were 49 300 people going to work by car, in 2012 70 000 people are going to work by car (Stat, 2013). Most of the Tallinn residents (Stat, 2014d) and additional 36 % of residents from the new development areas outside Tallinn are working (and studying) in the city centre (Ahas and Silm, 2006, p.39). Of course, whilst not all the cars are driving at the same time they still require at least 2 parking places, one at home and the other near the destination (e.g. working place, shop, school). Currently there are 84 private parking lots and 44 city parking lots in Tallinn, excluding the companies', shopping centres' and institutions' own parking lots (Europark, 2014; Parkimine, 2014). According to the recent

news, there were 81 new parking places built in one of the Tallinn districts that cover 2 610 m^2 of asphalt pavement with a total value of 120 000 EUR (Postimees, 2014a). Apart from cars there are also tramway, trolleybuses, and buses that are using the limited city space.

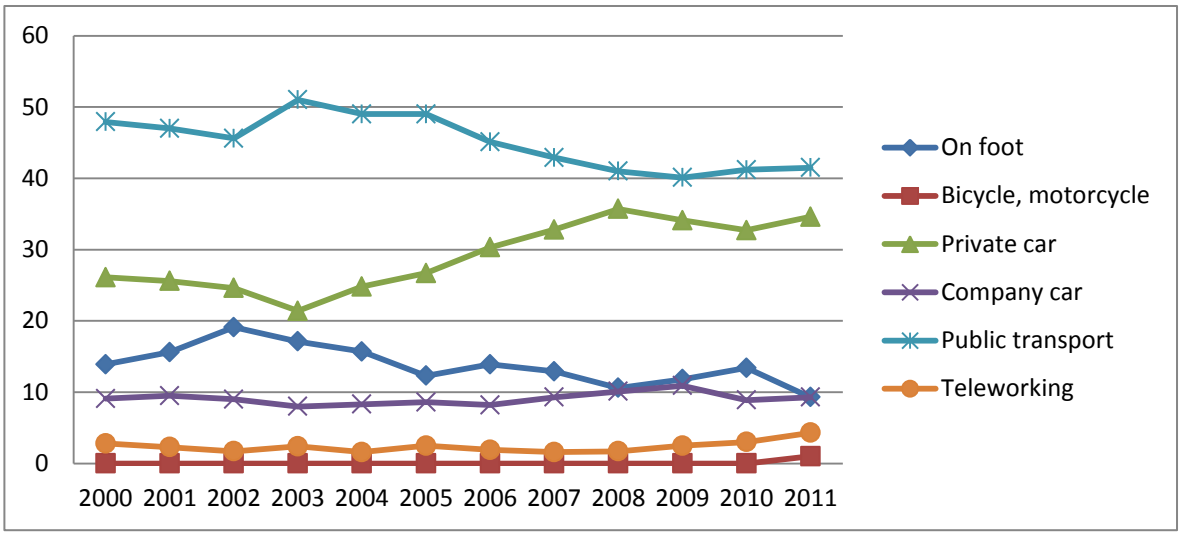


Figure 4-2 The main way of going to work (Stat, 2013).

Road maintenance and building costs

The overall surface of Tallinn roads is 10 758 566 m^2 (in 2010) of which 6.6.km^2 has tarmac road cover (Tallinn, 2010).There is an inequality of the road space allocated in Tallinn for car users and for bicyclists, where there is 1030 km of roads (of which 17.4 km are allocated for public transport) and 227 km of cycling paths most shared with pedestrians (Appendix I; Riigiteataja, 2013, p.60; Tallinn, 2013b).

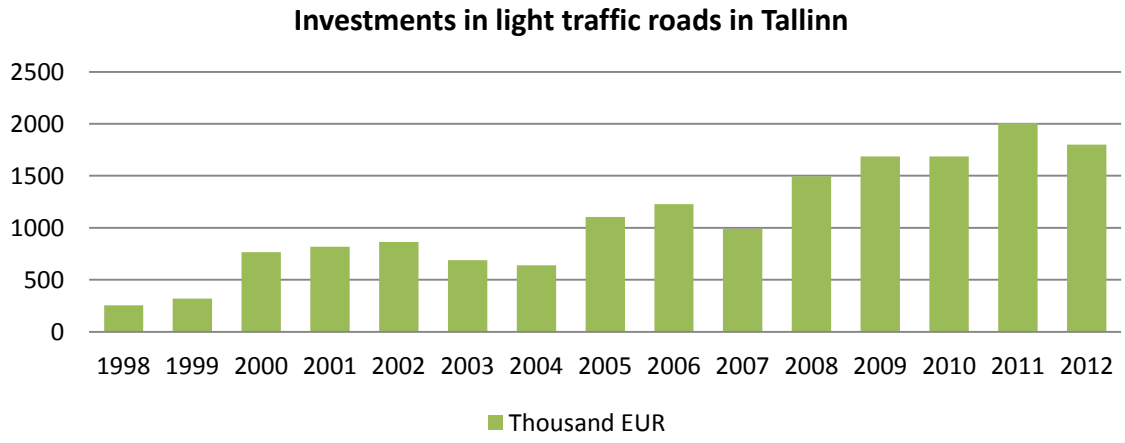


Figure 4-3 Investments in roads in Tallinn (Tallinn, 2012).

Despite this, the City of Tallinn investments for construction of non-motorized traffic over the years has increased from about ~0.3 mln EUR[10] in 1998 up to ~2.3 mln EUR[11] in 2011 (Tallinn 2012; Figure 4-3; Figure 4-4). In comparison the annual total investments for the road

[10] Converted from EEK to EUR via Currency Conventer (Google Conventer, 2014).

[11] Converted from EEK to EUR via Currency Conventer (Google Conventer, 2014).

maintenance is 43 mln EUR, which means the investments for roads were 95% of the whole infrastructure construction and maintenance budget and (Tallinn, 2013c). The estimated cost of developing a infrastructure is 14 mln EUR per year, with assumption that 20 % of the local authority's road maintenance budget is allocated to the investments in and the maintenance of infrastructure and 20 % of the investments are coming from the national road budget. The savings from the cycling and walking are expected to be 180 million Euros, which makes it 1, 2 €/km (Jüssi and Rannala, 2014, pp.13, 27). According to the European Cohesion Policy, Estonia is considered among the less developed regions in Europe, which together with other such regions, mostly in Eastern Europe, covers 27% of the EU population and receives an estimated 182 billion EUR for investments (EC, 2014d).

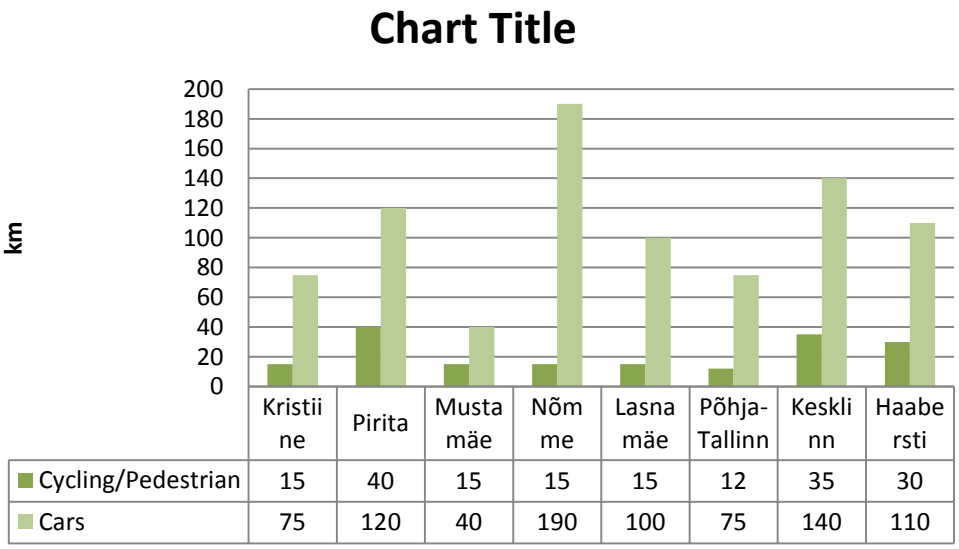


Figure 4-4 Estimated ratio of non-motorized traffic and motorized traffic by districts (Tallinn, 2011).

4.3 Barriers in Tallinn

Barriers commonly stated in Chapter 2 are mostly overlapping the barriers observed in Estonia. Based on already existing studies and statistics that include cycling such as Estonian Labour Force Survey by Statistical Office; Harju County Public Transport Study by Stratum Ltd. and preliminary analysis for CIVITAS MIMOSA Project in 2009, Tallinn Cycling Strategy Phase I (TTÜ, 2012, p.17), Endomondo Cycling Challenge data and Transport, Environment and Quality of Life in Tallinn research (Uljas, 2007& TTÜ, 2012), the barriers are indirectly institutional management (especially public sector), other development priorities with conditioned economical shortcomings Tallinn's spatial structure (area and population density), and lack of space in the city centre to make the bike lanes overarching. In addition, the barriers that directly affect the levels of cycling such as lack of facilities (safe cycle parks, air pumps), and similarly to literature review (Chapter 2) peoples' mindsets, safety, unsafe cycling infrastructure with bad network connectivity, and climate (low temperature and snow fall during the winter) (Pealinn, 2014; Uljas, 2007; TTÜ, 2012).Legislation is explained in part 4.4.

Infrastructure

As of 2012, there were 211, 7 km of bike lanes built in Tallinn (Tallinn, 2012), which were gradually developed from 1998-2012 (Tallinn, 2014b) and forming of 62 % of the total cycling infrastructure in Estonia (MKM, 2013, p.16). Of which, 167.9 km were separate light roads and 43.8 km of bike lanes were marked on the traffic roads (Tallinn, 2012). Most of the lanes marked on the roads are located in the city centre by the roads without protecting barriers and

with speed limit between 50-70 km/h (Appendix II). Apart from roads there are separate bus lanes (17, 4 km), which give the priority to the public transport, marked in Tallinn (ERR, 2014g; Tallinn, 2014).During 2013, there were additional 8.21 km new cycling lanes created in Tallinn (Tallinn, 2014, p.18). According to Tallinn Development Plan 2014-2020, there is plan to build 15 km of both roads and light roads (Tallinn, 2013b; Riigiteataja, 2013, p.60). In addition, there is a standby plan to enlarge already existing public transport bus lanes and share them with cyclists (ERR, 2014c) but it requires avoidance of conflict between the two sustainable modes of mobility, and a good communication between the cyclists and public transport drivers is needed in order to prevent accidents (Appendix I).

The existing cycling infrastructure requires regular maintenance but there is no certain amount of funding allocated to that purposes every year (Figure 4-3), with the result that the quality of infrastructure varies (Appendix II). Although cycling infrastructure requires much less finances than roads, it has been under-financed in many local authorities including in Tallinn (Jüssi and Rannala, 2014, p.20). Usually walking and cycling are considered as one in the places where the share of cycling is very low (Martens, 2004, p.282). It is likely that there is no clear division between leisure and transport cycling in Tallinn, which means the bike lanes are all considered under one category in strategies and plans (Tallinn, 2014), which gives relatively high result of 12% for Tallinn in 2013 (Stat, 2014c). The shared cycling and pedestrians' paths are largely because most of the urban space was planned during the Soviet Union and thus, did not concentrate on cycling and was mainly based on public transport (Appendix I).

According to the survey carried out by Tallinn Technical University (2012), 75 % of men and 80 % of women find that there is not enough cycling infrastructure and more than 90 % of cyclists find that the cycling infrastructure network is intermittent in Tallinn (TTÜ, 2012, pp.38-39). According to Pucher (2011), the cycling rates are usually higher in older, gentrifying neighbourhoods near the city centre and are usually located within close cycling distance of important institutions and places. Thus, the share of cycling in the city centre compared to suburbs is much higher (Pucher et.al. 2011, p. 461-462). It is likely that in Tallinn people from residential areas surrounding the old town use cycle more as a mode of transport than the citizens from suburbs. Most of the high quality cycling infrastructure is built outside the city centre and is rather for the leisure purposes than for getting from point A to point B. In addition, those roads are of very good quality with lights and well-marked asphalt, in order to use those paths, ironically people use their car to get there and back or they struggle to ride a bike in a busy traffic and cope with bad road conditions (Appendix I, 2). Despite this, most of the working places that are located in the outskirts of Tallinn or near the capital city are easily accessible by cycle (Appendix II) because the conditions for cycling are much better outside the city centre in the new development areas. On the one hand, it is because the cycle infrastructure is considered during the road repair or new roads development. On the other hand, those developments have considered the requirements for the cycling tracks such as passing behind the public transport stop and lower or no curbs that prevent the smooth cycling in areas with old street design (Appendix II). Overall, Tallinn is missing a comfortable and safe cycling infrastructure network and it does not allow cyclists to cross the city centre smoothly.

Mindset

It is important to understand the social and political forces that have made the car so dominant in society, before attempting to understand the possibilities for moving further with sustainable mobility management (Castillo-Manzano et.al. 2013, p.1012). Whilst in most of the Western European countries there was a car boom already in 1950-60s in Estonia and other Eastern European countries the people did not have a change to owning a car easily or the

luxury brands in this period. Thus, now after the second independence in 1991, it took people a decade to grow the economy, which nowadays also allows many to own a car (MKM, 2013, p.21). However, it is still extremely important, which car you own the richer you are. Today, the car is 30 % cheaper than it was during the millennium period (Jüssi et.al, 2010, p.8). In 2000, around 51.6 % of people did not have a car, this number decreased to 38.5 % in 2006, when additionally 14.1 % wanted to buy a car and 22.1 % wanted to change their car for a new one (Uljas, 2007, p.58). Despite this people who cannot afford expensive cars buy old, used and not very environmentally sound vehicles but the attitude and mindset is satisfied. On average the younger the person the better views and acceptance level he has on alternative modes on transport. Unlike in Estonia, where cycling is a lifestyle that at the moment has more of "hipster" sound, which brands in this period, then, the number of young people owning a car in Western Europe has started to decrease because the trend is not to own a nice car and come to work from far but to live close and go to work by bike (Appendix I). Although, at the expense of buying a more expensive property in the centre or near the city centre it would be logical not to own a private car. It requires time for people to change their mindset in Tallinn. However, there are certainly more cyclists in the urban space than there were a decade ago. In addition, they have become more visible for the rest of the traffic, which is also essential for the motorists to change their mindsets and drive more carefully (Chapter 2) (Appendix I; Maanteamet, 2014).

Safety

Personal safety

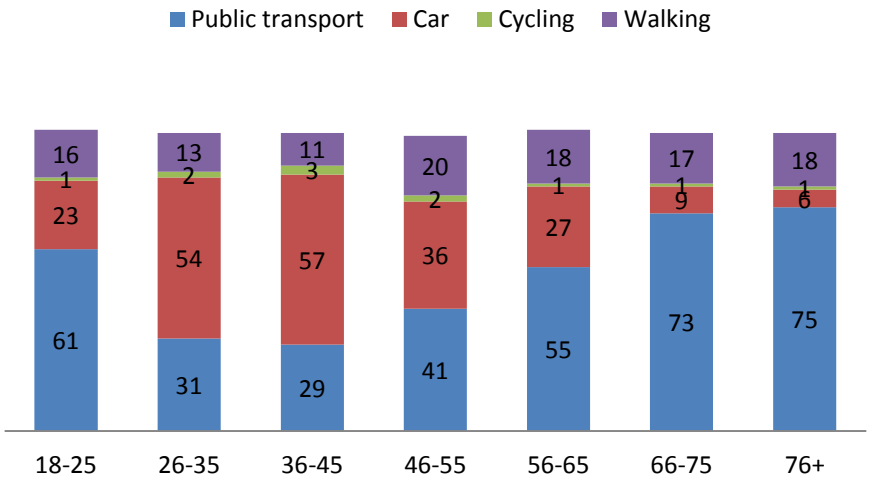


Figure 4-5 Use of different modes of transport by age groups (TTÜ, 2012, p.22).

The road safety in Estonia used to be among the poorest in Europe (Maanteamet, 2002) but has become twice better and is situated now in the middle of EU ranking (MKM, 2013, p.22). This is due to drivers' lack of consideration of other road users. For instance, compared to Sweden where there are 6 times higher population and 8 times more cars than in Estonia, the number of cyclists' deaths caused by car is the same (Maanteamet, 2002, p.1). Thus, cycling safety is very essential but today it is largely missing in Tallinn (Appendix I, II). Compared to year 2009, accidents with cyclists have doubled in 2012 from 26 accidents to 50 accidents per year. Giving in total 366 cycling accidents during the last decade, where 5 people died. Most of the accidents happened in the city centre. Accidents are happening mostly where there is no traffic calming and not very good conditions for cyclists to commute. Predominantly, the most common type of accident over the last decade is collision with vehicle from the side,

forming around 55 % of the total reasons for cycling accidents (Antov and Antso 2013; TTÜ, 2012, p.47). Considering that cycle paths frequently cross roads and the entrances to petrol stations and business driveways, this figure is understandable (Appendix II). As, can be seen from the Figure 4-5 the most car users are in age groups between 26-45 and least among people over 66 years old. This means that the city that is designed for cars and not for everyone as recommended in Chapter 2 under benefits. The survey carried out by Tallinn Technical University (2012) is providing a confirmation that people perceive cycling as unsafe in Tallinn, where more than half of the 206 respondents answered "yes"(TTÜ, 2012, p.37).

Security

Although, recently there were 96 new parking places created for cyclists that enable 192 cycle to park (ERR, 2014d), according to the survey (TTÜ, 2012, p. 42) it is not enough safe parking places for cycles, especially in the city centre (ERR, 2014e), or rather parking spaces are not spread around the city (Appendix I). Lack of safe or guarded cycle parks in Tallinn causes excessive bike thefts and due to space issues in some areas vandalism is the issue. In year 2014 from January to July, there has been reported 616 bike thefts in Tallinn of which 179 occurred in the city centre (Politsei, 2014). Although, according to Tallinn Transport Department, there should be enough parking places for cyclists in Tallinn because recently (in 2014) there were 180 parking places added in 4 around Tallinn. Although there are cycle thefts in the public places, a lot of cycles have been stolen from the private properties (from cellars, gardens, corridors) (Politsei, 2014). The reason is the absence of the cycle storage by the residential buildings. Especially close to the multi-storey buildings where more than half of the Tallinners live and most of them have to carry their cycles higher than 4th floor (Appendix I, II; Tallinn, 2014h). In addition to bike thefts there has been 220 street crimes reported (Politsei, 2014), there have been no studies carried out about this topic but crime can potentially discourage people from cycling especially at night in Tallinn.

Climate

The temperature in winter occasionally drops below -20°C, an average temperature in winter (November-January) in Estonia is between -3 and -10°C. The snowfall is from late October until late March and can be quite heavy, on average 50 cm as seen in Figure 0-5(Ilmateenistus, 2014; Keppart, 2010). Constant, snow and cold together make it more difficult to advocate cycling in Tallinn.

Communication

Instead of utility cycling, Tallinn promotes leisure cycling. For instance the agenda for Car Free Day this year includes cycling trip that is preceded by warm-up, which describes urban cycling as sport (Tallinn, 2014). The new cycling infrastructure is built in the outskirts of Tallinn and is suitable for leisure cycling because it does not connect to the wider city's network. Cycling and walking infrastructure are considered together in most of the strategies (Table 4-1). Even though, Tallinn provides free cycling map with all the existing and planned cycling paths and lanes, the quality of infrastructure varies a lot due to leisure paths and pavements along the main streets, which are both marked with the same legend (Tallinn, 2014). Furthermore, there are no uniform cycling traffic signs in Tallinn and standards of implementation, which results in some streets having more signs than needed per km than other path and lane parts, which are more dangerous without markings and signs (Appendix II). In addition, there is one street where the bike lanes are painted red but those lanes are repainted before 1st of September, when the children are going to school to promote traffic safety where possible and prior to events, for instance this year those lanes were additionally repainted before National Song and Dance festival in July. This clearly shows the political

interest rather than practicality because those lanes are mostly used from April to October (Appendix I; Eesti rattarikkaks, 2014).

