UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master's Degree Project in Logistics and Transport Management

Shaping the Future of Mobility in Gothenburg: The Implementation of a Cycle Taxi Service

A case study in collaboration with Addvelo and The Space – First to Know

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Abstract

As a result from the ongoing urbanization, the population in cities throughout the world is continuously increasing. Despite the benefits that urbanization brings, cities are facing challenges related to the increased demand for travel. With congested roads and a high amount of pollution caused by motorized vehicles, there is a need for innovative means of transportation in order to cope with the challenges and reduce the environmental impact. This thesis aims at investigating the current travel patterns, challenges connected to the mobility market, and the desired market in order to find the potential for a cycle taxi service as a complement to the existing mobility options in Gothenburg. Due to the lack of academia and theory within topic, a theoretical framework has been derived from related literature and subjects that are believed to influence the potential for the service. In order to submit a conclusion, the empirical findings are presented through a SWOT analysis, where strengths and opportunities of the cycle taxi service are weighted against the weaknesses and threats that have been found in the research.

Keywords: *Urban Transportation, Sustainability, Travel Patterns, Cycle Infrastructure, Product Implementation*

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1. Introduction

This chapter will provide an understanding of the background and the reasons for the importance of the study. It will further present the research questions that the authors will be investigating. Moreover, it will provide an understanding of the structure of this thesis and an introduction of the product.

1.1 Background

With the trend of urbanization, an increasing amount of people is moving to urban areas and cities are predicted to continuously grow in the future. Correspondingly, with more and more citizens in cities, the travel demand and congestion are rapidly increasing, and the need for innovative means of transportation arises. In addition to that, the concept of sustainability is gaining momentum which encourages the implementation of new efficient means of transportation in urban areas. In the last century, the major advancements and developments in goods transportation have facilitated trade and production and have shorten delivery times rapidly. However, the urbanization all over the world has led to severe problems related to people transportation, such as congestion and pollution, and the demand for travel in urban areas has become highly disproportionate to the supply of the current transportation systems (Woldeamanuel, 2016). What is expected to ease those problems are new and innovative business models and markets that are currently emerging in the transportation sector. That includes concepts as Mobility as a Service, shared mobility and shared economy, and the gig economy (Hannon, McKerracher, Orlandi & Ramkumar, 2016).

As people and the society get more and more reliant on cars, a higher amount of fossil fuel is consumed, resulting in a global environmental issue. Even though automobiles offer many benefits and facilitate time-efficient travels, the number of cars is increasingly becoming a burden for the society and environment. The growing population and number of cars in dense urban areas are leading to problems as traffic congestion and longer travel times, and more importantly a high amount of pollution in city centers. Arguably, as a result of that, the quality of life and the mobility for the population in urban areas are becoming a growing concern for the general public (Woldeamanuel, 2016).

The city of Gothenburg is predicted to grow with 150.000 residents by 2035 and in addition to that 80.000 more jobs are expected to be created, making it the core of a labor market region consisting of approximately 1,7 million people. Undoubtedly, this will cause numerous challenges for the city. Due to this, Gothenburg must, by various infrastructure projects, manage and set strategies to live up to environmental objectives to be in the forefront of future personal mobility. In other words, the city of Gothenburg is in the transition from being a small city to becoming a large city. Being the hub for thousands of jobs will bring many visitors to the city in the form of business trips. Adding that to all the people working and living in the area, the transport and infrastructure system must be developed in order to reach the environmental and sustainability objectives. A first step in this development is the

construction of Västlänken, a railway that connects central station to Haga and Korsvägen underground (Gothenburg 2035, 2013).

The city is aiming to make everyday life simple in a large, dense and close-knit city. Part of that are the traffic and road users, who play a vital role creating an attractive city enhancing economic growth. To achieve these goals and create sustainability, quality of life and competitiveness, the city of Gothenburg has developed the Transport Strategy which focuses on travel, urban space and transport of goods. The travel objectives relate to how the city should create an accessible regional center where key places and functions are easy to reach with various means of transportations. The goal related to urban space is to create an attractive city environment where people want to live, work and meet. The strategy of transportation of goods aims at developing Gothenburg to become the central logistics center of Scandinavia. Further, the aim is to position Gothenburg as a city where both existing and new companies can develop and thus create job opportunities without interfering with either sustainability, environment or accessibility. There are however challenges and obstacles that might disrupt the achievement of the objectives set up in the Transport Strategy. Gothenburg is facing the challenge of reducing the impact of human activities on the environment. To achieve these goals, the transport sector's pollution and use of energy must be reduced. A plan on how to manage the implementation of new vehicle types in the public transportation network must also be determined. Gothenburg also faces the challenge of reducing the travels by private car and instead increase the use of public transportation. In connection to the latter, a challenge is further to make it possible and efficient for commuters to travel to and from Gothenburg with other means of transportation than cars (Gothenburg 2035, 2013).