Political support

Currently, Tallinn City Administration is prioritizing public transport, by providing it for free for Tallinn residents, allocating road space for public transport lanes, and renewing the existing infrastructure for cars (Tallinn, 2014; Tallinn, 2010). This is not negative but the current share of public transport in Tallinn is already over 45 % and if it is to increase it will require more public spending and city's space. In addition, the difference in investing in roads and cycling infrastructure is significant, where only 5 % is allocated for cycling and the rest for roads (Tallinn, 2013c; Tallinn, 2010). There have been several initiatives from the city officials and pressure groups to raise awareness and recommend the potential solutions for more liveable city. For example, a plan for re-structuring part of the city centre so that it could be open more for pedestrians and cyclists and, which would substantially reduce the through-flow of cars due to restriction and reduction for car roads and motorists has been denied by Tallinn Council. A second, similar plan is currently on stand-by because the construction of road junctions is considered more important today (Tallinn, 2014, Appendix I, II). In addition, Tallinn does not have a cycling strategy or policy, which is also mainly due to lack of knowledge of current situation. There is also lack of incentive and competence at the national level to motivate local authorities (MKM, 2013; Appendix I).

4.4 Urban transport management in Tallinn

Key stakeholders

Tallinn is a local government unit of Estonia, which main task is to organize the public services to residents of Tallinn by following the framework of legislation and at the same time by actively shaping the urban environment. Tallinn City Council and City Government are the local authorities that manage the city by using the independent budget of the city for that purpose (Tallinn, 2013a, p. 29). Urban transport management in Tallinn is unofficially mainly divided between three institutions: Tallinn Municipal Engineering Services Department, Tallinn Transport Department and Tallinn Urban Planning Department (Tallinn, 2014 e, f, g). All of the three City Administration departments have a role to play in cycling development:

Tallinn Urban Planning Department is responsible for development of a common city's strategy that includes development, planning and infrastructure of the city. The main cycling related responsibilities are preparation of the development plans and inspection of implementation in planning activities. Also, organisation of sustainable urban design and planning the city's road network (Tallinn, 2014e).

Tallinn Transport Department is responsible for city's transport planning, direction, coordination, organisation and development. This includes the provision of smooth, fast, safe and environmentally friendly traffic. Transport Department is also responsible for organising the international cooperation on city's transport and to handle the European Union activities concerning Tallinn. In addition, it organises the transport network on city level and connections to the other regions, which includes the operational management of traffic (e.g. traffic signs, road markings, traffic lights, control devices). As well, it is responsible for inspection of the parking payments and charges, collection of the penalty charges, parking management and compliance of the Taxation Act, the Local Taxes Act and the parking charge regulation (Tallinn, 2014f).

Tallinn Municipal Engineering Services responsibilities are to design, repair, maintain and clean the city's roads. In addition, to develop draft plans for the road management. Tallinn

Municipal Engineering Services is responsible for applying for the European Union funds and organisation and allocation of the all the received funds. As well, the department is participating in international cooperation including the European Union programmes (Tallinn, 2014g).

Other stakeholders

Apart from Tallinn City Government some of the decisions are made on the national level. **The Ministry of Economic Affairs and Communication (MKM)** is one of the most relevant institutions, when it comes to the sustainable mobility and promotion of cycling in the cities (MKM, 2014). The main responsibilities of the MKM are the national transport policy development, implementation, and assurance. In addition, it is responsible for managing the public investments in transport infrastructure planning and when appropriate provides the necessary measures (MKM, 2012, pp.1-2).

The Estonian Road Administration (ERA) is a government agency that operates within the administrative area of the MKM. Road administration is not only highway management it also includes other roads and bicycle traffic education for children and is the authority for issuing driving licences. In addition, it designs the standards and Acts and provision of "know how" for the cities. However, the ERA is not supporting financially cycling paths construction in cities but some of the existing city cycling infrastructure could be interconnected to the regional paths that are already constructed (Appendix I). Thus, "the ERA performs the implementation of state policy and development programmes, management functions, state supervision, and applies the enforcement powers of the state in the field of road management, traffic safety, public transport and the environmental safety of vehicles" (Maanteamet, 2014).

Apart from city and government officials, there are **cycling pressure groups** that are publicly expressing their ideas and opinions about the current situation and the potential future, one of such is **Eesti Rattarikkaks** group, currently with 3226 members in *Facebook*. Eesti Rattarikkaks is a group created to advocate cycling in Estonia. The group is aggregating good examples from the institutions and cities where cycling is used as a mode of transport and tries to share the best practices with those who want to advocate cycling. Every year the most cycling-friendly city, employer, and institution is elected. In addition, the group is easing the accessibility of bikes and sharing helpful information about bike maintenance (Facebook; Eesti Rattarikkaks, 2014). In addition, in Tallinn there are neighbouring associations such as **Telliskivi** (since 2009, Soo and Telliskivi streets) (Telliskivi Selts, 2014) and **Uue Maailma** (since 2007) (Uue Maailma Selts, 2014) **associations**, which are location based grassroots initiatives to improve those areas, which means the people in those associations are very pro-cycling and walking. Furthermore, there is Tallinn Bicycle Week that organises bike related events and activities among them Tour d'ÖÖ (Tallinn Bicycle Week, 2014). In addition, the non-governmental organisation **Estonian Green Movement** established in 1988 and its activities are concentrating on environmental awareness, policy and nature conservation (Eesti Roheline Liikumine, 2014).

Policies related to cycling

Free Public Transport

Since 2013, Tallinn provides free public transport to all of its residents, which includes buses, trams, trolleybuses and commuter trains in Tallinn area. It has raised modal share of the public transport in total about 1.2% (Cats, et.al. 2014). As a result, however, public transport has reduced the number of pedestrians and cyclists rather than car users (ERR, 2014a). In

addition, the public transport today is very limited to accommodate cycles neither does it have a bike racks (Chapter 2). Public transport is instead integrated with car users through "Park and Ride" program that provides free car parks near the public transport stops outskirts of Tallinn to avoid the cars to pass the busy city centre (Tallinn, 2014i). This is compared to other cities in Europe such as Vienna where the fee is 12-14 EUR per week or 3 EUR per day, in Tallinn it is free of charge but still limited (Car Parking, 2014).

Free public transport in Tallinn discourages people to walk and cycle distances shorter than 5 km;
Public transport lanes in Tallinn are limiting already limited city centre space to be allocated for cyclists;
Public transport lanes prevents some residents to drive cars and "Park and Ride" system prevents to some degree the cars entering to the city centre;
There is high potential to integrate utility cycling with public transport.

Parking tariffs

Since 2014, parking in the city centre is further restricted somewhat ensuring the decrease in private car use by making it more costly and uncomfortable to come to the city centre by car. Although, car users mostly affected are the residents of the high tariff parking areas whose parking fee was raised from 38 EUR to 120 EUR per year, to decrease the need for car for residents in the city centre. Although, the parking rate per hour is comparable to the rest of European cities then the rate per year is still relatively low in Tallinn an average 17 EUR per month, which is an average per week in Western Europe. In addition, the major change made was to charge for evening and night parking, which restricts the car use during the evening when there is not so much traffic (Appendix I; Delfi, 2014 a; Tallinn, 2014j).

Parking tariffs are only affecting local residents and people wanting to park during night time;
Tallinn does own 41 parking lots compared to Europark that owns 84 lots, thus most of the private parking places are not affected by this policy;
Revenue received from the parking fees.

Cycling Helmet

The Road Traffic Act RT I, 17.03.2011, 21 §30 point 6 and §31 point 1, *The use of security devices point* , children under 16 years old must wear cycling helmet when riding a cycle (Riigiteataja, 2011). Despite, Estonian Road Administration has included helmets under the campaigns targeted at bicyclists in its Estonian National Road Safety program 2003-2015 (Maanteamet, 2002, p.8). Cycling helmet laws have created contradictory views in Estonia and also abroad. Some people see it as a need for cyclists to significantly reduce the seriousness of injuries (ERR, 2014b). To others, find it is not important for utility cycling (TEDx, Mikael Colville-Andersen, 2010). On the other hand, in Estonia the cycling helmet has had positive attention in media, reflecting accidents that have happened and advocating the need for helmets, resulting the people to change their habits out of fear and may be discouraging some to cycle at all (Postimees 2014; Delfi 2014).

People who would cycle without the helmet have changed their minds due to the safety risks reminded for them every now and then, even if it is not compulsory for people over 16 years old to wear the helmet;
Media is using cycling helmet as a reason for all the accidents happening to cyclists;
The Law does not require people over 16 years old to wear helmet.

Painted cycle paths

As already mentioned under Drivers and Barriers, the cycling infrastructure in Tallinn is not a priority for the local authority. There are new lanes marked occasionally on the busy streets but those lanes are worn out in many places and confusing, where the old painted lanes were narrower and still remained on the road. This is not an official policy of Tallinn City Administration but cooperation with an activist. According to the unofficial plan, those lanes were to be marked on newly renovated Pärnu avenue, but due to "lack of space" cycling lanes were not marked there (Appendix I, II).

In addition, there are no uniform signs or marking criteria worked out;
The lanes are not painted where it requires trades-offs at expense of roads;
Cycling lanes are better than nothing for utility cyclist today.

Strategies and plans related to cycling

One of the main central development documents is Tallinn Development Plan for 2014-2020, which is related to the other development plans and legal system as shown in Figure 4-7a. In addition, it is considering the national long-term strategic development, Tallinn city districts and sectorial development plans, the key positions of the City budget strategy and Tallinn's comprehensive city plan. The plan helps to get funding and connect with the relevant stakeholders. In addition, it is stated that the plan serves a potential positive effect on the regional collaboration. Tallinn Development Plan 2014-2020 states six main development visions for Tallinn of which one vision is directly related to the sustainable urban mobility:

> *a Tallinner, who sustainably connects and values home, work and recreation – Tallinn with a comfortable, inspiring and environmentally sound urban space* (Tallinn, 2013b, p.25).

Environmentally sound urban space refers to sustainable and liveable city that is designed for people (Transport Learning, 2014). There are a couple of initiatives made by the City Administration for restructuring the urban space in Tallinn so that one part of the city centre is redesigned for pedestrians, cyclists and public transport by making it very uncomfortable to cross those areas by car due to speed limitation and reduced roads. Those plans, however, are on hold due to lack of finances and other priorities (Appendix I, Tallinn, 2013b). Another vision for Tallinn is related to the safety:

> *a Tallinner who is taken care of, protected and helped – a (socially) safe Tallinn, with managed risks* (Tallinn, 2013b, p.25).

Although, the public inclusion in decision-making is minimal in Tallinn, The Development Plan 2014-2020 has based its vision for Tallinn on the Talliners' aspects of life, which correspond to the areas of development that include the three sustainability pillars of society, economy and environment (Figure 4-7b). Considering the benefits of the utility cycling, it is a way to improve those areas of development successfully and equally.

All the measures indicated to improve the cyclists and pedestrian road safety (Figure 4-11) in Estonian National Road Safety Program 2003-2015 were allocated to the first measure stage during years 2003-2006, which refers to the implementation of fast improving and low-costs measures (Maanteamet, 2002, p. 6). National Transport Plan for 2014-2020 exists at the moment, considers the European White Paper 2050 and advocates the sustainable transport.

The plan also states that there are not enough funds to build out infrastructure for all modes of transport and therefore, the prioritisation should be made in terms of transport mode (MKM, 2013, p.22). In addition, it suggests for the cities with population more than 40 000 inhabitants to prioritise walking, cycling, public transport and the only at the last private car use. In addition, it is highlighted that the interconnection between the different modes is essential (MKM, 2012, p.30). Tallinn 2030+ strategy is listing many hard and soft measures to be used to achieve the main goals. The strategy has prioritised cycling but does not include the exact targets on how much the cycling share should be increased by year 2030. In addition, it is very broad and considers many different sectors and fields without concentrating much on transport only (Tallinn, 2010). Tallinn Public Transport Management Plan 2011-2020 is considering integrated cycling and public transport system (Tallinn, 2014). Tallinn Transport Management also considers cycling infrastructure but rather diverts it underground to avoid reducing road space. One of the central actions in the agenda for 2025 is tramway improvement in Tallinn (Tallinn, 2010). All those strategies mention cycling, and there are also other strategies not listed here. Still, it is just a nice working on paper rather than planning for real actions to improve cycling conditions and increase cycling share. For roads and public transport there are management plans in the end of each strategy but not for cycling except in Tallinn Development Plan 2014-2020 the plan to build 5 km of cycling infrastructure per year by 2017.

Strategy/ Plan	Period	Purpose	Level	Relevance	Target	Institution
Tallinn Transport Management Plan	2010-2025	To make traffic more smooth and road users more satisfied	Local	Considers cycling infrastructure but not at the expense of cars but as an addition and option	To improve city's transport system	Tallinn City Administration
Tallinn Public Transport Management Plan	2011-2020	To develop public transport in Tallinn	Local	Cycle path network and provision of cycle parks by the principal public transport stations, integrated public transport and cycling idea	To improve public transport efficiency and sustainability.	Tallinn City Administration
Tallinn Development Plan	2014-2020	Population, socio-cultural and economic development	Local	Creation of a modern pedestrian- and bicycle-friendly urban space in the area of the city centre, building streets for pedestrians;	242 km (~5 km per year) cycling infrastructure by 2017 (currently 227 km)	Tallinn City Administration
Tallinn	2030	To increase safety for road users and re organise and restructure the urban space	Local	Cycle path network adjustment, which must comply with the demand, to be easily usable, safe and clearly marked and connected to the important institutions; programmes to promote the cycling , increased safety for the cyclists	All the missing cycle paths are built out to connect to wider cycling infrastructure , cycling partial integration to the public transport	Tallinn City Administration

Strategy/ Plan	Period	Purpose	Level	Relevance	Target	Institution
					system	
Estonian National Road Safety Programme	2003-2015	To reduce the traffic accidents	National	Cycle training; campaigns for car drivers to protect cyclists and for cyclists; analysis of the accidents happened with cyclists and finding appropriate solutions	No more than 100 deaths per year	Estonian Road Administration
Transport Development Plan	2014-2020	To reduce GHG emissions and increase traffic safety, integration of different modes of transports	National	Projects to increase the share of utility cycling; better spatial planning; preference of the ; supports the sustainable mobility planning projects in local authorities; infrastructure improvement, which provides safe conditions for all the road users	To increase the people going to work by cycle or on foot from 21% up to 25% (in Estonia)	Ministry of Economic Affairs and Communication

Figure 4-6 Current strategies and plans related to cycling

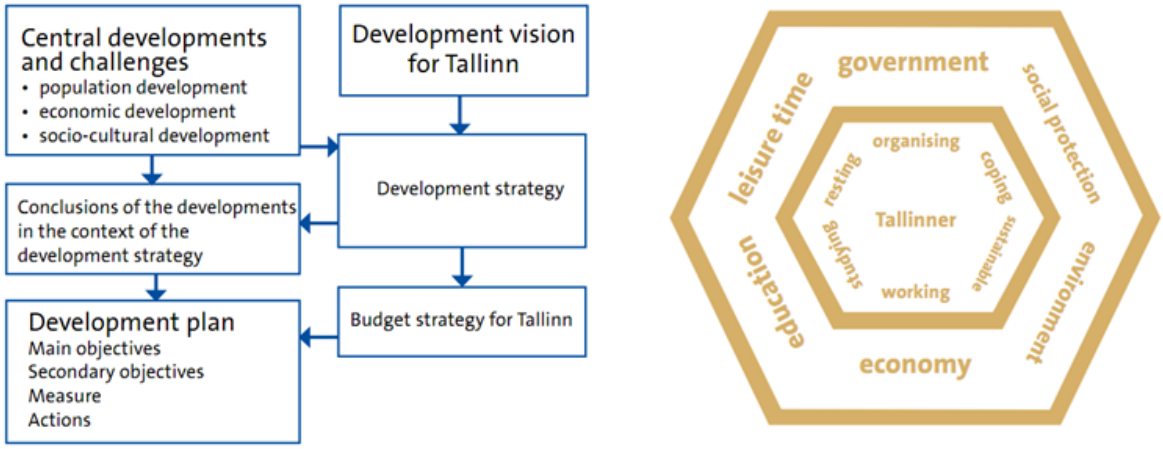


Figure 4-7 a) Development Model for Tallinn (left) (Tallinn City Council, 2013, p.5) and b) Tallinners' aspects of life and corresponding areas of development (right) (Tallinn, 2013b, p. 29).

5 Promoting Cycling in Tallinn

5.1 What to promote

Based on the current situation in Tallinn (Chapter 4), examples from the successful cycling cities (Chapters 2 and 3) and policy types, the role of policy and strategy in cycling promotion, Chapter 5 analyses the policy gaps in Tallinn and highlights the areas of potential improvement.

5.1.1 Cycling infrastructure

It is important to note that there are currently no transport strategy and pro-utility cycling policies in Tallinn (EPOMM, 2014), although cycling is mentioned in Tallinn Development strategy 2014-2020 under modal shift option but it is usually considered together with walking. In addition, the strategy's action plan includes the infrastructure policy instrument to increase the network from 227 km in 2014 to 242 km in 2017, which means only 5 km per year of new bike lanes (Tallinn, 2013b, p.39). Ideally, 5 km of additional bicycle infrastructure could, according to Pucher (2010),[12] increase the share of utility cycling by 3 % (Pucher et.al. 2010, p.107). This, however, would require a supporting policy mix. Today, Tallinn has already around 230 km of cycling infrastructure, which is around 0.5 m per city's inhabitant but the cycling share is still low around 1 % (Tallinn, 2014), which clearly shows that the cycling potential is unused. This is mainly because the cycling infrastructure is not well connected to the wider city's network. People do not have an easy access to the city centre and through the city centre, where the population triples during the day, where the busiest area in the city centre has around 14 000 people more than usual (Stat, 2014 d). Thus, the recently built network for cycling serves more the cyclists with sport and leisure purposes than utility cycling. It also shows that cycling for the general public is seen as a means of exercise rather than a mode of transport from getting point A to point B.

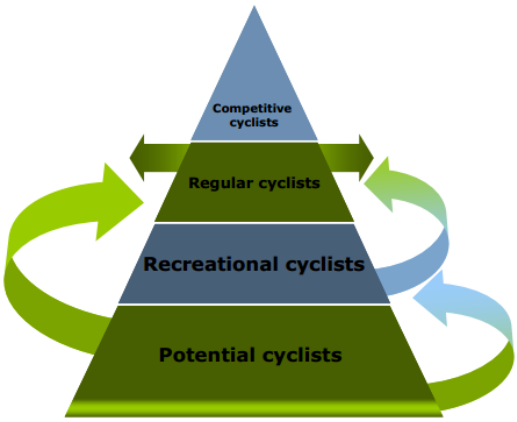


Figure 5-1Target groups and the desirable shift to encourage more cycling (PRESTO, 2010, p.15)

5.1.2 Cycling as a means of transport, not only leisure

It is positive that the cycling is already promoted as healthy activity under thematic year 2014, which is "Active Movement Year in Estonia" (Liigume, 2014) under which Tallinn also has "Active Movement Month" in September 2014 (Tallinn, 2014 k), because it does not depend

[12] 1 mile= 1,6 km, thus 5 km= 3 miles (Metric Conversion, 2014), 1 mile increase 1 % of cycling share, then 3 miles 3 % (Pucher, 2010, p. 107).

on the purpose of the cycling but the way it has been promoted together with pole walking and hiking. Furthermore, during this years' Car Free Day[13] in Tallinn, an activity of cycling with the purpose of seeing architecture in one of the city's districts will be included. The activity is preceded by the warm-up session (Tallinn, 2014 k), which would likely not encourage the people to use bike as means of transport; rather cycling would be seen as sporting activity, because they perceive it differently. In addition, during the month of May, within the context of Tallinn Bicycle Week in May, there is a utility cycling competition Endomondo: European Cycling Challenge that takes place in Europe. Tallinn has participated since 2012 (423 cyclists 21,752 km) and won in year 2013, which does not really mean that everything is that great. According to the Endomondo's data for the results in year 2013, the total km cycled was 55762 km with 509 cyclists. The individual data of the participants represents a lot of competitive cyclists, who cycled around 30 km per day (one participant cycled 1312 km per month), which is not the initial purpose of this competition (Endomondo). However, by promoting recreational cycling the potential cyclists might become leisure cyclists. According to target groups and the desirable shift (Figure 5-1), considering the current informative policy instruments that Tallinn is using then the focus on how to encourage the cycling should be shifted from recreational cyclists to regular cyclists. Thus, Tallinn is currently putting more efforts on developing recreational cycling paths around the city centre, which can be interpreted as getting the non-cyclists to pursue recreational cycling.

In order to get both leisure and potential cyclists on the utility cycling level Tallinn must improve the connectivity and conditions of the cycling lanes and paths especially in Tallinn city centre. It is also important to advocate cycling to shift the non-cyclists and recreational cyclist to utility cyclists (PRESTO, 2010, p.15). Although, it is recommended to count the cyclists to see if there is potential to build certain infrastructure. Then, today the questionnaire about people's preferences around cycling would show very low levels because the society is not ready to imagine the outcome of the modal shift. The minor changes would probably not change the way non-cyclists perceive utility cycling unless there is well explained vision and benefits. Thus, it is very important to use informative policy instruments such as campaigns, events, and programs and also economic incentives such as tax reduction from the bicycle purchase. Currently, utility cycling is seen as normal only from the peoples' perspectives that have experienced and seen how the system works abroad (eg. Exchange students) and by the residents that are already using cycle as a mean of transport in Tallinn. Therefore, if the ex-ante policy evaluation gives negative results in current situation, for instance there would not be enough potential cycling path users. This does not mean that the policy should be discarded; rather it means that the policy perhaps is missing complementary policy instruments.

5.1.3 Cycling integrated with public transport system

Apart from car use, public transport is the major alternative mode of transport in Tallinn. Despite, the modal split of 45 % of public transport, Tallinn continues to invest more in to raise the share even further. Although, public transport is more space and resource effective; it cannot satisfy all mobility needs (PRESTO, 2010, p.3). In addition, due to high levels of noise pollution in Tallinn (Terviseamet, 2014), it is important to reduce the need for any motorised transport to reduce the noise levels and air pollution, including public transport. Most of the people that are commuting to Tallinn by car are from surrounding municipalities thus the

[13] "Every year on or around 22 September, people from around the world get together in the streets, intersections, and neighbourhood blocks to remind the world that we don't have to accept our car-dominated society" (World Carfree Network, 2014).

cycling integration to public transport is essential especially for people outside Tallinn. One of the solutions could be to provide bike sharing scheme in Tallinn by the regional bus and railway stations, public transport stops and near important institutions. Bike sharing scheme could also enhance city tourism by providing tourists easy and simple connection between the most attractive areas. Furthermore, the system would take off the load from free public transport. Public transport and cycling could be integrated to increase both the use of public transport and cycling (BKK, 2014). Tallinn free public transport requires around 60 mln EUR per year to run, which according to Cats et.al. (2014), only increased 1.2 % the passenger demand. Instead, the modal split of the public transport rose thanks to provision of public transport priority lanes and increased service frequency (Cats, et.al. 2014, p. 1). Therefore, it would be advisable to re-introduce the fair ticket price for public transport journeys. The only affected people were with low income who walked or cycled the short distances before and could not afford or were affected by the price (Appendix I; Tallinn, 2014; Cats et.al, 2014, pp.11-12). With the result that the public transport is considered as transport for low income people rather than sustainable means of transport (Chapter 4-Mindset).

There is a pilot project "Park and Ride" that intends to integrate car users with the public transport system (Tallinn, 2014). Currently, there are only four free parking lots with 298 parking places near the public transport stops by the city borders. In 2012, around 45 people used "Park and Ride" system (Tallinn, 2012, p.4). Even though, the parking fees were increased in the city centre in the beginning of 2014, they only affected the night parking and people living in those areas (Tallinn, 2014).In addition, most of the city's parking places are free or privately operated parking lots such as Europark and those are not affected by the price set on Tallinn parking places (Europark, 2014; Parkimine, 2014). Although, there is no post evaluation of this policy yet, it is assumed that the day traffic has not decreased after the current economical policy instrument has been implemented. Despite this, it is positive that parking is not allowed on the pavement and by the busy roads cars are allowed to park only for short periods (Tallinn, 2014; Riigiteataja, 2014b). Tallinn should provide more end-of-trip facilities for cyclists. In addition, the need for a safe cycle parking should be promoted at the residential buildings.

5.1.4 Better land use planning

In order to encourage people to take up utility cycling it is also important for Tallinn to re-think its land use policy and all other regulative policy instruments. Currently, the common vision of politicians in Tallinn sees that the spaces should be divided evenly among all the modes of transport to give people the free choice depending on the market for how residents want to commute and move (Appendix I). This short of "doing nothing" policy (Vedung, 1998) is fine in the places where there is room to develop infrastructure for all modes of transport. However, in areas where there is lack of space to satisfy all the modes of transport, there is a conflict. The recent regulative policy restricted the cars to use transport priority lanes in Tallinn. It has been successful as it made the public transport much faster and thus more competitive with cars especially during the peak hour traffic congestion (Tallinn, 2014). Because there is already space taken away from the cars (one lane each way) and given for public transport, it is politically unpopular to further decrease the roads. In practice it is not impossible because there are unused space in many roads that would able to squeeze motorists in the middle. If it is not possible, the regulative policy instrument could limit the speed in those areas to 30 km/h. In addition, using infrastructure policy instruments such as bollards in the middle of the street to allow the cyclists to safely share the road with the rest of the road users. Second, some of the streets could be closed for the car users and instead traffic is diverted around those places via other streets and roads. Third, the public transport lanes (i.e. bus lanes) could be enlarged and cyclists could be allowed to share them. Currently, the cycle lanes and paths are quite satisfactory and relatively safe outside the city centre but in the city

centre they are limited and the safety is questionable (Appendix II). Cycling policy encourages people to cycle and helps to mitigate the air and noise pollution, the space problem and other issues. Therefore, if the politicians find they are making unpopular decisions by advocating cycling and restricting car use then the policy could be interpret differently and instead communicated the need for cycling as a solution to the drivers such as air pollution and noise pollution in order to achieve modal shift.

5.1.5 Agenda setting

Taking into account the current mindset of the majority of the residents (reflected in the choice of mobility), it would be advisable for Tallinn to start to advocate cycling by using informative instruments that would show utility cycling in positive light. In addition, economical and regulative instruments are recommended to restrict and reduce car use. After people are aware of the bikes' usefulness and the car drivers feel they are not wanted (especially in the city centre) the local authority can use regulative instruments. For example, this year when there has been excessive construction works in Tallinn principal avenues and streets, the car traffic has been greatly disrupted and radically diverted. It would have been a great opportunity for the city to implement cycling lanes in the areas that were under construction all summer because car drivers already got used to go by other roads. Instead, Tallinn City Administration promised to "normalise" after the construction works (Tallinn, 2014). It is often arranged so that cyclists have to go around and car drivers directly (Appendix I). Tallinn would benefit a lot if there would be shortcuts for cyclists to make it faster and comfortable (e.g. cycling corridors by the railway tracks). Railway lines are the potential for cycling corridors because 80% of the people live nearby the railway (Jüssi et.al. 2014, p.30; Jones, 2012, p.139; Appendix I). Not all the politicians are against the cycling that are currently decision-makers, thus there should be a common vision in all the departments to improve the cycling. Otherwise if there is opposition from the public and from the colleagues it makes it very hard to go about it (Chapters 4, 6).

If the Tallinn City Administration and Government is to take any of these recommendations into account, it would be advisable to involve relevant stakeholders at all levels and sectors in the process of developing bicycle promoting policies. Doing so could both ease the responsibility of the local authority, and also reduce the expected costs for the city (e.g. economic incentive to go to work by bike, provision of the cycling parks at working places).

To summarise the agenda setting, Tallinn should:

- Have a common vision within Tallinn Local Authority's departments and other all the relevant stakeholders from all levels;
- Start to promote utility (regular) cycling instead of recreational cycling in order to increase the modal share of cycling;
- Restrict the car use and access especially in the city centre and prioritise the cycling and walking;
- Improve the cycling conditions and network, to regulate the traffic and re-shape the urban space so that the cyclists could have an access to and through the city centre and or make cycling faster by providing cycling corridors and shortcuts for cyclist to move faster.

5.2 How to promote

After identifying in Section 5.1 what should be promoted in Tallinn to steer towards more cycling, in order to formulate cycling policy package for Tallinn, it is important to consider all relevant policy instruments and both soft and measures. In addition, the allocation of the responsibilities among the stakeholders.

5.2.1 Types of policy instruments and measures

According to Figure 2-1 and Figure 1-4, Tallinn is a 'starter city'. Hence, based on the *sequence of cycling strategy efforts*, a suggested policy framework by PRESTO, the starter cities with very low levels of cycling due to lack of cycling culture, safe and connected direct infrastructure, and the infrastructure efforts should be prioritised (Figure 2-4). Promotional efforts would not be successful without sufficient infrastructure. Furthermore, the policy objective for 'starter cities' is to make utility cycling possible, safe and respectable, first on neighbourhood level and then city wide. Despite the efforts so far made for cycling in Tallinn, it would be beneficial to start from the city centre because this is the part of the city that most of the people pass during the day. However, according to PRESTO Policy Guide (2010), changing the city centre to being more cycle friendly is considered under climber cities' category (PRESTO, 2010).

Table 5-1 outlines the types of policy instruments and measures that could be used in Tallinn in order to successfully advocate utility cycling and at the same time reduce traffic congestion and resulting air and noise pollution. First, the table is pointing out the recommendations from the Section 5.1, excluding the common vision, which is further analysed in Section 5.2.3 under stakeholder integration. Second, Table 5-1 is divided into four so that infrastructural, regulative, economical and informative types of policy instruments correspond to the recommendations. The third column is the measure suggestion and fourth column specifies the suggested measure. The table justifies that there is a need for a policy package in Tallinn (Taeihagh et.al. 2013, p.596). For example, in order to successfully give economic incentives for bicycle use, safe and direct infrastructure should be available. In addition, the infrastructure e.g. cycling boxes require bike-friendly traffic regulation to prevent the cars using cycling infrastructure. Furthermore, whenever there is new cycle lane or path built, it is advisable to use informative policy instruments.

	How to promote in Tallinn		
What to promote in Tallinn	Type of Policy instruments	Measure	Specification
Reshape the urban space	Infrastructure	Bike parking	Safe cycling parking in residential areas and destinations "Bike and Ride"
		Bike-sharing schemes	By the tourist attractions Public transport integration
		Cycling infrastructure	Cycling prioritization (e.g. cycling boxes) Complete cycling network Cycling corridors Better maintenance
		Traffic calming and deviation	Physical barriers to slow down the traffic Allocate part of the streets/roads for cycle lanes/paths Closing the streets for cars or reducing access to cars Physical barriers to slow down the traffic Speed limit signs
Regulate traffic	Regulative	Bike-friendly traffic regulation and management	Widening of bus priority lanes Re-organise traffic schemes Reduction of parking places Speed limits, one-way streets
		Bike parking standards and building norms	Include bicycle standards and reduce the demand for car
Give incentives to ride a bike	Economical	Parking fees for cars	Rise in parking fees,
		Tax-benefit	Subsidized access to bikes

	How to promote in Tallinn		
What to promote in Tallinn	Type of Policy instruments	Measure	Specification
		Incentives for cycling	Add on to salary, discount checks
		Congestion charge	Incentives to reduce car use in and through the city centre
		Re- introduce public transport ticketing	Fair fee to use public transport
Promote utility cycling	Informative	Bicycle monitoring	Cyclists counters
		Education	Bicycle traffic safety course
		Campaigns	"no ridiculous car trips" (Malmö)
		Events	Car Free Day, Tallinn Mobility Week
		Competitions	Endomondo: European Cycling Challenge Painted and indicated cycle lanes and paths
		Better cycling signs	Traffic light, signposts
		Cycling map	Interactive or paper copy
		Mobility plans	Business and schools mobility plans

Table 5-1 Types of policy instruments and measures that could be used in Tallinn in order to successfully advocate utility cycling and at the same time reduce traffic congestion and resulting air and noise pollution

5.2.2 Stakeholder integration

Apart from the *sequence of cycling strategy efforts* (Figure 1-4), the analytical framework in Figure 3-1 shows that some policy instruments affect the cycle use directly by affecting the travel time, avoid risks related to cycling, provide comfort, and favour accessibility to bike. On the other hand, some policies indirectly affect cycling such as car parking costs and free public transport (Chapters 3, 4). Therefore, it is important to identify all intermediaries, key and primary stakeholders to ensure the common vision and assure transparency and logic of cycling policy input, output and outcome (SUMP, 2011, p.32). For this, it is important to identify the areas of cohesion and potential policy integration opportunity (Taeihagh et.al. 2013, p.596). Table 5-2 has divided stakeholders into intermediaries, key and primary stakeholders. Another subdivision is done to differentiate the targets on local and national levels per each stakeholder. There are some additional stakeholders added to the ones outlined earlier in Chapter 4.

Key stakeholders on the local level are Tallinn City Administration Departments such as Tallinn Municipal Engineering Services, Tallinn Transport Planning Department, Tallinn Urban Planning Department and also Tallinn Environmental department. On the right column there are stated a potential cohesion and integration points. For example it is in Tallinn Environmental Department's interest to reduce the noise pollution resulting from traffic and to improve the air quality. Tallinn Transport Department should be able to confirm uniform cycling traffic signs and cycling lane marking criteria for Tallinn. In addition, to regulate the current traffic, where needed in order to improve cycling safety and comfort. Tallinn Municipal Engineering Services should take into account the urban design proposed by the Tallinn Urban Planning Department, which should consider the Tallinn Transport Department input on traffic regulation, and build accordingly. This also requires allocating resources according to the common vision.

The national level stakeholders are mainly the Ministry of Economic Affairs (MKM) and Communication with competency to set the national cycling standards in the National Transport Development Plan. The Estonian Road Administration (ERA), run in collaboration with the MKM, is providing traffic education at the national level including cycling permit courses for schools (i.e. for children under 16), but also issuing the driving licences for car users. Thus, the education could be made transparent in a way that driving schools involve more informative policy instruments such as campaigns, where the drivers have to cycle to understand the point of view of the cyclists. In addition, safe cycling conditions and cycling as an activity could be of interest to the Ministry of Social Affairs. The environmental benefits of cycling in the cities are beneficial to meet the National environmental policy targets set by the EU Directives. The Ministry of Interior is responsible for allocating the EU funding schemes for the local authorities, if cycling is not wanted on the local level the national level only has competence to advise the choice and act accordingly. Both Police and traffic educators from the ERA are considered as intermediaries that act according to the local authority and national criteria.

Apart from intermediaries and key stakeholders there are primary stakeholders. Those are both on the local and national level non-governmental organisations and businesses. It would be beneficial to include those groups in key stakeholders' decision making process because they represent the target group of the key stakeholders and are the receivers of the policy output. Businesses are competent also in turn to design their company's mobility plans, for example, give economic incentives and provide end-of-trip facilities for its employees. In order for all businesses to do so, the key stakeholders have to give incentives to the employers and provide awareness raising campaigns, and courses. Apart from involving the business sector, the grassroots can be included directly through cycling related non-governmental organisations (NGOs) such as *Eesti Rattarikkaks*, which is the lead for the cycling activists who have a clear view on how the city should look like in order to increase the modal split of cycling. It is highly recommended to include those groups because they are the main target group affected directly by the decisions made on cycling in local (and national) level(s). NGOs have specific knowledge about the urban weaknesses in terms of cycling advocacy and conditions.

To conclude, considering the policy instruments and measures that could be used in Tallinn (Table 5-1), the recommendations stated in section 5.1, and relevant stakeholders (Table 5-2), it is very important to make sure the cycling policy is integrated into other development plans and strategies and relevant Acts. Those plans and strategies should include action plans and clear targets to follow to avoid populism, where cycling and car use are promoted in parallel to "please" everyone. In addition, it is important to set a target, vision and mission for cycling in Tallinn in order to formulate policy statements and to follow policy objectives. After formulating policies the use of policy instruments and measures can be chosen and integrated into relevant strategies and plans. The policy instruments that require changing the law could be identified and recommended (City of Lund, 2014; San Diego, 2014; Smart travel 2014; ECF, 2014; Durham, 2014).

	Target	Stakeholders	Specification	Cohesion and integration point
Key stakeholders	Local	Tallinn City Administration	Tallinn Municipal Engineering Services	Tallinn Building Regulation Street design standards Traffic regulation Urban planning
			Tallinn Transport Department	
			Tallinn Urban Planning Department	
			Tallinn Environmental Department	Tallinn environmental policy targets (CO_2 reduction, air quality and noise)
	National	Ministry	Ministry of Economic Affairs and Communication	The Road Traffic Act National Transport Development Plan
			Ministry of Social Affairs	The national health improvement goals. Planning guidance for cities
			Estonian Ministry of the Interior	EU funding schemes
			Ministry of the Environment	National environmental policy targets (CO_2 reduction, air quality and noise)
Intermediaries		Estonian Road Administration	Traffic Safety Department	Educational programmes
			Traffic Management Department	Uniform bicycle traffic signposts
		Police	Traffic Police	Bicycle traffic regulation implementation Accident, crime and bike theft records
Primary stakeholders	Local and National	Non-governmental organisation	*Eesti Rattarikkaks, Tallinn Bicycle Week, Linnad ja Liikuvus, Vänta Aga, Estonian Green Movement, community organizations*	Current trends; help to identify the weak points
		Companies Industries Enterprises	All bussinesses	Cycling mobility plan for employees and customers (e.g. supermarkets) Cycling benefits (e.g. additional add on salaries)
		Educational institutions	Kindergarten, Schools, Universities	Cycling mobility plan for educational institutions (e.g. "cycle to school") Traffic safety programs

Table 5-2 Stakeholders and policy integration

5.3 Policy formulation

This Section first proposes the target, vision and mission for Tallinn cycling policy and then formulates the policy statements with corresponding necessary core objectives to follow in strategies and plans.

5.3.1 Formulation of target, vision, mission

Considering the current modal split in Tallinn and the state of existing cycling infrastructure and peoples' mindset, the target 10 % of cycling in modal share should be achieved by 2020. The vision is that cycling is considered as a normal means of transport to get from point A to point B, especially for trips shorter than 5 km. In addition, cycling is recognized, encouraged

and funded equally to other modes of transport. The mission is to create a strong cycling culture in Tallinn, where the cyclists can move safely and comfortably.

Target	Cycling modal share is 10% in Tallinn in 2020
Vision	Cycling in Tallinn is considered as normal means of transport from getting point A to point B.
	Cycling is recognized, encouraged and funded as an important and essential mode of transportation.
Mission	The mission is to create strong cycling culture in Tallinn.
	Tallinn is bicycle friendly city, where the cyclists can move safely and comfortably.