1.2 Problem Discussion

As discussed in the previous section, the city of Gothenburg will face various challenges in the upcoming years. The increased population will lead to an increased travel demand, and thus the current public transportation system must be developed to provide the supply for the future demand. In addition to the expected congestion problems in the city center of Gothenburg, the construction of Västlänken is believed to aggravate the problem. Building this underground rail system will cause multiple construction sites and therefore limit the traffic at those places (Trafikverket, 2017). To fulfil the objective of reducing the pollution in the city, resulting in enhancing the quality of life for the city's citizens, sustainable means of transportation are necessary as a complement and substitution for cars. This need opens an opportunity for new and innovative transportation solutions. Hence, this thesis aims at investigating the market for such innovative solution: a cycle taxi, developed by Addvelo, as a new means of transportation in Gothenburg. In more detail, the research will cover how Addvelo's product can fit into the current transportation network, as either a complement or substitute to current mobility services. Further, the thesis will analyze how the product can be used in emerging business models and markets. The outcome will be an indication on the potential market and customers for the cycle taxi.

1.3 Research Question

Connected to the background and problem description, the aim of this thesis is to find the potential for a cycle taxi service within the transportation network of the city of Gothenburg. The **research question** therefore is:

"What is the potential for a cycle taxi service as a new means of transportation in the city of Gothenburg?"

In order to find the answer, various sub questions have to be explored. Starting point will be Gothenburg's transportation network of today. The current travel patterns and travel behavior will be examined, after which the challenges within the current situation can be identified. From these two questions it is moved on to the question what users and the City of Gothenburg desire in the city's transportation market. Accordingly, the **sub questions** are:

- *What are the current travel patterns and travel behavior in the city of Gothenburg?*
- *What are the challenges in the current market?*
- *How does the desired market look like?*

Together with the main question, these questions form the process that will be followed during the thesis.

Figure 1 - Process of research

1.4 Thesis Disposition

Having discussed the background of the topic, the problem and the connected research questions, relevant literature is examined in the *Literature Review*. This chapter first introduces existing material that forms the context for the research. Topics addressed include an introduction on urban transportation, theory on travel patterns and travel behavior, an overview of the vision of Gothenburg for the future, and information regarding regulations associated with the service. Related to the future, two concepts are then chosen that are expected to fit the product, which are the gig economy and mobility as a service. From the literature review, factors that influence the research questions are identified and put together in the Theoretical Framework.

Next, in the *Methodology,* methods used to perform the study are presented. It describes how the study is executed and how the data is collected. Next to the research strategy, design and method, it contains insights on the quality of the research.

After the methods are defined, all data collected is displayed in the *Empirical findings*. This chapter is divided into three parts, which follow the process introduced in chapter 1.3. First,

information on the current market is gathered, next the challenges are investigated, and last it is explored how people want the market to look like.

In the *Analysis*, the data is analyzed in detail by combining the outcomes of the empirical findings by performing a SWOT analysis to find the potential for the service. This chapter is concluded by comparing the empirical findings to the literature by using the theoretical framework.

The paper is completed by offering the major findings and answers on the research questions in the *Conclusions*. The most important results are presented, recommendations to the company are offered, and the chapter is finalized with suggestions for further research.

1.5 Introduction of the Product

The product (see Figure 2) is a cycle taxi developed by Addvelo in collaboration with Velove and is called Quicab. The Quicab can fit two passengers and one driver. The passengers are protected from rain and wind, and the well-developed suspension system makes the journey stable and quiet. It is powered by an electrical engine, has a range of 150 km and a maximum speed of approximately 25 km/hour. It is classified as a cycle, meaning that it is allowed to use both bike lanes and roads (Zinn, 2018).