Figure 5-2 Proposed cycling target, vision, mission for Tallinn

5.3.2 Formulation of policy and objectives

The policies stated in this Section are the outcome of the previous Sections that summarizes the recommendations for Tallinn City Administration. Those policies and objectives are followed and should be supplemented with stakeholder specific policies to help to reach the target. Prior to policy integration it is advisable to consider the applicability of best practices in Tallinn. In Section 5.4, seven examples corresponding to identified barriers in Chapters 2 and 4, their applicability is further analysed.

POLICY 1: Tallinn regularly maintain the existing cycling network to high standards to maximise comfort and effective use by cyclists, new and existing cycle infrastructures are better planned and incorporated into public transport and road network

Objectives:

- More convenient and attractive cycling infrastructure, reduced car trips up to 5 km;
- Well connected cycling network and increase in the number and quality of cycling lanes and paths;

POLICY 2: Tallinn encourages participation of cycling and promotes cycling through a variety of schemes

Objectives:

- Common vision among all the stakeholders;
- Cycling policy is fully integrated to relevant laws, strategies and plans;
- More residents cycle to work;

POLICY 3: Tallinn improves the cycling safety and includes safe cycling parking

Objectives:

- More comfortable and safe cycling conditions for cyclists, reduced accidents with cyclists;
- More cycling parking and end-of-trip facilities, reduced bike thefts and more people cycle to work;

5.3.3 Strategic approach

In order to understand how the policies should work it is important to trade-off car use and public transport in Tallinn. At the moment there is no strategic approach to advocate utility cycling in Tallinn. Therefore, based on the Sections 5.1, 5.2, 5.3 and *sequence of cycling efforts* it would be recommended that the current strategic approaches are to raise awareness, improve infrastructure and safety. There are two scenarios, which are depending on the scale the changes are required. Those scenarios are:

Scenario 1: Tallinn wants to improve the **existing cycling infrastructure**, raise awareness and improve safety:

- Improvement of existing cycling infrastructure;
- Maintenance of existing cycling infrastructure;
- No new bike lanes/ paths are built;
- Provision of uniform cycling traffic standards (signs, paint color, lane width);
- Distinction between walking and cycling in policies and strategies and on cycling map;
- Promotes utility cycling and raise awareness by organizing events, campaigns, competitions (utility cycling);
- Improvement of cycling safety on existing cycle paths and lanes;
- Monitor cyclists before and regularly after opening a new reconstructed and adjusted lane or path;
- Include cycling into transport development action plans with clear goals and actions;
- Provision of end-of- trip facilities;

Scenario 2: Tallinn wants to **prioritize cycling** by providing cyclists **direct and safe access to and through the city centre**, raise awareness, improve safety (potential continuation to Scenario1):

- Scenario 1: Tallinn wants to improve the **existing cycling infrastructure**, raise awareness and improve safety (excluding "no new bike lanes/ paths are built");
- New cycle paths and lanes;
- Intermediaries, key and primary stakeholders integration;
- Public transport integration with cycling;
- Bicycle friendly traffic management and regulation based on prioritization of bikes;

5.4 Applicability of best practices in Tallinn

5.4.1 Benchmarking

Identified barriers, drivers (Chapter 4) and the recommendations in Tallinn are guiding the decision makers to policy areas that are of interest for particular issues. There is a clear understanding of the areas of improvement, which facilitates analysis of the examples of best practice given in Chapter 3(Handy et.al. 2014, p.15). Although, based on *sequence of cycling efforts* (Figure 3-3), the priority areas for Tallinn are to first overcome infrastructure and safety related barriers, the study finds the barriers are relatively interconnected to cycling drivers in Tallinn and therefore, should be considered equally. Therefore, depending on the policy example and based on the policies formulated in Section 5.3.2 and the current situation in Tallinn (Chapter 4) (Taeihagh et.al. 2013, p.596), the transfer incentive is either voluntary, coercive or lesson-drawing (Dolowitz and Marsh, 2000, p.13). The policy interpretation is based on the evaluation criteria in Table 5-4. The benchmarks against which the policy applicability is measured are population density, an average climate and modal share of public transport. Those benchmarks are chosen based on the literature review (Mickwitz, 2003, pp.425; 429; Weber, 2014, pp.132-133).

In Table 5-4, the exporter city policies are corresponding to the barriers identified in Chapters 2 and 3. In addition, the table is colour coded; green is for similar, red for different and orange for partial similarity of the cycling influencing characteristics. On the top row of the table, there is information about Tallinn characteristics. Colour coding each characteristic could be questioned in places. For instance, *an average precipitation and climate*, if the snow discourages people to cycle then the entire column except Oulu and Stockholm should be green because Tallinn has one of the lowest mm and days of precipitation and an average temperature per year compared to exporter cities. On the contrary, if the rain discourages people to cycle all

cities apart from Oulu and Stockholm are potentially restricting the policy transfer. In addition, *population density,* lower population densities usually tend to be more difficult to advocate cycling due to longer distances and fewer cyclists. Thus, Oulu with 1000 inhabitants /km^2 should be marked green because Tallinn has higher population density. Although, the comprised city with higher densities can also pose a barrier due to lack of space (Pucher et.al. 2011, p.458; Pucher et.al. 2006, p.265), in this case all the cities with population densities higher than in Tallinn could be marked green.

Example cities		Population density (inhabitants/km^2)	Public transport %	Climate averages[14]	
				Temperature (°C)	Precipitation (mm/ days)
Tallinn (importer city)		2711 (Tallinn, 2011)	45	5.5	693, 4/ 126
Exporter cities	Malmö	4362 (Malmö stad, 2014)	14	7.8	701/ 150
	London	5285 (ONS, 2014)	37	10.3	754, 4/ 150<...
	Budapest	3219 (Budapest, 2014)	47	10.6	619, 8/ 81
	Tartu	2464 (Visit Tartu, 2014)	27	5.2	609.6/ 129
	Oulu	1000 (Ouka, 2014)	6	2.2	436, 9/ 50-90
	Munich	4468 (City population, 2014)	21	8.3	927/ 189
	Stockholm	4687(statistikomstockholm, 2013)	35	6.1	538/ 197

Table 5-3 Policy evaluation benchmarking criteria for applicability of best practices in Tallinn.

5.5 Policy evaluation

As follows, it should be identified whether the policy transfer is copying, emulation, combination, or inspiration, which is important, in case the complementing policy instruments are needed. In addition, well identified policy transfer types prevent the uninformed, incomplete, and inappropriate policy transfers. Background information about the policy exporting and importing cities (and countries) outlined in Table 5-4 are essential to designate the type of policy transfer (Dolowitz and Marsh, 2000, p.13, 17).

Examples from policy exporting cities are grouped into four based on Chapter 3.5, which type of policy instrument is used primarily. The final group 'regulative policy instruments' is left for the further analysis because none of the examples outlined in Table 5-5 is regulative policy. Table 5-5 outlines the types of policy instruments with corresponding Tallinn objectives and examples from policy exporter cities. The second part of the table shows the type of policy and the policy transfer initiative per each policy example. Under 'Initiative' category the lesson-drawing option is left out because the policy evaluation itself is a learning process (Mickwitz, 2003, p. 433). The table is colour coded, where the green means relevant, red means not relevant and orange means questionable or complimentary policy instrument.

[14] Climate averages are taken from Weather Base website (Weatherbase, 2014).

	Policy instruments	Infrastructure	Regulative	Economical	Informative	Type of policy transfer				Initiative	
Barriers	Tallinn objectives	Re-shape the urban space	Regulate traffic	Give incentives to ride a bike	Promote utility cycling	Copying	Emulation	Combination	Inspiration	Voluntary	Coercive
MINDSET	Trips shorter than 5 km (Malmö)	☺☹	☹	☹	☺	☹	☹	☺	☺	☺	☹
INFRAS.	Cycle Superhighways (London)	☺	☺☹	☹	☹	☹	☺	☺	☺	☹	☺
SAFETY	Redesigned bike lane (Budabest)	☺	☺☹	☹	☹	☺	☹	☺	☹	☹	☺
SECURITY	Anti-bicycle theft (Tartu)	☹	☹	☹	☺	☺	☹	☹	☹	☺	☹
CLIMATE	Winter cycling promotion (Oulu)	☺☹	☹	☹	☺	☹	☹	☹	☺	☺	☹
COMMUNIC.	The most cycle-friendly city (Munich)	☺☹	☹	☹	☺	☺☹	☺	☺	☺	☺	☹
	Congestion charge (Stockholm)	☹	☺☹	☺	☹	☹	☹	☹	☺	☺	☹

Table 5-4 Applicability of best practices in Tallinn context

5.5.1 Infrastructural

Super highways in London

London and Tallinn both have a relatively high public transport modal split (EPOMM, 2014). London intends to take off the load from public transport and Tallinn should do the same, especially because the public transport is free in Tallinn. Compared to London, there are missing potential revenues from the public transport that Tallinn could use to develop alike super highways. Such super highways could be built by the railway lanes. On the one hand, the population density is almost twice higher than in Tallinn (5285 inhabitants/ km^2), therefore it would serve potentially more cyclists. On the other hand, it is of benefit for less densely populated Tallinn to have more free space to build those highways. Another difference is an average climate and precipitation per year. London has very little or almost no snow fall during the winter, whereas in Tallinn there is an average 60cm of snow and long cold winter, which requires regular snow clearance (Appendix II). There would not be that big of an issue with the bike lanes that are painted on roads but with cycling corridors that are segregated (Appendix I). Therefore, the policy transfer in this case could be emulation by borrowing the idea of connecting the city center with the surrounding districts via direct, safe and comfortable cycling highways. In addition, the policy transfer requires complementing policy instruments such as informative policy instruments (e.g. campaigns, promotions) and economic incentive for car drivers to shift. It could also be inspirational policy transfer because superhighways could be integrated into public transport system. This policy transfer should be coercive to put a basis for cycling infrastructure in Tallinn (Appendix I).

Redesign of Andrássy Avenue in Budapest

Tallinn and Budapest are both 'starter cities' with low levels of cycling. Budapest target is to achieve 10 % of cycling by 2020. In this study the same goal is proposed in Section 5.3.1. Both cities have around the same length of cycling lanes and paths (Budapest 221 km) (BKK, 2013). Hence, the idea to re construct the existing bike lanes is exactly what should be done in Tallinn. In addition, both cities have about the same population density, but Tallinn has smaller area than Budapest, which is advantage. Budapest has also very high public transport modal share, similarly to Tallinn. The important difference is an average temperature and relatively shorter winter periods in Budapest, which as with London require less snow clearance compared to Tallinn. On the other hand, well designed lanes are not requiring extra costs because they are located on the roads. Therefore, the suggested policy transfer type could be copying. The transfer could be more effective by combining different policy instruments. For example, including the informative policy instruments such as promotional events, accurate cycle path/lane maps, and monitoring. In addition, economic incentives for non-cyclists such as tax benefit from buying a bicycle or rewarding the already existing cyclists with bike accessories. Cities like Budapest, with low levels of cycling but great ambition to increase the modal split of cycling should be the focus for Tallinn. Since, the purpose of this infrastructure policy is to increase the cycling safety and comfort; the policy transfer should definitely be coercive.

5.5.2 Economic

Congestion Tax in Stockholm

Both Tallinn and Stockholm have about the same average climate. The population density is higher in Stockholm than in Tallinn, which makes the Congestion Tax more effective. In addition, the public transport use is 10 % lower and car share around 10 % is higher in Stockholm than in Tallinn. Because the public transport share is relatively high to offer it as an alternative for car users, then prior to implementing such policy for cycling, there should be a well-connected and safe cycling network in place in Tallinn. In addition, Tallinn could introduce bike sharing scheme as an alternative in addition to public transport. On the one hand, a congestion tax could be a city's revenue, which is invested into cycling infrastructure development and advocacy. On the other hand, Tallinn centre is relatively small area to be taxed. Furthermore, because the tax is unpopular policy to make for decision-makers (Börjesson, 2012, p.1), perhaps Tallinn could instead use traffic calming in the city centre to make it uncomfortable and slow for cars to commute through the city centre. Thus, such policy could inspire Tallinn to find ways to reduce car users. The policy transfer is therefore voluntary.

5.5.3 Informative

"No ridiculous car trips" in Malmö

Both Tallinn and Malmö have around the same amount of inhabitants but the population density in Malmö is higher than in Tallinn because of smaller surface. Malmö has the same average climate but relatively shorter winter period than in Tallinn. Another difference appears to be the share of public transport, which is only 14 % (EU Advance, 2014), which is 4 times less than in Tallinn. Considering the primary purpose for Malmö's policy is to reduce car use for trips shorter than 5 km, Tallinn with 30 % car share and 45 % of public transport share, should also target the residents that are using the public transport for short distances to take

off the load. In addition, in order to transfer the policy, Tallinn has to provide sufficient cycling infrastructure. Thus, the best policy transfer type would be combination of different policy instruments to complement Malmö's policy. According to Figure 5-3, around 24 000 people in Tallinn are going to work by car at least 5 km (that excludes trips for other purposes such as going to shopping centre). Despite, Malmö's policy is voluntary but would be very useful tool to raise awareness and change mindset.

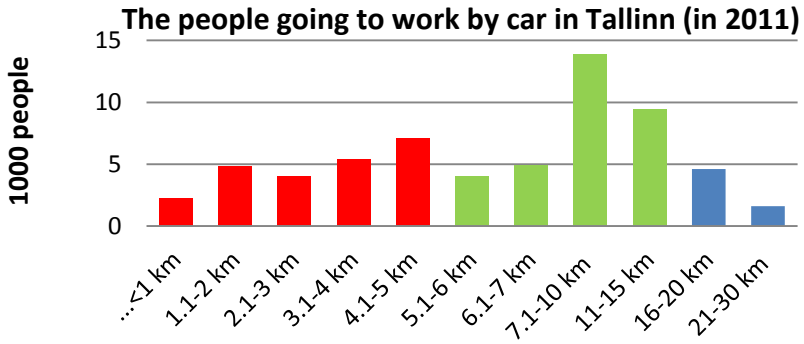


Figure 5-3 The number of people going to work by car in Tallinn and distance (Mobile 2020, Stat, 2013).

Tartu Anti-bike theft campaign

Both cities are having about the same population densities, except Tartu is smaller in area, which gives advantage for riding a bike. Tartu has already 4 % of cyclists in modal split and it has been nominated as the best bicycle friendly city in Estonia (Mobile2020, 2014). Despite, Tartu's modal share of public transport is 27 %, which is adequate when considering the number of residents and the area of Tartu. Tartu is actively promoting cycling and in integrating relevant stakeholders in decision making. In addition, because both cities are located in Estonia the climate is the same. Bicycle theft is a problem in Tallinn as well, as this policy requires engaging stakeholders for a common goal: to reduce bike thefts. It would be a very good start for Tallinn to start to have a dialogue on bicycling topic with key, primary and intermediaries. In addition, Tallinn is already providing cycling parks. The safety could be improved with anti-bike theft campaign. Therefore, the policy transfer would definitely be copying and voluntary but useful.

Winter cycling promotion in Oulu

Oulu's average temperature is lower than in Tallinn but both Oulu and Tallinn have more than 100 thermal winter and snow days. The population density in Oulu is twice lower but there is trice longer cycling infrastructure than in Tallinn (613 km) but this is mainly resulting from the longer distances between the destinations (ibikeoulu, 2014). Oulu's share of public transport is just 6 %, which is much lower and the modal share of cars is 54 % that is much higher than in Tallinn. Overall, considering the current situation in Tallinn, the inspirational policy transfer seems the only applicable type because the outcome would rather be to improve cycling conditions during the winter season rather than to promote Tallinn as winter cycling city. The latter could be possible only through combination of policies and gradual development. With winter cycling safety perspectives the policy transfer should be coercive otherwise voluntary.

Cycling capital campaign in Munich

Munich's population density is higher than in Tallinn. In addition, an average temperature is higher, which means the winter period regardless of snow is shorter than in Tallinn. The share of public transport is around 21 %, which is twice less in Tallinn. This criterion is irrelevant for Munich's campaign, but becomes relevant when there are complimentary policy instruments such as infrastructure policy required. Therefore, concentrating only on the campaign and taking into account the competition for "Estonian most bicycling friendly city" (Mobile 2020), the policy could be copied to Tallinn context. Tallinn could find a motivation to compete with other Estonian cities and at the same time increase cycling share. Eventually, this approach requires infrastructural policy instruments. If Tallinn would use this policy to encourage cycling to achieve the target of 10 %, then the policy transfer would be inspirational, or still copying with co-benefit (ECF, 2014b, p.13; Giles-Corti et.al, 2010). The policy transfer imitative would be in this case voluntary.

5.5.4 Regulations

According to the Table 5-5 and Section 3.X. There were no regulative examples from other cities evaluated in this study. The regulative policy instruments in the examples cities such as Budapest and London were used to complement the initial Infrastructure policy (Transport for London, 2011, p.14; BKK, 2013). In addition, Stockholm's Congestion Tax, which is economical policy instrument that requires regulative policy instrument in order to fine the car drivers who do not pay the tax. Within first 5 days the 7 EUR charge is added, if this is not paid in four weeks' time additional 50 EUR is added to the payable Tax and authorities have the right to automatically take off this money from the person's bank account (Swedish Transport Agency, 2014; p.13; Stockholm, 2009; Transport-Technologies, 2014). Therefore, regulative policy instruments require additions or changes in a law, which mainly depends on the political situation in certain cities (countries). For instance, in case Tallinn wants to have a cycling friendly traffic management regulations such as speed limits, one-way streets for cars and two way streets for cyclists, and widening of the transport priority lanes, require the use of regulative policy instrument, those should be regulated in traffic standards or Tallinn Acts.

5.6 Policy intervention

Transferring policies from example cities helps Tallinn to avoid waste of limited resources and prevent failures that in turn can reduce public support. The policy transfer analysis considering the examples of best practices shows that not all polices could be just copied from one city context to another. Based on the potential Scenarios in Section 5.3.3, the best practices from other cities can be used to a certain extent. The explanation of how those policies are intended to be implemented and what are the expectations for each Scenario are explained.

Scenario 1: In this Scenario Tallinn would not trade-off road use and public transport but puts infrastructure and promotional measures to improve the current infrastructure. For that purpose, it is important that Tallinn is forming bicycle traffic standards, which include cycling traffic signs, paint colour and marking criteria, the width of cycle lane and path. In addition, it is important that the cyclists and pedestrians are not considered as one category in strategies, plans and policies; this prevents the cycling share to rise. Cycling utility promotion and awareness rising of the benefits of utility cycling should be included in Scenario 1 measures. All the policies objectives should be provided with corresponding action in the transport strategies and plans, which also includes the regular stabilized investments. Before and after an improvement is made the cyclists should be monitored and audited to be able to further analyse and improve certain policies and resulted policy outcomes. Scenario 1 could benefit from transferring the Budapest policy idea to redesign and improve the safety on already existing cycling infrastructure. However, this requires identification of the most dangerous

intersections and also the most practical parts that should be prioritized. In practice, this would involve the removal of the dangerous curbs and moving the public transport shelters closer to the roads in order to enable access behind the pavilion. In addition, all the bike lanes (marked blue in Tallinn cycling map), should be painted in red, for example, as in Tehnika street to have a uniform standard. All existing bike lanes and paths should have traffic signs, which would raise awareness among the car drivers and grow trust and prevent confusion among all road users. Emulation of the idea from Budapest would require an inspirational policy transfer from Oulu that is maintenance of the cycling infrastructure, especially during the winter. Cyclists that are using existing cycling paths should not be put in danger and given second priority after road maintenance (Appendix II). In case Tallinn fails to promote winter cycling similarly to Oulu, then an alternative approach is to make more promotional campaigns during the late spring to late autumn (with reference to Tallinn Bicycling Week in May, on Car Free Day in September, and during the Endomondo European Cycling Challenge month in May). All the improvements should be communicated to the public similarly to Budapest example. For instance, re-opening the restructured and painted cycle lane in Luise Street. In addition, Tallinn should reward already existing cyclists and discourage car use, as is done in Malmö and Munich. The aim of this scenario is to build a good basis for Scenario 2. Therefore, regardless the target stated in Section, 5.3.1 the primary focus is to improve safety and infrastructure. There is a fear of bike theft not only by the important institutions and city centre but also near people's homes especially by the multi-story dwellings that form most of the residential buildings in Tallinn. The economic incentive should be given to the housing associations to build safe parking house by the residential building. This policy instrument could be complemented with Tartu's Anti-bike theft informative policy instrument. The intention of the Scenario 1, is to gradually increase the cyclists at the expense of existing cycling infrastructure. As mentioned previously in Section 5.1.1, 5 km of cycling infrastructure can increase 3 % of cycling share. Thus, potentially Scenario 1 would increase up to 4-5 %.

Scenario 2: Ideally, Scenario 2 would be a continuation of Scenario 1, after 4-5 % of cycling share is achieved. Therefore, the criteria under Scenario 1 is not analysed to a great extent. The Scenario 2 would include some new parts. First, building new cycle lanes and paths to further connect the cycling infrastructure with the aim to make it more direct and convenient for cyclists to move from point A to point B. For this it is necessary to have a bicycle- friendly traffic management and regulations that prioritize cycling before cars and public transport. Second, the public transport could be integrated with cycling to reduce commuting by cars from the neighbouring municipalities to Tallinn daily. Additionally, a bike sharing scheme could be introduced. Scenario 2 requires frequent communication between all the stakeholders to improve, consider and represent all the interests. According to Table 5-4, then the coercive policy incentives should be given the priority. Transferring the London example, would help cyclists to commute faster longer distances. Such highways or cycling corridors could be positioned by the railway to connect inner and outer city or by the important key streets, which would require the road space reduction for cycle highway. The policy requires regulative policy instruments to prevent car drivers and motorcyclist using the cycling designated infrastructure. In case, the highway or corridor is running through the streets where, there is no possibility to reduce road space the speed limit should be implemented and/ or infrastructure policy instruments such as bollards or other physical barriers to ensure the speed reduction should be implemented. The highway should be opened with a promotional event. Meanwhile, the economical policy instruments such as tax benefits, subsidized bike equipment and discounts could be rewarded to cyclists. Malmö's "no ridiculous car trips" campaign would be advisable in order to change car users' mindset and provide them an alternative in a form of cycling. In addition, those public transport users travelling only a few stops could ideally shift to cycling to take off the load and raise the satisfaction of the public

transport. With 4-5 % of cycling share and improvements in infrastructure and safety Tallinn could potentially became the most bicycle friendly city in Estonia. Therefore, Munich's policy for promotion is appropriate. If Scenario 1 might not need cycling working group and could be confined to involving non-governmental organizations and wider public to policy-making, then Scenario 2 would require Tallinn City Administration to create a position for cycling ambassador as in many Swedish cities such as Lund, Malmö, Gothenburg (Appendix I). The expected outcome of Scenario 2 is to achieve 10-15 % of cycling share in Tallinn both at the expense of car and public transport users.

To conclude chapter 5 then both scenarios witness that the policy transfer type copying can be possible but are not sufficient to meet the policy target and objectives alone. The political willingness is invaluable in both Scenarios. Furthermore, it requires involving public, planners and careful allocation of the funds. Thus, the decision-makers should prioritize the routes that are connected to the city centre where the most people are going daily. It is good initiative that the city is building outside the city centre the high quality cycle paths but they are not used to their full potential by the utility cyclists. Tallinn is not so big city that it could not be able to have a fully connected cycling infrastructure. However, there are several additional barriers that are more complex such as political willingness, the current city structure, and climate, where very cold weather is more an issue than just removing the snow fall. Those challenges are further discussed in Chapter 6 together with the timeframes and expected outcome of the policies for both scenarios.

6 Discussion

6.1 Timeframes

Based on the two recommended Scenarios in Chapter 5, the timeframe is divided into two categories. Taking into account Tallinn target is to raise cycling share up to 10 % by 2020, then presumably the changes would start to happen from year 2015. First stage includes the actions from the Scenario 1, which would be allocated 2-3 years, from 2015-2017(8). Second stage includes the actions from Scenario 2, which are based on Scenario 1 achievement. This stage would be allocated depending on Scenario 1 time consumption, also 2-3 years. It may happen that some of the policy measures are overlapping or are relevant all the time e.g. cycling infrastructure management. Because some policy instruments require pre-study, such as the most dangerous or uncomfortable cycling paths and lanes, therefore, the timeframes is more to indicate how the implementation process would look. However, it is certain that ideally the prioritisation should be from the centre to outskirts and connectivity and safety are the essential when redesigning those lanes and paths. In order to exemplify what this could mean in practice, a number of practical actions in Tallinn are suggested in the Table 6-1.

	STAGE 1			STAGE 2		
Suggested practical actions	2015	2016	2017	2018	2019	2020
Action I						
Action II						
Action III						
Action IV						

Action I: Regular maintenance of the cycle paths and lanes.
Action II: Repaint and protect the current lane with partitions at places from Vabaduse Square along Kaarli Avenue, Luise Street till the beginning of Sõpruse Avenue (1.6 km). Currently, those lanes are putting cyclists in danger because they are not visible. By the cycle lane, on the right hand side there are high curbs and when approaching to Kristiine viaduct, those lanes disappear and are especially dangerous under the viaduct (Appendix II). This would connect Western Tallinn with city centre with high quality painted cycling lane. The estimated cost for 1.6 km would be around 107 200 EUR.
Action II: The same year or if not possible the following year the cycling lane in Tehnika Street until Paldiski avenue (2.1 km) bike lanes should be redesigned e.g. widened. Estimated cost for 2.1 km would be around 140 700 EUR.
Action III: The continuous cyclists' policy implication review is required to monitor the cyclists' amount and satisfaction regarding the improvement made. The first year would form the basis for comparison with the following years. Monitoring also helps to formulate informative policies and target groups
Action IV: Cycling highway from Tallinn Technical University- Sõpruse Avenue-(already existing bike lanes from Endla to Vabaduse Square)- Pärnu Avenue- Viru roundabout- Tallinn University, Narva Avenue- until Pirita promenade (around 12 km).

Figure 6-1 Examples of the practical actions in Tallinn and timeframes

6.2 Expected results and benefits

The ultimate goal for Tallinn is to become more liveable city. The policy objectives to regulate traffic and re-shape the urban space, restrict car use and give incentives to ride a bike, and promote utility cycling are expected after implementing policies through Scenario 1 and 2 leading to three main expected results, which are interconnected. It is expected Tallinn becomes a climber city in 2020 with cycling share 10 % of modal split. As the Tallinn population in August 2014 was about 432 000 inhabitants, it would mean that approximately 45 000 people in Tallinn would bicycle in 2020. Supposedly, the benefit of Tallinn being a

climber city is that new utility cyclists reduce the car use and also reduce the burden from the public transport. The public transport costs around 56 mln EUR per year to maintain. If 10 % would travel less frequently by public transport and there is no re introduction of fair ticketing system, the cost would be lower or there would be more funds available at the expense of those that shifted to cycling, to improve the public transport system because there is less demand. More important is that the expected increase in modal share would come at the expense of car users. Therefore, expected utility cyclists are the residents that are living inside a 5 km radius from the city centre. In Figure 5-4, the distances up to 5 km marked with red colour are home to around 24 000 people, which is approximately 5 % of the residents ideally that should be shifting to cycling. The next category of car users in driving distances from 5 km to 15 km inhabited by around 32 000 people and 7 % of the Tallinn residents start to use public transport integrated with cycling (Spokanetransit, 2014). The blue columns in Figure 6-2 from 16 km -30 km will probably remain the same depending on the integrated transport system time and cost effectiveness and comfort, but it forms less than 1 % of the people going to work by car in Tallinn.

In 2012 there were 274 268 registered cars in Tallinn. The total CO_2 emissions in transport sector were 620 362 t, where only 8. 3 % is due to public transport and in total it is 1.55 t per resident and 0.5 t per car in Tallinn (Hendrikson & Ko, 2011, p.40). If there would be 56 000 cars fewer daily then the CO_2 could be reduced. 10 % share of cycling in the busy streets with traffic volume higher than 30 000 cars per day such as Endla street (70 240), Tammsaare road (61 980), Pärnu avenue (46 830), Tartu avenue (40 905), Mustamäe road (37 439), and Sõle street (32 400) would not significantly reduce the noise levels because streets such as Endla is the bottle neck and connecting road between Western and Eastern part of Tallinn. According to Terviseamet (2011) to reduce 1 dB noise level the traffic volume should be decreased by 30 % (Terviseamet, 2011, p.7).Thus, the overall 15 % of reduction of cars would on average lower the noise levels just 0.5 dB depending on the street and the effectiveness of the political instruments used. It depends on where the 10 % of cyclists are moving. Furthermore, the health costs, which formed 5.9 % of national GDP and comprised 765 EUR per person for health care expenditure in 2012 is expected to decrease according to Figure 2-8 at the expense of cycling contribution to daily physical activities and also because of reduced air emissions and noise pollution (TAI, 2014).

With increased levels of cyclists the safety increases and risk to have an accident decreases because of the visibility of cyclists and the car users' awareness will raise. The re construction of the junctions especially can reduce 75 % of the accidents happening to cyclists. The visibility of cycling lanes especially those that are crossing the petrol station entrances could reduce most of the accidents caused by car hitting from the side. In addition, the safe parking facilities by the residential areas would reduce the theft.

6.3 Challenges

The continued investment focused on driving facilities results in more cars on streets and separate investments for transit results crowded transit system, which in turn results more people driving cars. Furthermore, underinvestment in bicycling results less comfortable cycling conditions, which make people to either walk or drive cars. The underinvestment in walking causes more pedestrian collisions and they therefore choose to drive. Thus, Figure 6-1 clearly nails the current political challenge in Tallinn, where there are separate investments such as provision of free public transport at the same time developing new parking places for cars by the residential areas and in the city centre. The current investment in free public transport is using too much of the city's financial resources that otherwise could be used to promote cycling. Even though, most of the parking places are private, it is a gap in law and it

should be fixed. Currently, cycling is underinvested and that is visible and evident in places where the lane suddenly disappears (Appendix II).

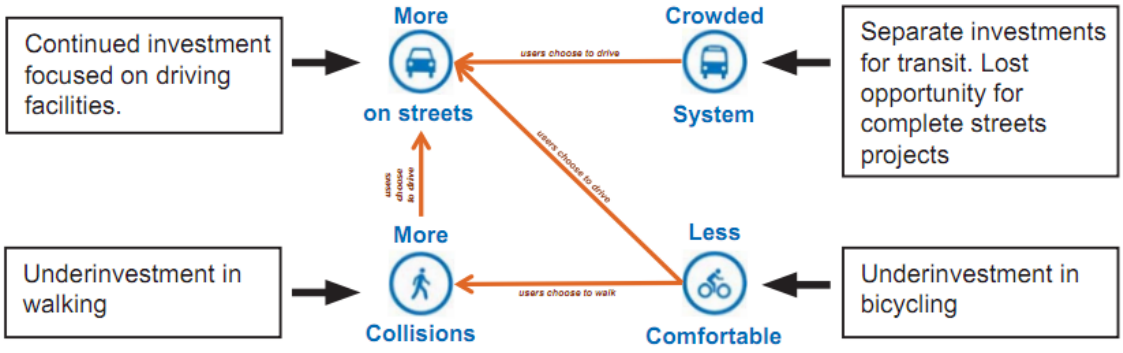


Figure 6-2 Implications of "business-as-usual" fragmented investments (SFMTA, 2013, p.7).

Whilst cycling remains marginal in transport policy discussion and in city budgetary allocation is modest, to change the system in favour of cyclists there cannot be under investment for transit and roads but there should be integration of cycling to the wider transport system and no more separate investments. In addition, until there is opposition between different political parties as there is today in Tallinn, it is very complicated to involve many actors because cycling policies are based on a wide range of objectives and due to lack of co-ordination, there are going to be continued biased policy planning in Tallinn. Furthermore, to change the mindset of car drivers is very difficult because currently there are no good cycling conditions, which could be provided as an alternative for car and also public transport users. The current utility cycling-specific infrastructure is flawed and of poor quality resulting from the decision makers technical understanding being not always adequate and efforts made are without goals. It is evident that the current high quality cycling paths are built outskirts of the city centre because as previously mentioned cycling in Tallinn is perceived as a sport and leisure activity rather than a mode of transport. Cycling lanes in the centre are just temporary lanes due to scarcity of road space, which considering the current situation, is making it difficult to provide adequate cycle infrastructure (ECMT, 2004, p.10).

Political perception of utility cycling

Interviews were carried out with the key decision makers in Tallinn (Appendix I) with the purpose to understand the political perception of the cycling as a mode of transport. Interviews gave a good overview of how policy makers, influential institutions and pressure groups see the cycling share development and how it affects the actual policy making. It is hard to generalise per department because some of the interviews were only carried out with one representative from each institution. Not all the politicians in current Tallinn Administration have the same priority, to improve cycling conditions especially in the city centre. Despite this, development of a liveable city should be the common goal for all and not depend on the background and personal preferences of certain politicians. There is a tendency in Tallinn on local level and in Estonia on national level that the decisions made and the priorities set are depending on the political party and its background and most of the stakeholders interviewed find that the background of the politician can be the biggest barrier or the best driver for increasing the share of cycling. The regulative policies are not very popular among the politicians because they give negative sound to the receiver of the regulation, when breaking a rule can lead to punishment or fees (Vedung, 1998). It is also an issue in Tallinn, where the politicians are afraid to make unpopular decisions such as taking away the urban space from cars or restricting further the car use in order to promote cycling. The common reason or excuse is that it would not receive a positive feedback from their

supporters and voters. Furthermore, because the political party can remain in power four years, it is very difficult to plan for long-term. Cycling, however, requires long-term and gradual planning.

The general political perception of the bicycle as a mode of transport is that it is important and beneficial to improve the modal share. Considering that there is enough evidence available of the benefits of the urban cycling, the local authority and other stakeholders are aware of the best practices, thus, there is no lack of evidence but rather lack of willingness to accept and to invest in cycling infrastructure and promotion. All relevant stakeholders are confident to see the cycling share increase happening in the future but also emphasizing that it is important to share the urban space equally among all modes of transport. This as previously mentioned is not possible in the areas with lack of space. Even though there are slight differences in opinion among the stakeholders, they all agree collectively that the change cannot happen overnight and must be therefore, gradual. All the city officials said that they are intending to decrease the parking places in the city, which is in conflict with actual actions. Some stakeholders find that there is a lack of interest to change BAU shift to more sustainable approach. Evidently there are many strategies that describe the common goal and vision but in reality the priorities vary slightly. Furthermore, the targets are often not achievable or gained with delay. For instance, the cycling share target was set to 10% by 2013 (Stratum, 2013), which is now extended to year 2020 (Tallinn, 2014). Thus, to shift towards cycling, requires more profound changes and measures to be implemented.

New street development according to old

There are many reasons why the bicyclists are considered together with pedestrians and why the utility cycling has not been prioritised over cars yet in Tallinn. They should be divided into walking and cycling, requiring distinct infrastructure for both categories. There are a lot of shared paths with pedestrians and cyclists. It is working, when there are just 1 % of cyclists but as soon as the cycling share raises those paths are not safe, fast and comfortable any longer for both cyclists and pedestrians and there will be conflict between two sustainable ways of mobility. This would also require sudden investments into infrastructure in order for the system to work properly. Today the cycle map considers all the paths where cycling is shared with pedestrians as part of the cycling infrastructure network (Figure 6-4).

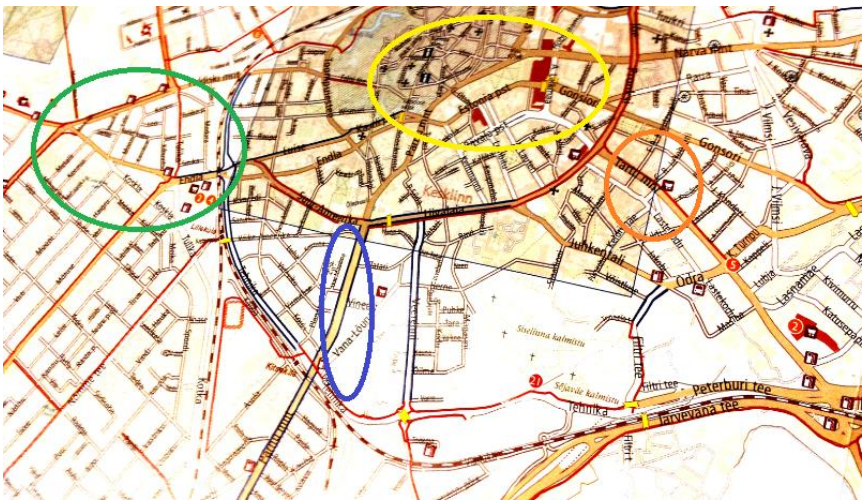


Figure 6-3 Tallinn cycling paths and lanes (Jalgrattateede kaart, 2014).

The main road construction works in Tallinn that are undertaken or currently in process only few projects have included cycling infrastructure and none in the city centre. The recent tramway lanes reconstruction in Pärnu and Tartu Roads reduced the space for cars but did not provide cycle lanes. Considering the cost of reconstructing 1 km of road, it is not economical to add cycling paths with extra costs. Most likely the next time cycling lanes come into discussion is in 10 years' time when those streets have to be reconstructed again. On the cycling map (Figure 6-3) the red lines mark cycle paths shared with pedestrians and the blue lines indicate painted lanes on the roads. On the figure the orange round indicates the Tartu road and it shows that there is cycle/pedestrian path, which ends randomly. The blue round indicates another project in Pärnu road, which was reconstructed but does have painted cycle lanes but very dangerous and ending closer to the city centre. The yellow round indicates the city centre area that the most residents need for good cycling connection but has currently no cycle lanes or paths. Finally, the green round indicates one important cycling connection that is partially missing. The cycle map is not very credible because the lanes marked with red do not mean the lanes are in good conditions and safe because the high quality paths are marked the same way. In addition, the card highlights the fact that the cycling infrastructure in Tallinn is not providing the cyclists direct access to the city centre. The cycle paths marked by the avenues of the districts such as Mustamäe, Lasnamäe, Õismäe, where most the Soviet era dwellings are located have exited there since half century and those paths are taken for granted today. It is not bad idea but those lines are not comfortable for cyclists to share with pedestrians and the cyclists are required to stop several times due to public transport stops, street lights, holes, high curbs and other such factors. In addition, as mentioned before, if the cycling share is to rise those shared paths are required to be widened or separated from pedestrians in order to provide safety for all the road users. The challenge is that these types of paths make up most of the current cycling infrastructure in Tallinn. The painted lanes are painted with temporary paint, which requires repainting every season or twice a season. The old lanes show that the current lanes are enlarged about 20 cm but also confuse both the cyclists and car drivers of which lanes are currently in use (Appendix II). Of course there are some good examples of the development of cycling lanes in Mulla Street. Despite this, those streets are not well connected to the wider cycling network. The whole cycling network marked on the cycle map can give wrong ideas about the safety and comfort of those lanes, especially for those that are not using the cycle daily or who are not familiar with Tallinn (e.g. tourists).