Figure 2 - Prototype of the Quicab (Zinn, 2018)

1.6 Delimitations

In this thesis, no financial aspects regarding the product and service are included. This information is not available to the authors and price and cost calculations are done by Addvelo. Furthermore, the geographical area is limited to Gothenburg since this is where the launch of the service is planned to be.

2. Literature review

In this chapter, the authors are presenting literature that is relevant in order to conduct the research. The chapter is divided into two parts. The first part includes material that forms a context behind the product and service, and covers urban transportation, travel patterns and behavior, Gothenburg's future plans related to mobility, and regulations. The second part elaborates on two concepts that are expected to fit the service. These investigated trends are the gig economy and mobility as a service (MaaS).

2.1 Context

2.1.1 Urban transportation

Researchers and industry professionals have for many years been studying issues related to the planning and management of urban transportation networks. According to Woldeamanuel (2016), urban transportation is defined as the movement of passengers and freight in urbanized areas. Rodrigue (2017) further divides urban transportation in three categories, namely public transportation, individual transportation and freight transportation. The purpose of public transportation is to provide mobility to the public, and individual transportation refers to private mobility performed by car, walking or cycling. In accordance to the urbanization, the urban transportation networks have developed, mainly in terms of efficiency and capacity (Rodrigue, 2017). The different transportation options that are included in urban transportation networks are, amongst others, cars, public transportation, pedestrian facilities and cycle lanes for people transportation, and trucks and vans for goods transportation (Woldeamanuel, 2016). As mentioned in the background, the goods transportation has been developed continuously during the last decade to become more efficient, leading to various benefits. However, urban transportation networks in cities across the world are facing numerous challenges. Many of these challenges have arisen through the increased car ownership, which resulted in congestion, pollution and a bad impact on the environment (Enoch, 2012). Enoch (2012) further argues that it is the responsibility of local politicians to solve current transportation issues. A current problem related to transportation networks worldwide is that the measurement of transport, to determine what to improve, is time consuming. Another problem is that the planning process is usually long and implementing improvements to the existing transport network is very costly.

In order to handle problems related to congestion in cities two approaches can be used, *supply-side solutions* and *demand-side solutions.* Supply-side solutions aim at increasing the capacity by either creating more or utilizing the current capacity in a more efficient way. When building more capacity, there is a number of different potential problems that might occur that one must be aware of. As previously mentioned, providing more capacity is time consuming and expensive. The length of such major projects will cause that many people will be affected negatively due to the construction phase. Where the need is the highest for new capacity tends to be in urbanized areas where land is scarce. This makes the project even more expensive and more people might be affected negatively from the construction (Enoch, 2012).

What is considered as less controversial, expensive and time consuming than building new capacity is to find a more efficient way of utilizing the existing transportation capacity. Generally, there are two ways to achieve this: either to allow a higher number of vehicles to use the existing infrastructure, or to increase the occupancy of the available vehicles. To increase the capacity of existing infrastructure, and thus enable a higher number of vehicles, lanes can be narrowed to increase the number of lanes, introduce one-way systems, and design more efficient junctions to increase the traffic flow. Various attempts to increase the occupancy of vehicles have been performed. Since 60% of all car rides only contain one person, carpooling has been encouraged in order to reduce that number. However, that has not showed any successful results, and a more common approach of increasing the vehicle occupancy is to increase incentives for people to choose public transportation (Enoch, 2012).

The main idea about the demand-side solution is to manage the demand in such way to make it fit the available capacity better. According to Enoch (2012), there are various ways to lower the need for transportation and thus reduce the demand. These strategies and objectives include enhancing alternative means and reduce the car use. As incomes have become higher and travelling has become cheaper, people have been getting used to mobility and travel, mainly by car. However, Enoch (2012) argues that the only viable solution to properly deal with previously mentioned challenges related to the transport network, is to reduce the travel demand. From a strategic approach, this can be achieved by controlling land use to enable people to walk, cycle and use public transportation as a substitute for cars.