Absence of national policy framework

It would be ideal if there would be national cycling plan in Estonia, which would establish policy framework with clear common vision, goals, and tasks for national, regional and local authorities. Transparent legislation, regulations and guidelines would be a stimulus and inevitable shift from BAU to sustainable mobility management, especially for local authorities like Tallinn. It would equally distribute and allocate the financial and other instruments to facilitate the cycling development. In absence of the successful national policy framework, it is difficult to implement policies on local level (ECTM, 2004, p.13). Currently, the strategies Estonia 2030+ and Transport Development Plan do not specifically state the targets to be achieved for cycling in each city over 40 000 inhabitants, which would give perhaps more incentives for the local authorities to make effort if they are requested. Thus, the existing national strategies are very basic; on the one hand they advocate bicycling on the other hand they are too flexible. Therefore, there should be national cycling plan or sustainable transport plan, which concentrates more specifically on the appropriate measures that could be used by the local authorities and regionally. This strategy should be transparent and regulated according to its goals with the money allocated for the general road maintenance per year for local authorities. This could prevent the present imbalance of 95% of money being spent on

roads, and only 5% on cycling. As mentioned in Chapter 3 the national cycling plan does have certain advantages but if it does not exists as at the moment in Estonia, the local authorities have more flexibility in decision-making, which on the one hand would mean the minimal effort made or inversely more effort would be made than required by the national plan (e.g. Tartu).

7 Conclusion

7.1 Significance of the cycle policies

RQ1: What policies can play a role in increasing the modal share cycling in urban areas?

There are three main types of policy instrument regulative, economical and informative policy instruments. To advocate cycling, another type of policy instrument is necessary, that is infrastructure policy instrument. It is not very often that the single policy can play a significant role in increasing the modal share of cycling. Therefore, successful policy consists of many policy instruments and forms policy package. Furthermore, all the policies do not have the same effect in different cities. For instance, in order to increase cycling share 5 % in starter cities, taking into account the sequence of cycling efforts, mainly infrastructural policy instruments are required in order to build more cycling infrastructure. Even though it is starter city, the infrastructural policy most probably need complementary policy instrument such as informative, to promote cycling and regulative to protect cyclists. If the 5 % cycling share is expected in the climber cities, then those cities most probably have a basic network and relatively safe path and lanes, most probably cities in that category require more informative policy instruments mixed with economic incentives. Thus, it is hard to generalise what policy can play a role in increasing the modal share of cycling. As analysed in Chapter 5, different policies can have a several external factors such as an average climate, economic situation, population density and cities' modal splits. For example, cities with high levels of public transport e.g. 45 %, often have lower car use than cities with low levels of public transport and high levels of cycling.

Another important factor that affects the effectiveness of a particular policy in promoting cycling is stakeholder integration. There are identified three main types of stakeholders; those are key stakeholders, primary stakeholders and intermediaries. Ideally, the successful policy integrates all the stakeholders, which would have input from all, which makes it easier to accept the outcome of the policy. In case the cycling policy does not exist or does not function in a particular city it is advisable to look at best practice abroad. However, in order to successfully transfer the policy, it requires the export policy evaluation, the understanding of the current situation in policy improving country by identifying the existing barriers to cycling and potential drivers. There are four types of policy transfer, Copying which means transferring policy as it is; Emulation is to transfer the idea; Combination is combined policy transfer and Inspirational policy transfer is having the same input but different policy outcome. The incentive behind the policy transfer indicates if the policy is coercive, voluntary, or lesson-drawing. Furthermore, a successful policy is also integrated into relevant strategies and plans, which often requires the integration of national, regional and occasionally European Union policies. Cycling policies when included in the strategies should include the action plan with timeframes.

To conclude, policies that can play a role in increasing the modal share cycling in urban areas are:

1. Policies that are part of carefully chosen policy mix;
2. Policies that have included all the stakeholders in decision-making;
3. Policies that are successfully transferred from other cities and implemented;

7.2 Next steps

RQ2: How could policies successfully promote cycling in Tallinn?

Evidently there are plenty of existing successful cycling policies available that could be transferred and put into Tallinn context either by copying, emulation, combination or inspiration. There is a room for flexibility to design a right city-specific policy mix but yet there are several challenges in Tallinn that prevent the modal shift from happening. Those challenges are lack of political willingness, where cycling clearly is not considered as priority number one. Furthermore, it is not only the political willingness but also the lack of common vision among different political parties. Above all, the current decision makers are stuck in business-as-usual approach and are reluctant to change. Therefore, the first challenge is to change the business-as-usual approach that it is in favour of changing the current way of doing things.

Because there are no surveys carried out in Tallinn to find out the exact modal share of cycling with some sources giving 1 % others 4 % cyclists. Even if there might be already 4 % of cyclists in Tallinn it is evident that there are no safe and comfortable direct conditions for cyclists to commute from point A to point B. Despite, there is around 240 km of cycle lanes and paths listed, most of them do not meet the standards given in most of the cycling infrastructure guidelines and compared to other cities that focus on cycling. Furthermore, the infrastructure is not well connected. There is not a lack of funding, rather lack of know-how and courage to change the old way of doing things, e.g. road repair. Cycling should be advocated by using both soft and hard measures and forming policy mix that integrates all relevant stakeholders from different levels and sectors to prevent the conflicts. It is also evident that policy transfer especially from climber and champion cities to starter city cannot be one-to-one transfer and therefore requires additional policy instruments and related necessary soft and/or hard measures and more time.

Reducing the car use in Tallinn is not the main aim to advocate the cycling because the car modal share (32 %) is lower or equal compared to other cities where the cycling share is high such as Malmö (43 %); Copenhagen (29 %) and Amsterdam (38 %). This is mainly because Tallinn has very high share of public transport (52 %) that is free for all Tallinn residents and also because of separated bus lanes in the congested areas, which makes it faster during the peak hours than commuting by car. Therefore, the cycling policy should be targeted primarily to give economic instinctive for car users to phase out price sensitive car users and then regulate the remaining car users so that it is safe for cyclists to share road with motorists and comfortable in terms of time and maintenance of the cycling infrastructure. This could possibly transfer also already overloaded free public transport users across to cycling. If improving cycling infrastructure does not encourage public transport users into cycling, the re-imposition of fares may do so. More than pollution issue there is a problem with space.

To conclude, how policies could successfully promote cycling in Tallinn:

1. The policies should be based on common vision, individual policies are conflicting;
2. All the stakeholders should be involved in policy making especially in the beginning;
3. It is important to regularly monitor the cycling, to record the accidents and complaints in order to improve further the cycling conditions in Tallinn;
4. Policies should also discourage to use the public transport for the short distances that could be walkable or cyclable;

Bibliography

8-80 cities.(2014). 8-80 Reports Archive. Retrieved July 8, 2014 from *http://www.8-80cities.org/8-80-reports-archive*

Ahas and Silm.(2006). Tallinna tagamaa uusasumite elanike ajalis-ruumilise käitumise analüüs. *Tartu Ülikool, Geograafia Instituut*, 1-163

Akukon. (2012). Tallinna Linna Strateegilise Mürakaardi ülevaatamine ja täiendamine. Seletuskiri,Akukon, KIK, 1-28

Antov and Antso.(2013). Jalgrattaõnnetused, Tallinn Technical University. (PowerPoint, slides 1-17), Retrieved July 28, 2014 from *http://f.ell.ee/failid/LVP/2014/11/11_Tallinna_JR_ohutus_Dago_LVP2014.pdf*

Arnfalk, P., and Brandt, C., (2010) Mobility Management Moving In: the journey of integrating MM into decision-making processes in Municipalities. *Lund University*, *Øresund Eco-mobility*, 1-9

Blue, E.(2013). Bikenomics: How Bicycling Can Save the Economy (Bicycle). *Microcosm Publishing*

BKK. (2013). Our Progress. Retrieved July 16, 2014 *from http://www.bkk.hu/en/main-page/our-progress/*

BMVI (Federal Ministry of Transport).(2012). National Cycling Plan 2020, Joining forces to evolve cycling. *Berlin*, 1-43

BYPAD. (2008). Cycling, the European approach Total quality management in cycling policy. Results and lessons of the BYPAD-project.1-56

BYPAD. (2014). BYPAD in one minute. Retrieved August 15, 2014 from *http://www.bypad.org/cms_site.phtml?id=551&sprache=en*

Börjesson. (2012). The Stockholm congestion charges—5 years on. Effects, acceptability and lessons learnt. *Transport Policy*, 20, 1-12

Car Parking .(2014). P+R Vienna. Retrieved August 10, 2014 from *http://www.car-parking.eu/austria/vienna/pr*

Castillo-Manzano, J.I., and Sánchez-Braza, A. (2013). Can anyone hate the cycle? The hunt for an optimal local transportation policy to encourage cycle usage. *Environmental Politics*, 22 (6), 1010–1028

Cats, O., Reima, T., Susil, Y. (2014). Public Transport Pricing Policy – Empirical Evidence from a Fare-Free Scheme in Tallinn, Estonia. *Centre for Transport Studies, Department of Transport Science, Royal Institute of Technology (KTH), Stockholm, Sweden*, 1-14

Catch-MR project. (2013). Recommendations for regional cycling developments of Budapest metropolitan area *Transport challenges in metropolitan regions: The Catch-MR project,*1-16

Central Lab.(2010). Tallinna linnastu välisõhu kvaliteedi parendamise tegevuskava. *Tallinn,* 1-114

Central Meet Bike.(2014).Hard and Soft measures. Retrieved August 10, 2014 from *http://www.centralmeetbike.eu/palio/html.run?_Instance=centralmeetbike*

Champ-cycling. (2014a). About CHAMP. Retrieved June 1, 2014 from *http://www.champ-cycling.eu/en/About-Champ/Overview/*

Champ-cycling. (2014b). Strategy and implementation. Retrieved August 22, 2014 from *http://www.champ-cycling.eu/en/Stay-a-Champ/Strategy-implementation/*

Christianabikes.(2014). Christiana bikes. Retrieved August 11, 2014 from *http://christianiabikes.com/en/*

City of Brussels. (2014). Bicycles in Brussels. Retrieved June 9, 2014 from *http://www.brussels.be/artdet.cfm/4345*

City of Copenhagen.(2002). Cycle Policy 2002-2012.1-40

City of Copenhagen. (2011). Good, Better, Best. The City of Copenhagen's Bicycle Strategy 2011-2025. Retrieved from *http://kk.sites.itera.dk/apps/kk_pub2/pdf/823_Bg65v7UH2t.pdf*

City of Copenhagen. (2014). Copenhagen- The City of the Cyclists. Reatrived August 5, 2014 from *http://subsite.kk.dk/sitecore/content/subsites/cityofcopenhagen/subsitefrontpage/livingincopenhagen/cityandtraffic/cityofcyclists.aspx*

City of Helsinki.(2012). Facts about Helsinki 2012. 1-24

City of Helsinki.(2014). Promotion of cycling. Retrieved July 28, 2014 from *http://www.hel.fi/www/Helsinki/en/maps-and-transport/cycling/promotion/*

City of Lund. (2005). Utbyggnad av lunds cycelvägnät- 1986-2005, Cycelkarta animation

City of Lund.(2014). LundaMaTs II Strategy for a sustainable transport system for Lund 2030.1-8

City of Malmö. (2011). Cykelprogram För Malmö Stad 2012-2019.1-40

City of Malmö. (2014). Cycling. Retrieved August 10, 2014 from http://www.malmo.se/Stadsplanering--trafik/Trafik--hallbart-resande/Nar-du-cyklar/Cykelsatsningar-2014.html

City of Stockholms .(2009). Analysis of traffic in Stockholm with special focus on the effects of the congestion tax. *Summary 2005–2008,* 2-10

City of Tartu. (2014). Jalgrattalinn Tartu. Retrieved July 7, 2014 from *https://www.tartu.ee/?lang_id=1&menu_id=6&page_id=4582*

City of Oulu. (2014). Cycling. Retrieved July 5, 2014 from *http://www.ouka.fi/oulu/english/cycling1;jsessionid=81784C018C16EA22C1CFEB2F2C4792D5*

CIVITAS 2020. (2014). About us. Retrieved June 1, 2014 from *http://www.civitas.eu/about-us-page*

Copenhagenize. (2014a). The World's Most Cycle Friendly Cities. Retrieved July 9, 2014 from: *http://www.copenhagenize.com/2009/07/worlds-most-cycle -friendly-cities.html*

Copenhagenize. (2014b). The Copenhagenize Cycle Planning Guide. Retrieved July 16, 2014 from *http://www.copenhagenize.com/2013/04/the-copenhagenize-cycle -planning-guide.html*

Copenhagenize. (2014c). Accommodating for Cyclists During Roadworks. Retrieved Augus 8, 2014 from *http://www.flickr.com/photos/16nine/3618581639/*

Copenhagenize. (2014d). The Copenhagenize Index 2013, Cycle friendly cities. Retrieved August 10, 2014 from: *http://copenhagenize.eu/index/04.html*

Copenhagenize. (2014e). Seville. Retrieved August 23, 2014 from *http://copenhagenize.eu/index/04.html*

Copenhagenize. (2014f). Nantes. Retrieved August 23, 2014 from *http://copenhagenize.eu/index/06.html*

COWI .(2013). Study to Support An Impact Assessment of The Urban Mobility Package. 1-392

County of Durham. (2011). County Durham Cycling Strategy and Action Plan 2012-2015. 1-39

Cycle helmets. (2014). Cutting through the controversy about helmet effectiveness. Retrieved August 8, 2014 from: *http://cyclehelmets.org/*

Daley, M., Rissel, C.(2011). Perspectives and images of cycling as a barrier or facilitator of cycling. *Transport Policy*, 18, 211–216

de Hartog, J,J., Boogaard, H., Nijland,H., Hoek, G.(2010). Do the Health Benefits of Cycling Outweigh the Risks? *Environmental Health Perspectives*, 118(8), 1109–1116.

Delfi .(2014a). Tallinnas läks tasuline parkimine oluliselt kallimaks. Retrieved August 10, 2014 from *http://www.delfi.ee/news/paevauudised/eesti/tallinnas-laks-tasuline-parkimine-oluliselt-kallimaks.d?id=67540946*

Delfi .(2014b).Amet: Tallinna rajataval uusarendusel puudub ehitus- ja kasutusluba. Retrieved August 23, 2014 from *http://arileht.delfi.ee/news/uudised/amet-tallinna-rajataval-uusarendusel-puudub-ehitus-ja-kasutusluba.d?id=69588341*

dell'Olio, L, Ibeas, A., Bordagaray, M., de Dios Ortúzar, J. (2014). Modeling the Effects of Pro Cycle Infrastructure and Policies Toward Sustainable Urban Mobility. 1-8

Dolowitz, D.P., Marsh, D.(2000). Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-Making, Governance. *An International Journal of Policy and Administration*, 13 (1), 5–24

EC. (1996). Future Noise Policy. *European Commission Green Paper*, 1-35

EC. (2002). Directive 2002/49/EC of the European Parliament and the Council of 25 June 2002 relating to the assessment and management of environmental noise. 18.7.2002, L 189/12. Noise Directive.

EC. (2008). Directive 2008/50/EC on ambient air quality and cleaner air for Europe. 11.6.2008, L 152/1. Air Quality Directive.

EC. (2010). Impact Assessment in the policy cycle at the European Commision. *CIA4OPM Conference*, Retrieved August 20, 2014 from *http://slideplayer.us/slide/232866/*

EC. (2011). Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system. *White Paper*, 1-30

EC.(2014a).Reducing Emissions from transport. Retrieved June 26, 2014, from *http://ec.europa.eu/clima/policies/transport/index_en.htm*

EC.(2014b).A sectoral perspective. Retrieved June 26, 2014 from http://ec.europa.eu/clima/policies/roadmap/perspective/index_en.htm

EC.(2014c). Clean Transport, Urban Mobility. Retrieved August 9, 2014 from *http://ec.europa.eu/transport/themes/urban/urban_mobility/index_en.htm*

EC.(2014d).Cohesion Policy. Retrieved June 3, 2014 from *http://ec.europa.eu/regional_policy/thefunds/funding/data/graphics/cohesionpolicy20142020_full_highres.pg*

EC. (2014e). Clean Transport, Cycling. Retrieved June 10, 2014 from *http://ec.europa.eu/transport/themes/urban/urban_mobility/index_en.htm*

EC. (2014f).European Green Capital. Retrieved July 10, 2014 from *http://ec.europa.eu/environment/europeangreencapital/index_en.htm*

EC. (2014g).Reducing CO_2 emissions from passenger cars. Retrieved June 14 from *http://ec.europa.eu/clima/policies/transport/vehicles/cars/index_en.htm*

ECMT (European Conference of Ministers of Transport). (2004). National Policies to Promote Cycling. *OECD*, 1-90

EEA (European Environmental Agency).(2008). Transport at a crossroads TERM 2008: indicators tracking transport and environment in the European Union. *EEA Report No 3/2009,* 1-56

EEA (European Environmental Agency).(2011). Laying the foundations for greener transport

TERM 2011: transport indicators tracking progress towards environmental targets in Europe. *EEA Report No 7/2011,* 1-92

EEA (European Environmental Agency).(2013). A closer look at urban transport TERM 2013: transport indicators tracking progress towards environmental targets in Europe. *EEA Report No 11/2013*, 1-112

EEA (European Environmental Agency).(2014a). Front-running cities changing transport, improving quality of life. Retrieved August 17, 2014 from *http://www.eea.europa.eu/media/newsreleases/front-running-cities-changing-transport*

EEA (European Environmental Agency).(2014b). Environmental Terminology and Discovery Service (ETDS). Retrieved August 17, 2014 from *http://glossary.eea.europa.eu/EEAGlossary/A/A-weighted_decibel*

EEA (European Environmental Agency).(2014c). Urban Environment. Retrieved August 17, 2014 from *http://www.eea.europa.eu/themes/urban/intro*

EEA (European Environmental Agency).(2014d). Noise. Retrieved August 17, 2014 from *http://www.eea.europa.eu/themes/noise/intro*

EEA (European Environmental Agency).(2014e).Turn down the noise - softening the impact of excess transport noise. Retrieved August 17, 2014 from *http://www.eea.europa.eu/articles/turn-down-the-noise-2013-67-million-europeans-endure-high-transport-noise-exposure*

EEA (European Environmental Agency).(2014f).Estimated percentage of population exposed to different road traffic noise levels. Retrieved August 17, 2014 from *http://www.eea.europa.eu/data-and-maps/figures/estimated-percentage-of-population-exposed-to-different-road-trafic-noise-levels/fig5/image_original*

Eesti Roheline Liikumine. (2014). Ogranisatsioon. Retrieved August 10, 2014 from *http://www.roheline.ee/organisatsioon/*

EFC. (2011). CyCle more often 2 Cool down the planet! Quantifying Co2 savings of Cycling, 1-16

ECF. (2013). National Cycling Concept 2014-2020. 1-14

ECF. (2012). ECF Vision 2020, more people cycle more often. Retrieved August 23, 2014 from *http://www.ecf.com/wp-content/uploads/121004_ECF-Vision-2020_final_version_agm_vienna_2012.pdf*

ECF.(2014a). European Funding. Retrieved June 26, 2014, from *http://www.ecf.com/advocary/eu-funding-2/6-billion-euros-for-cycling-campaign/*

ECF.(2014b). A Call for Action: 10 key measures to get more people cycling more often in Europe ECF Manifesto for the European Parliament election 2014 – Long version, 1-21

ECF.(2014c). Who owns the city? A public "road space justice report" from Berlin. Retrieved August 23, 2014 from: *http://www.ecf.com/news/who-owns-the-city-a-public-road-space-justice-report-from-berlin/*

Rosqvist Eliasson, J., Hultkrantzb, L., Nerhagenc, L., Smidfelt, L. (2006). The Stockholm Congestion-Charging Trial 2006: Overview of Effects. 1-29

ELLE, Keskkonnaamet, KIK.(2013). Välisõhus leviva müra vähendamise tegevuskava Tallinnas aastateks 2014—2018. 1-107

ELTIS. (2013).Developing and implementing a sustainable urban mobility plan. *Guidelines*, 1-151 Retrieved from *http://www.eltis.org/sites/eltis/files/guidelines-developing-and-implementing-a-sump_final_web_jan2014b.pdf*

ELTIS. (2014a). Case Studies. Retrieved June 1, 2014 from *http://www.eltis.org/*

ELTIS. (2014b).Oulu – The winter cycling capital of the world, Finland. Retrieved August 8, 2014 from *http://www.eltis.org/index.php?id=13&study_id=3708*

ELTIS. (2014c).Transforming of car tracks into cycle lanes.(Video) Retrieved August 7, 2014 from *http://www.eltis.org/index.php?id=61&items_num=10&items_start=0&search_start=1&video_id=125&searchstring=Full text+search&country_id=0&topic_id=15&eltis=0&*

EPOMM.(2013).Managing for a better future. *Brussels*, 1-123

EPOMM. (2014). EPOMM activities and membership explained. Retrieved June 1, 2014 from *http://www.epomm.eu/index.php?id=2591*

ERR .(2014a). Siseministeerium tahab teha kiivri kandmise kõigile jalgratturitele kohustuslikuks. Retrieved August 10, 2014 from *http://uudised.err.ee/v/eesti/a1ace2f8-1564-4c36-8b06-0c575a5503f3*

ERR .(2014b).Tallinn: kesklinnas napib maad jalgrattateede rajamiseks. Retrieved July 9, 2014 from *http://uudised.err.ee/v/eesti/7c2104a0-612e-4d15-9e5b-b78cc2604b67*

ERR .(2014c).Tallinna kesklinna paigaldatakse sadakond jalgrattahoidikut. Retrieved July 9, 2014 from: *http://uudised.err.ee/v/eesti/b7d94bcd-8197-4b72-934e-79507fd8eecc*

ERR .(2014d). Tallinna ratturitele teeb muret hoiukohtade vähesus. Retrieved July 9, 2014 from *http://uudised.err.ee/v/eesti/0e8de966-97d2-4af0-88d0-3651ba6e5410*

ERR .(2014e). Jalgrattur: Eesti autojuhid pole suhtumises Euroopale järele jõudnud. Retrieved July 9, 2014 from *http://uudised.err.ee/v/eesti/c23a771d-cd0e-4e1f-8187-42cae11eaf0b*

ERR .(2014f).Bussijuht: bussirajad on väga positiivselt mõjunud. Retrieved August 18, 2014 from: *http://uudised.err.ee/v/eesti/110d5be7-6559-4439-b7cc-cd418a3c716e*

EU Advance.(2014). Description. Retrieved May 10, 2014 from *http://eu-advance.eu/index.php?id=40*

Euro Park.(2014). Euro Park Web page. Retrieved August 23, 2014 *from http://www.europark.ee/*

Fastcoexist. (2014a).The Cities That Spend The Most On Bike Lanes Later Reap The Most Reward. Retrieved August 19, 2014 from *http://www.fastcoexist.com/3034354/the-cities-that-spend-the-most-on-bike-lanes-later-reap-the-most-reward?partner=rss*

Fastcoexist. (2014b). Want To Make Money? Build A Business On A Bike Lane, August 19, 2014 from *http://www.fastcoexist.com/1682022/want-to-make-money-build-a-business-on-a-bike-lane*

Fastcoexist. (2014c).Bikes Aren't Just Good For You, They're Good For The Economy, Too. Retrieved August 19, 2014 from *http://www.fastcoexist.com/1680611/bikes-arent-just-good-for-you-theyre-good-for-the-economy-too*

Fietsberaad. (2009). Cycle policies of the European principals: continuous and integral. *Fiets and Beraad, publication*, 7, 1-120, Retrieved from *http://www.fietsberaad.nl/library/repository/bestanden/Fietsberaad_publicatie7_Engels.pdf*

Flood site. (2007). Framework to Analyse Strategies for Pre-Flood Risk Management in Strategies for Pre-Flood Risk Management. *Chapter 2,* 2-37

Flusche, D.(2012). Cycling Means Business: The Economic Benefits of Cycle Infrastructure. *Advocacy Advance*, 1-28

Fubicy. (2014). Our helmet main page, English version. Retrieved August 8, 2014 from *http://www.fubicy.org/spip.php?article191*

Giles-Corti,A., Foster,S., Shilton, T., Falconer, R.(2010). The co-benefits for health of investing in active transportation. *N S W Public Health Bull,*21(5-6), 122-7.

Hajinasab. (2014). A Survey on the Use of Computational Models for Ex Ante Analysis of Urban Transport Policy Instruments. *Procedia Computer Science*, 32, 348–355

Handy, S., Wee, B., Kroesen, M. (2014). Promoting Cycling for Transport: Research Needs and Challenges. *Transport Reviews: A Transnational Transdisciplinary Journal*, 34 (1), 4-24

Hendrikson & Ko. (2011). Tallinna linna ja linnastu süsihappegaasi heitkoguste inventuur 2011. *KIK, Tartu*, 1-84

Hull, A. (2008). Policy integration: What will it take to achieve more sustainable transport solutions in cities? *Transport Policy,* 15, 94–103

i Bike Oulu. (2013). Winter Cycling Congress 2013. 1-24

i Bike Oulu. (2014). I Bike Oulu Website. Retrieved August 5, 2014 from *http://www.ibikeoulu.com/*

Ilmateenistus. (2014). Ilmaprognoosid. Retrieved August 16, 2014 from *http://www.ilmateenistus.ee/ilm/prognoosid/4-oopaeva-prognoos/*

ISU (Infrastructure Services Unit). (2013). Integrated and sustainable mobility policies: review and proposed conceptual framework, Facilitation of Transport and Trade in Latin America and The Caribbean. 323 (7), 1-8

JCDecaux .(2014). Bike Hire. Retrieved August 1, 2014 from *http://www.jcdecaux-oneworld.com/jcdecaux-products/bike-hire/*

Jones, T. (2012). Getting the British back on cycle s—The effects of urban traffic-free paths on everyday cycling. *Transport Policy*, 20, 138–149

Junta de Andalucía. (2014). Plan Andaluz de la Bicicleta 2014-2020. 1-192

Jüssi, M., Poltimäe, H., Sarv, K., Orru, H. (2010). Säästva transpordi raport 2010. *Säästva Arengu Komisjon,* Tallinn, 1-73

Jüssi, M., Sarv, K. (2011). Sustainable Transport Perspectives for Estonia. *Stockholm Environment Institute*, Policy Brief, 1-4

Jüssi, M., Rannala, M. (2014). ENMAK 2030+ Transpordi ja liikuvuse stsenaariumid. *Stockholm Environmental Institute, Kami OÜ*, 1-36

Jüssi, M., Poltmäe, H., Luts, H., Metspalu, P. (2014). Energiasäästupotensiaal Eesti trantspordis ja liikuvuses, Energiamajanduse arengukava 2030+ tastauuring. *Stockholm Environmental Institute, Arengufond*, 1-70

Keppart.(2010). Kokkuvõte 2009-2010. a talve ilmast.1-3

Koucky, M.(2013). Cycling: A sustainable mode of transport. Potential and challenges. *Koucky&Partners*, (PowerPoint, slides 1-74)

Lah, O.(2014). 1st European Conference on Sustainable Urban Mobility Plans: Planning for a liveable city Seminar: *Moderation and introduction 'Integration of transport, land-use and health planning'*, Wuppertal Institute, Germany, attended on 12th of June 2014 in Sopot

Landeshaupstadt München.(2010). Bicycle Traffic in Munich, 2-28

Landeshauptstadt München.(2013) Munich as a business location. Facts and figures. 1-24

Lepik, R. (2007). BYPAD auditi aruanne. Tallinn, 1-18

Liigume .(2014). Eesti Liikumise Aasta 2014. Retrieved August 26, 2014 from *http://liigume.ee/*

Maanteamet .(2002). Eesti Rahvuslik Liiklusohtusprogramm aastateks 2003-2015. 1-8

Maanteamet. (2014). Estonian Road Administration. Retrieved August 5, 2014 from *http://www.mnt.ee/index.php?id=13655*

Mackett, R.L. (2001). Policies to attract drivers out of their cars for short trips. *Transport Policy*, 8, 295-306

Macmillan, A., Connor, J., Witten, K., Kearns, R., Rees, D., Woodward, A. (2014). The Societal Costs and Benefits of Commuter Bicycling: Simulating the Effects of Specific Policies Using System Dynamics Modeling. *Enviornmental Healht Perspectives,* 1-10

Martens, K.(2004). The cycle as a feedering mode: experiences from three European countries. *Transportation Research Part D*, 9, 281–294

Mickwitz, P. (2003). A Framework for Evaluating Environmental Policy Instruments, Context and Key Concepts, 9(4), 415–436, *Sage Publication, London*

MKM (Majandus- ja Kommunikatsiooni Ministeerium). (2012). Transpordi arengu ja investeeringute osakonna põhimäärus. 1-4. Retrieved from *https://www.mkm.ee/sites/default/files/contenteditors/failid/Organisatsioon/pohimaarus_taio.pdf*

MKM (Majandus- ja Kommunikatsiooni Ministeerium). (2013). Transpordi arengukava 2014-2020, 1-74

MKM (Majandus- ja Kommunikatsiooni Ministeerium). (2014).Transport. Retrieved August 8, 2014 from *https://www.mkm.ee/et/tegevused-eesmargid/transport*

Mobile 2020 (2011) Koolitus. Retrieved May 10, 2014 from *http://files.bef.ee/Mobile_koolitused/01_Integreeritud%20planeerimine.pdf*

Mobile 2020 (2014) Jalgrattasõbraliklinn 2014, küsitluse kokkuvõte, 1-6. Retrieved July 9, 2014 from *http://www.mobile2020.eu/fileadmin/files_ee/seminar/Jalgrattasobralik_linn_kokkuvote_loplik.pdf*

Möller, T. (2007). Cycling inspiration book. *Baltic Sea Cycling project*, 1-83

O'Dolan, C., and Rye, T.(2012). An insight into policy transfer processes within an EU project and implications for future project design. *Transport Policy*, 24, 273–283

OECD. (1999). Traffic congestion in Europe, Round Table 110. *Economic Research Centre*, 1-40

Orru .(2007). Välisõhu kvaliteedi mõju inimeste tervisele Tallinna linnas, Peenetest osakestes tuleneva mõju hindamine. *Tartu Ülikool*, 1-61

Orru .(2011). Välisõhu kvaliteedi mõju inimeste tervisele Eestis, Peenetest osakestes tuleneva mõju hindamine. *Tartu Ülikool*, 1-67

Palma and Lindsey.(2011). Traffic congestion pricing methodologies and technologies. *Transportation Research Part C: Emerging Technologies*,19, (6), 1377–1399

Parkimine.(2014).Tallinna Avatud Parklad. Retrieved August 10, 2014 from *http://www.parkimine.ee/Parkimisinfo/tallinn/parklad*

Pealinn .(2014). Tallinna kesklinna tuleb juurde uusi jalgrattateid. Retrieved July 9, 2014 from *http://www.pealinn.ee/koik-uudised/tallinna-kesklinna-tuleb-juurde-uusi-jalgrattateid-n15884*

Politsei .(2014). Jalgrattavargused. Retrieved August 9, 2014 from *https://www.politsei.ee/et/nouanded/oma-vara-kaitse/jalgrattavargused.dot*

Politsei .(2014). Statistilised andmed jalgrattavarguste kohta Tallinnas aastatel 2009-2014. *Sourced via email (Excel table)*

Politsei. (2014). Jalgrattavargused Tartu linnas 2010.aastal. 1-3

Postimees. (2014a). Savisaar läheb Lasnamäele parklaid avama. Retrieved August 14, 2014, from: *http://tallinncity.postimees.ee/2886067/savisaar-laheb-lasnamaele-parklaid-avama*

Postimees.(2014b). Jalgrattaõnnetuste arv Tallinnas on kahekordistunud. *Tallinn City*, Retrieved July 28, 2014 from *http://tallinncity.postimees.ee/2753266/jalgrattaonnetuste-arv-tallinnas-on-kahekordistunud*

Pooley, C.G., Horton, H., Scheldeman, G., Mullen, C., Jones, T., Tight, M., Jopson, A., Chisholm, A. (2013). Policies for promoting walking and cycling in England: A view from the street. *Transport Policy*, 27, 66–72

PRESTO. (2010). Cycling Policy Guide General Framework. 1-18

Pruetz, R., (2013) Prosperity comes in cycles, cycle trails can pump up local economies. *Fellow of the American Institute of Certified Planners (FAICP)*, 1-7

Pucher, J., Buehler, R. (2006). Why Canadians cycle more than Americans: A comparative analysis of cycling trends and policies. *Transport Policy,* 13, 265–279

Pucher, J., Dill, J., Handy, S.(2010). Infrastructure, programs, and policies to increase cycling: An international review. *Preventive Medicine*, 50,106–125

Pucher, J., Buehler, R., Seinen, M. (2011). Cycling renaissance in North America? An update and re-appraisal of cycling trends and policies. *Transportation Research Part A*, 45, 451–475

Queensland Government. (2010). Queensland Cycle Strategy 2011-2021. 1-84

Queensland Government. (2014). Queensland Cycle Strategy 2011-2021. Retrieved August 24, 2014 from *http://www.tmr.qld.gov.au/Travel-and-transport/Cycling/Strategy.aspx*

Radlhauptstadt. (2014). Retrieved August 10, 2014 from *http://www.radlhauptstadt.muenchen.de/*

Rietveld, P., and Daniel, V., (2004) Determinants of cycle use: do municipal policies matter? *Transportation Research Part A*, 38, 531–550

Riigiteataja. (2011). Liiklusseadus. RT I 2010, 44, 261, 01.07.2011. Retrieved from *https://www.riigiteataja.ee/akt/117032011021*

Riigiteataja. (2012). Tallinna linna ehitusmäärus. RT IV, 09.03.2013, 42, 06.09.2012. Retrieved August 15, 2014 from *https://www.riigiteataja.ee/akt/409032013042*

Riigiteataja.(2013). Tallinna Linnavolikogu 13. juuni 2013 määruse nr 29 *„Tallinna arengukava 2014–2020" LISA*. 1-82, Retrieved August 15, 2014 from *https://www.riigiteataja.ee/aktilisa/4250/6201/3041/1110126050.attachment.pdf*

Santos, G., Behrendt, H.,Teytelboym, A.(2010a). Part I: Externalities and economic policies in road transport, *Research in Transportation Economics,* 28, 2–45

Santos, G., Behrendt, H.,Teytelboym, A.(2010b). Part II: Policy instruments for sustainable road transport, *Research in Transportation Economics,* 28, 46-91

Shepherd,S., Zhang, X., Emberger, G., Hudson, M., Maya, A,D.,Paulley , N. (2006). Designing optimal urban transport strategies: The role of individual policy instruments and the impact of financial constraints. *Transport Policy,* 13, 49–65

Schneider, R. (2011). Understanding Sustainable Transportation Choices: Shifting Routine Automobile Travel to Walking and Cycling. *University of California*, *Berkley,* 1-490

Schöller-Schwedes, O.(2010).The failure of integrated transport policy in Germany: a historical perspective. *Journal of Transport Geography*, 18, 85-96

SFMTA (Municipal Transportation Agency). (2013). SFMTA Cycle Strategy 2013, 1-34

Smart travel. (2008). Ireland's First National Cycle Policy Framework, 1-56

Spokanetransit .(2014). Bikes on Busses. Retrieved August 17, 2014 from *http://www.spokanetransit.com/ride-sta/view/bikes-on-buses*

Stat (Statistikaamet). (2013). Autiga tööl käivad hõivatud Tallinna elanikud põhitöökoha kauguse järgi elukohast. *Sourced via email (Excel table)*

Stat (Statistikaamet). (2014a). Real GDP per capita, growth rate and totals, Retrieved 26 June 2014 from *http://www.stat.ee/29958*

Stat (Statistikaamet). (2014b). Half of the gross domestic product of Estonia is created in Tallinn, Retrieved 26 June 2014 from *http://www.stat.ee/18877*

Stat (Statistikaamet). (2014c). Jalgsi või jalgrattaga käib tööl alla veerandi töötajatest. Retrieved July 9, 2014 from *http://statistikaamet.wordpress.com/2013/04/17/jalgsi-voi-jalgrattaga-kaib-tool-ligi-veerand-tootajatest/*

Stat (Statistikaamet). (2014d). Päevasel ajal Tallinna kesklinna rahvastik kolmekordistub. Retrieved August 26, 2014 from *http://statistikaamet.wordpress.com/2014/05/29/paevasel-ajal-tallinna-kesklinna-rahvastik-kolmekordistub/*

Stratum. (2009). 40 km/h Piirkiiruse rakendamise võimalus ja mõjud Tallinna kesklinnas. *Tallinn,* 1-71

Stratum.(2013). Kergliikluse prognoosimise juhend. 1-33

Sustainable Urban Mobility Plans. (2011). Developing and implementing a Sustainable urban mobility plan. *Guidelines,* 1-120

Swiss world. (2014). Bern. Retrieved July 28, 2014 from *http://www.swissworld.org/en/geography/towns/bern/*

Swedish Transport Agency. (2014). Congestion Tax in Sweden, 1-28

Taeihagh, A., Givoni, M., Bañares-Alcántara, R. (2013). Which policy first? A network-centric approach for the analysis and ranking of policy measures. *Environment and Planning B: Planning and Design*, 40, 595 – 616

TAI(Tervise Arengu Instituut) .(2014). Total expenditures on health care 2012. Retrieved August 19, 2014, from *http://www.tai.ee/en/health-data/health-statistics-and-health-research-database/latest-updates/3395-tervishoiu-kogukulud-2012*

Tallinn Bicycle Week. (2014). TBW-st. Retrieved August 10, 2014 from *http://tallinnbicycleweek.ee/tbw-st*

Tallinn Transport Department. (2012). Kesklinnas parkimise põhjused.*Küsitlus autojuhtide seas*, Turu-uuringute AS, 1-22

Tallinn (City Administration).(2010). Strateegia "Tallinn 2030". Retrieved August 16 2014 from: https://oigusaktid.tallinn.ee/?id=3001&aktid=118878

Tallinn (City Administration).(2011). Fakte Tallinnast. Retrieved June 24, 2014 from *http://www.tallinn.ee/est/ettevotjale/g2606s55594*

Tallinn (City Administration). (2012). Kergliikluse areng ja planeerimine Tallinnas. *Tallinn Municipal Engineering Services Department,* (PowerPoint, slides1-14).

Tallinn (City Administration). (2013a). Elanike rahulolu Tallinna linna avalike teenustega, 2013 Uuringu raport, *Eesti Uuringukeskus*, 1-83

Tallinn (City Administration). (2013b).Tallinn Development Plan 2014-2020. 1-88

Tallinn (City Administration). (2013c). Teehoolduskulud elukaare jooksul. *Tallinn City Municipal Engineering Services*, (PowePoint, slides 1-35).