As discussed previously in this paper, cities across the world are facing challenges due to the ongoing urbanization. These challenges include, amongst others, congestion, high travel demand during peak hours and parking (Rodrigue, 2017). To avoid these problems and deal with these challenges, a change in people's travel behavior is crucial. To enable this behavioral change, there lies a big responsibility at politicians to ensure sustainable substitutions for cars, such as public transportation and a proper bike infrastructure. Woldeamanuel (2016) argues that the most efficient way of dealing with the mentioned problems is to enable citizens in cities to use walking and cycling as the main means of transportation in city centers. These means of transportation are referred to as non-motorized transportation and have a positive impact on land use, congestion and pollution. In urban areas today, the greater part of urban transportation development is within cars and public transportation. In order to increase the use of non-motorized transportation, there must indeed be a development of cities enabling walking and cycling (Woldeamanuel, 2016).

As the appearance of cities is changing, the planning of public transportation networks must do accordingly. The planning must adapt to changes related to environmental issues, technological improvements and demographic development and most importantly the local travel demands. In order to create a satisfying public transportation network in an urban area, Woldeamanuel (2016) argues that there are various factors that must be taken into consideration. Aspects regarding costs and pricing must be carefully considered. This includes total cost per passenger, investment and maintenance costs, and operating costs. The different means included in the public transportation network must further be able to cope with the actual volume of passengers, and thus travel demand forecasting is of high

importance. Moreover, the means within the public transportation network must be evaluated from an environmental perspective. This includes noise, degree of pollution from vehicles and total energy consumption. Another aspect which to a high degree influences which means of transportation people choose is the time aspect. In order to create a public transportation network that attracts users, time savings must be as great as possible. The last aspect that Woldeamanuel (2016) argues to be of high importance is the safety. The means included in transportation networks must have a low expected number of injuries, collisions and most importantly fatalities in order to change behavior of customers from car travelling to use public transportation. Besides, the importance of additional soft values is highlighted, which includes passengers comfort and convenience, number of available trips, reliability, flexibility and accessibility (Woldeamanuel, 2016).

In order to follow up and develop the public transportation network once it is operational, Woldeamanuel (2016) has developed an evaluation scheme to identify problems, establish performance indicators and objectives, and determine solutions and improvements. In this thesis, the scheme has been derived and adapted to better fit the topic. Therefore, the content in the scheme that is not applicable for this subject will not be mentioned in the description. *Availability* refers to when and where public transportation services are available for the user. *Frequency* further describes the average waiting time and trips per hour or day. *Travel speed* should be evaluated from the aspect of average vehicle speed, and the average travel time compared to travelling the same route by car. How well the service follows the published schedules and punctuality of the service should also be evaluated and is referred to as *reliability*. *Price and affordability* should be rated from the aspect of ease of purchasing tickets, and the ticket price should be aligned with average income and relative to the cost of other means of transportation. How users perceive safety, security and amount of accidents should be evaluated in the aspect of *safety and security*. The ease of transferring between different means of transportation included in the public transportation network is also of high importance and should be evaluated as *network and systems integration*. *Passenger comfort*, such as quality and availability of seats, level of noise and temperature must further be evaluated. Connected to availability, an additional aspect that must be assessed it the *accessibility*. This factor refers to the simplicity of reaching the different means of transportation by walking and cycling (Woldeamanuel, 2016).

2.1.2 Travel Patterns and Travel Behavior

This chapter will provide an understanding of travel patterns and why people choose which destinations. This is important to understand in order to be able to optimize the urban travel network. It shortly describes what is meant with travel patterns, however, travel patterns are more practice related and will therefore form a larger part in the empirical findings. Secondly, travel behavior is explained in detail by using multiple articles.

2.1.2.1 Travel Patterns

Travel patterns, also called urban mobility patterns, can be described as the movement of the population in an urban area (González, Hidalgo & Barabási, 2009). Sevtsuk and Ratti (2010) argue that a vast majority of the population in an urban area has daily routines, for example

travel from home to work, making the mobility patterns in a city somewhat predictable. Previously, studying travel patterns has been a challenging topic. However, technology has enabled to study the topic through mobile phone networks which has eased the study and also confirmed the routine and predictability of people's daily activity and mobility pattern. Individual travel patterns describe personal mobility in urban areas, but it lacks factors that explain the reasons for the mobility patterns (Sevtsuk & Ratti, 2010). However, it is important to understand mobility patterns in a city when planning the urban mobility infrastructure and forecasting traffic (González et al, 2009).