Tallinn (City Administration). (2014a). Tallinna elanike arv. Retrieved June 26, 2014 from: *http://www.tallinn.ee/est/Tallinna-elanike-arv*

Tallinn (City Administration). (2014b). Tallinna jalgrattateed linnaosade lõikes. Retrieved July 9, 2014 from *http://www.tallinn.ee/est/Tallinna-jalgrattateed-linnaosade-loikes*

Tallinn (City Administration). (2014c). Tallinna elanike arv. Retrieved June 26, 2014 from *http://www.tallinn.ee/est/g391s20223*

Tallinn (City Administration). (2014d). Urban Planning Department. Retrieved July 29, 2014 from *http://www.tallinn.ee/eng/Urban-Planning-Department*

Tallinn (City Administration). (2014e). Transport Department. Retrieved July 29, 2014 from *http://www.tallinn.ee/eng/Transport-Department*

Tallinn (City Administration). (2014f). Municipal Engineering Services Department. Retrieved July 29, 2014 from *http://www.tallinn.ee/eng/Municipal-Engineering-Services-Department*

Tallinn (City Administration). (2014g). Linnaosad. Retrieved August 9, 2014 from *http://www.tallinn.ee/est/Linnaosad*

Tallinn (City Administration). (2014i). Pargi ja reisi. Retrieved August 10, 2014 from *http://www.tallinn.ee/est/Pargi-ja-Reisi*

Tallinn (City Administration). (2014j). Parkimishinnad 2014. Retrieved August 10, 2014 from *http://www.tallinn.ee/est/Parkimishinnad-2014*

Tallinn (City Administration). (2014k).Keskkonnasõbraliku liikumise kuu ajakava 2014. Retrieved August 26, 2014 from *http://www.tallinn.ee/Keskkonnasobraliku-liikumise-kuu-ajakava-2014*

Tallinn (City Administration). (2014l).Free Public Transport. Retrieved August 26, 2014 from *http://www.tallinn.ee/est/pilet/*

Tallinn (City Administration). (2014m).Tallinna Ühistranspordi Arengukava 2011-2020. *TÖÖVERSIOON*, 1-50

Tallinn (City Administration). (2014n).Tallinn in Brief. Retrieved August 30, 2014 from *http://www.tallinn.ee/eng/investor/Facts-about-Tallinn*

Tallinn (City Administration). (2014o). Tallinna Linna 2014. aasta eelarve eelnõu seletuskiri. Retrieved August 10, 2014 from *http://www.tallinn.ee/est/Koond.pdf*

Tallinna Keskkonnaamet.(2012). Tallinn Environment Department Yearbook 2012. 1-73

Tellsikivi Selts. (2014). Seltsi Info. Retrieved August 10, 2014 from *http://www.telliskiviselts.info/seltsist*

Terviseamet. (2014). Tallinna mürakaardid. Retrieved August 20, 2014 from *http://www.terviseamet.ee/keskkonnatervis/fuusikalised-tegurid/murakaardid-ja-tegevuskavad-2008/tallinna-murakaardid.html*

Teschke.K., Reynolds, C., Ries, F., Gouge, B., Winters, M. (2012). Bicycling: Health Risk or Benefit? *UBCMJ,* 1-6

Teschke K., Winters M., Brauer M., Setton E M. (2013). Mapping bikeability: a spatial tool to support sustainable travel. *Environment and Planning B: Planning and Design,* 40(5) 865 – 883

Thinking Cities. (2014). How to make a good cycling city even better in Creating the livable city, Electro mobility, open systems and the rise of the intelligent environment. 1 (3), 40-43

TomTom. (2013). TomTom European Congestion Index, 1-67

Transport for London. (2008). Demand Elasticities for Car Trips to Central London as revealed by the Central London Congestion Charge. 1-28

Transport for London. (2010). Cycling Revolution London. 1-90

Transport for London. (2011). Barclays Cycle Superhighways FAQs. 1-25

Transport for London.(2013). The Mayor's Vision for Cycling in London. *An Olympic Legacy for all Londoners*, 1-33

Transport for London.(2014). Congestion charge, fact sheet, 1-2

Transport Learning. (2013). Follow Transport Learning to increase quality of life in your city! 1-66

TTÜ (Tallinn Technical University). (2012). Tallinna Jalgrattaliikluse Strateegia I Etapp. *Logistikainstituut*, 1-73

Tuominena,A., Himanen, V. (2007). Assessing the interaction between transport policy targets and policy implementation—A Finnish case study. *Transport Policy*, 14, 388–398

Uljas,J.(2007). Transport, keskkond ja elukvaliteet Tallinnas Monitooringusüsteemi väljatöötamine.*Sotsioloogiline uurimus, Tallinn,* 1-75

Uue Maailma Selts .(2014). Uue Maailma Selts. Retrieved August 10, 2014 from *http://www.uusmaailm.ee/*

Uustal, M., Prass, M., Peterson, K. (2013). Ülevaade Euroopa Rohelise Pealinna tiitli laureaatide 2010-2014 keskkonnanäitajatest, Lisa Tallinna keskkonnakaitse arengukava 2013–2018 juurde. *Stockholm Environmental Institute*, 1-67

Vedung, Evert. (1998). Policy Instruments: Typologies and Theories. In M.-L. Bemelmans-Videc, R.C. Rist & E. Vedung (eds.), *Carrots, Sticks & Sermons Policy Instruments & Their Evaluation.* (21-58). New Brunswick: Transaction Publishers.

Velo City .(2013). Who Thinks of Budapest as a Cycling City. 1-19

Weatherbase .(2014). Average climate. Retrieved August 23, 2014 from *http://www.weatherbase.com/*

Weber, J. (2014). The process of crafting bicycle and pedestrian policy: A discussion of cost–benefit analysis and the multiple streams framework. *Transport Policy*, 32, 132-138

Wien International. (2014).Traffic Master Plan 2003 - Goals for 2012. Retrieved July 9, 2014 from *http://www.wieninternational.at/en/content/traffic-master-plan-2003-goals-for-2012-en*

WHO (World Health Organization). (2014a). Data and statistics, Noise. August 17, 2014 from *http://www.euro.who.int/en/health-topics/environment-and-health/noise/data-and-statistics*

WHO (World Health Organization). (2014b). Health Policy. August 17, 2014 from *http://www.who.int/topics/health_policy/en/*

WHO (World Health Organization). (2014c). Data and statistics, Air quality. Retrieved August 17, 2014 from *http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/data-and-statistics*

Woodcock, J., Goodman, A., Green, J. (2014).The role of bicycle sharing systems in normalising the image of cycling: An observational study of London cyclists. *Journal of Transport & Health*, 1, (1), 5–8

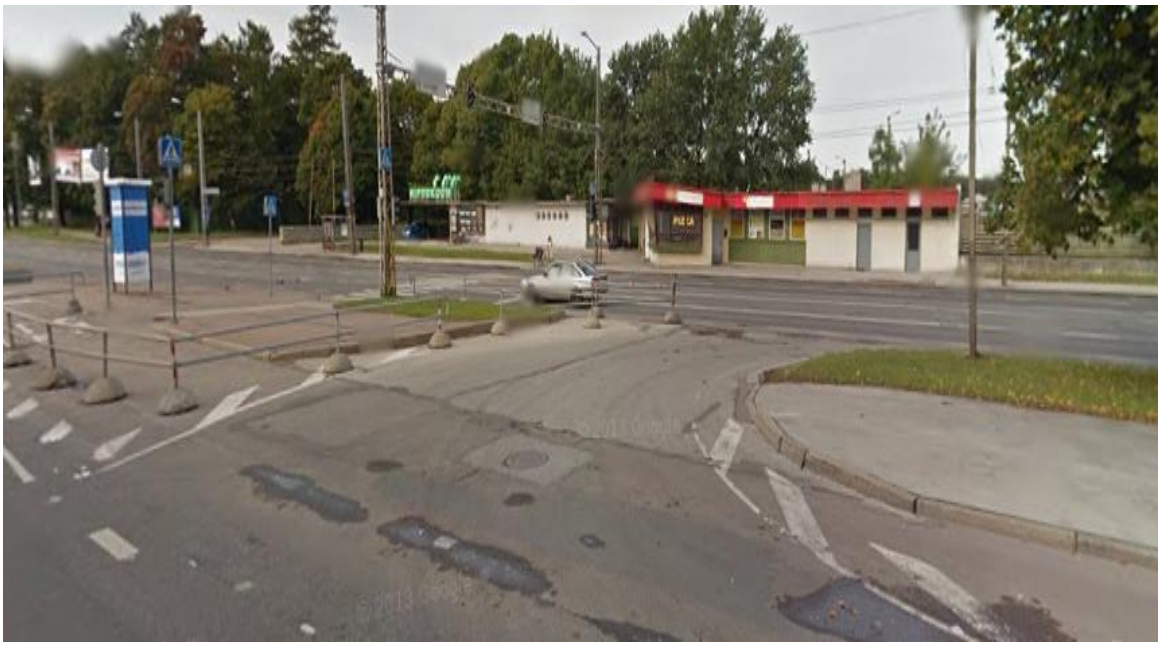
World Carfree Network .(2014). World Carfree Day. Retrieved August 26, 2014 from *http://www.worldcarfree.net/wcfd/*

Appendix I- List of Interviewees

Key Stakeholders			Date
Tallinn City Administration	Tallinn Municipal Engineering Services	Head of the Office	27/06/14
		Head of Engineering Department	12/08/14
	Tallinn Urban Planning Department	Head of the Urban Planning Department	08/07/14
	Tallinn Transport Department	Head of the Office	30/06/14
Intermedians			
The Estonian Road Administration (ERA)	Head of Traffic Department	Jaan Tarmak	30/06.14
Politician	Vice Chairman of the Tallinn City Council, on behalf of IRL	Yoko Alender	02/07/14
Politican	Vice-President of the Riigikogu.	Jüri Rattas	04/07/14 (phone)
Official	Ministry of Economic Affairs and Communication	Toomas Haidak	19/08/14
Experts in field			
Project Manager	TAEM Urbanitsai	James McGeever	11/08/14 (Skype)
CEO	Koucky& Partners AB	Michael Koucky	24/06/14 (Skype)
Cycling Specialist	Gothenburg City	Malin Månnson	02/07/14 (Skype)
Cycling Specialist/ Traffic safety	City of Lund	Anders Söderberg	19/05/14 22/05/14 02/06/14 05/06/14
Cycling Specialist	Vienna City	Rupert Fellinger	09/07/14 (email)

Appendix II- Observation

Shared cycle and pedestrian path on the left (Source: Googlemaps)



High curbs both sides of the shared cycle and pedestrian path, cars can pass no traffic signs (Source: Googlemaps)

Painted cycle lane and cycle sign top right (Source: Googlemaps)

High quality cycle track outskirts of Tallinn, provided by the car parking on the right (Source: Delfi, 2014).

Cycle and pedestrian path maintenance during the winter (Source: Postimees, 2014).

A lot of car oriented space and on the front there is viaduct and on the right the cycle lane next to three busy roads (Source: Googlemaps)

Appendix III- Additional illustrative and informative figures

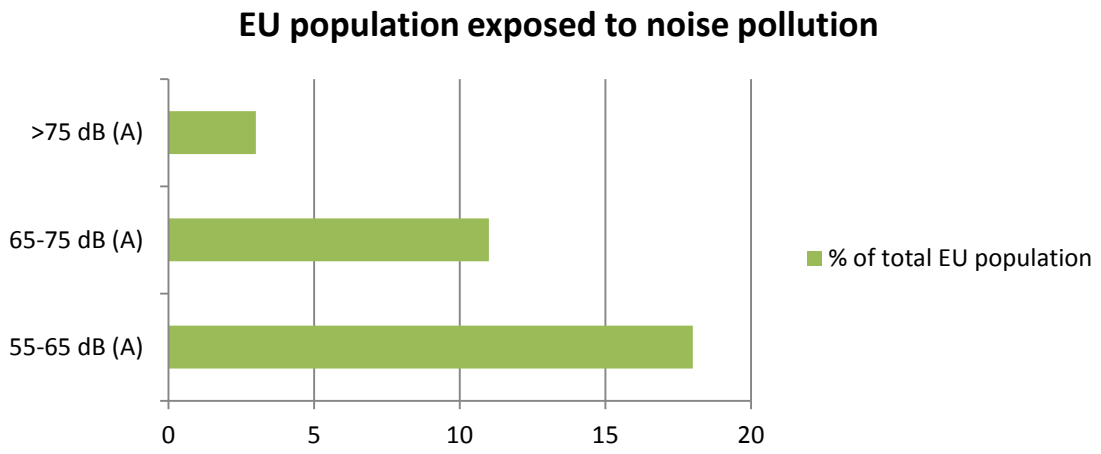


Figure 0-1Estimated percentage of population exposed to different road traffic noise levels (EEA, 2014f).

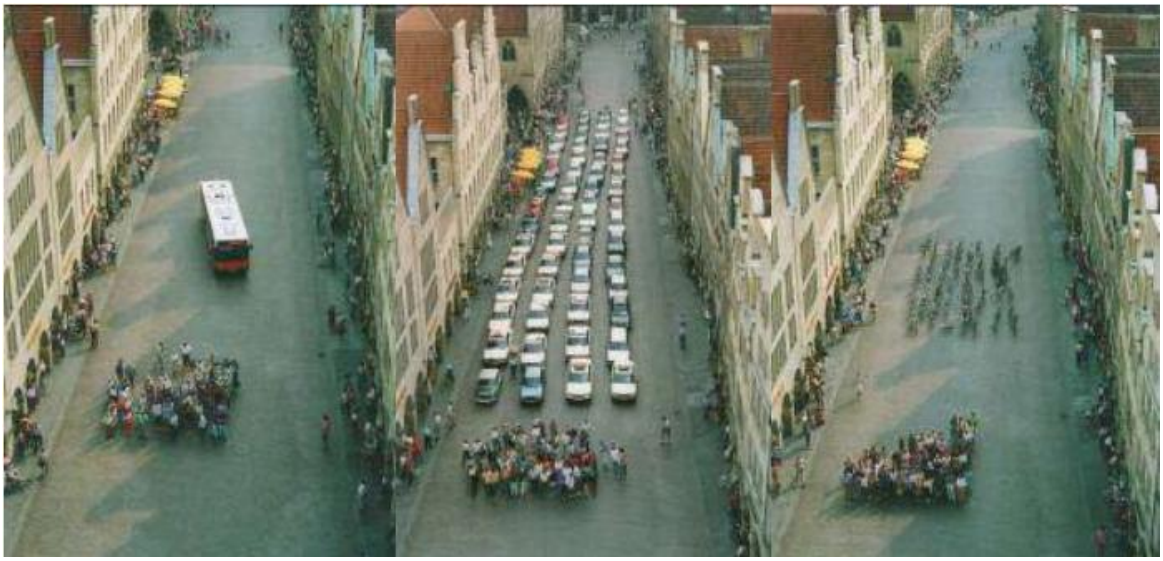


Figure 0-2 Space required by transport mode (PRESTO, 2010, p.5).

Figure 0-3 PM emissions in Tallinn (Keskkonnaamet, 2010, p.27).

Figure 0-4 Residential buildings in the city center affected by the noise levels higher than 70 dB in Tallinn centre (Terviseamet, 2012).

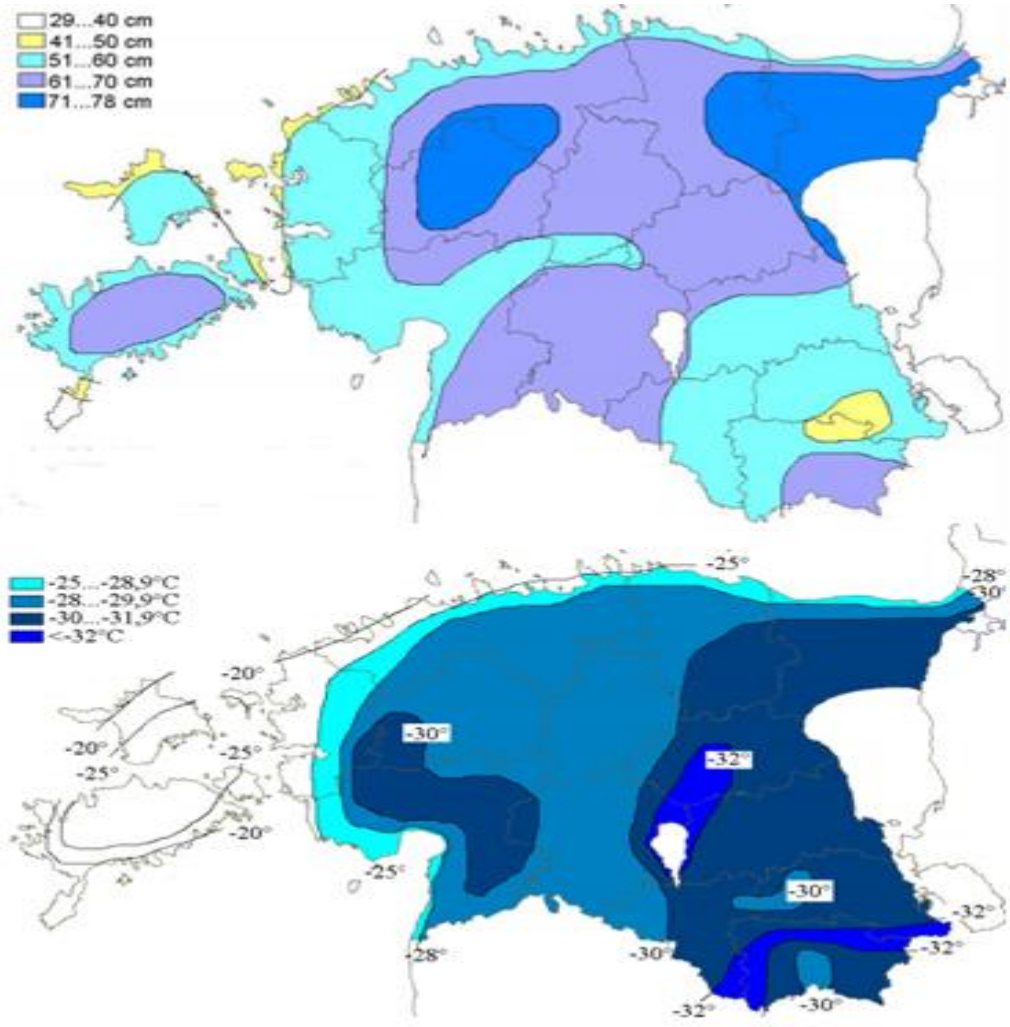


Figure 0-5 Snow fall thickness in cm (top) and occasionally very cold weather (Keppart, 2010).

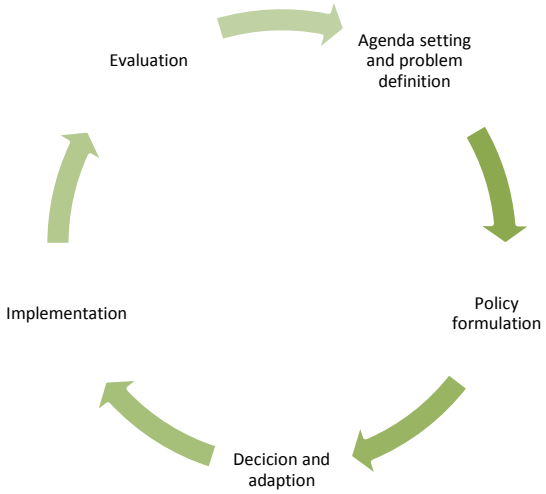


Figure 0-6 Policy cycle (EC, 2010g).

Appendix IV- Additional illustrative and informative tables

Duration of exercise (minutes)	Effect
10	Improves the joints
20	Strengthens the immune system
30	Cardiovascular improvements
40	Increased respiratory capacity
50	Faster metabolism
60	Weight control, reduced stress and increased overall wellbeing

Table 0-1 Health benefits according to duration of exercise (Junta de Andalucía, 2014, p.19).

Target group	Message
School children	Cycling is fun, makes you feel free and independent. You are part of traffic.
Adults	Cycling is fun, makes you fit and healthy.
Commuters	Cycling saves time and money and keeps you fit.
Leisure cyclists	Cycling is a relaxing way to see the local area.
Novice cyclists	Cycling is quick, easy and flexible.
Females	Cycling is chic, fun and shapes your body.
Immigrants	Cycling means freedom of movement and independence. It is quick and easy.
Elderly	Cycling is relaxing and good for heart.
Car drivers	Cycling is fast and convenient and saves money.

Table 0-2 Example of messages for different target groups (PRESTO, 2010, p.17).