2.1.2.2 Travel Behavior

To understand and predict travel patterns, it is important to understand the factors that influence people's behavior in travelling. Big data on travel patterns can be used to study underlying casualties of travel behavior. The results of travel behavior studies show that the influential factors differ depending on the place and population. However, the outcome of the different studies usually comes back to four categories that influence travel behavior. The first category is the built environment. This category refers to factors related to the density of the city, the diversity, the design, and the distances between key places. In the second category, residential choices are studied. There is a two-way relationship between residential choices and travel behavior. People can choose their residence depending on their travel behavior, or they choose their residence first after which they adapt their travel behavior. The third category involves trip and alternative related factors. These include for instance the purpose of the trip, the travel time, the costs of the trip and the reliability of the means of transportation. Last but not least, the socio-demographics are important to study (Chen, Ma, Susilo, Liu & Wang, 2016), which investigates how and why there is a relationship between travel behavior and personality characters (Van Acker, Van Wee & Witlox, 2010). All categories will be discussed using multiple studies.

Built environment

The most researched influence factor on travel behavior is the built environment. There are over 200 studies investigating the relationship between the built environment and travel behavior. Ewing and Cervero (2010) conducted a meta-analysis on multiple studies and found out that the most commonly used measures of the built environment can be roughly put together in the 5 Ds: Density, Diversity, Design, Destination accessibility and Distance to transit. Table 1 gives an overview of the variables and how each of them is measured. Newer studies focus a lot on the environmental aspects of these measures (Ewing & Cervero, 2010).

Name	Measure
Density	Population per unit of area / Employment
Diversity	Number of different land uses with an area
Design	Street work characteristics (interconnection, block size, intersections, sidewalks, width etc.)
Destination accessibility	Ease of access to trip destinations
Distance to transit	Shortest route from a home or workplace to nearest connection to public transportation

Table 1 - Variables to measure the built environment (derived from Ewing & Cervero, 2010)

The relationship between the separate five Ds and travel behavior turn out to be rather inelastic. However, the combined effect of multiple Ds could be significant. The influence of the single variables varies a lot between studies. According to Ewing and Cervero (2010), the variable with the most influence on travel behavior is Destination accessibility. Its relation to travel behavior is as strong as the combined influence of Density, Diversity and Design. The rather high influence of the Design was remarkable, since not many studies focus on this. This means that the connections of streets are relevant for people's travel behavior. The population density does not seem to have a high correlation with travel behavior. Contradicting are the outcomes obtained by Leck (2006), who conducted a similar meta-analysis a few years earlier. The variables with the highest influence were the density and the diversity. The design has less influence on travel behavior according to this study (Leck, 2006). The results also tend to differ between locations, such as the difference between the EU and the US found by (Gim, 2012).

In general, the strength of influence of the different variables changes depending if looking at public transportation, car transportation, cycling or walking. Walking is more related to Diversity, Density and the walking distances. Public transportation is more related to transit and street network design (Ewing & Cervero, 2010). Regardless the different outcomes, it can be said that these five characteristics have a direct impact on travel behavior (Leck, 2006).

Residential choices

Several studies state that residential self-selection weakens the influence of the built environment on travel behavior. Thus, residential preferences are important to study separately (Ewing & Cervero, 2010). Residential choices and travel behavior have a two-way relationship: travel behavior is based on the residence, but at the same time the residence might be chosen depending on the person's travel behavior. This means that ability to change people's behavior by changing the environment, might be limited (Cao, Mokhtarian & Handy, 2007).

Several factors are related to residential choices. A major division can be seen between downtown, the middle suburbs and the outer suburbs. People who live downtown make different choices regarding the means of transportation that they use than people that live in the outer suburbs. In the latter, people mainly use a car, while people in the center often walk more or use public transportation (Srinivasan & Ferreira, 2002). This also works the other

way around: people who like walking, will most likely move to a walkable neighborhood, and people that own a car will more likely move outside the center. This is also dependent on the availability of outdoor spaciousness and accessibility. Downtown there is less space and a higher accessibility, which generally supports walking or the use of public transportation. In the outer suburbs the opposite is true, through which more people use cars (Cao et al., 2007).

These are only a few examples, but it shows the two-way relationship between residence and travel behavior. A large part of people's choices are solely habits. It is thus easier to change people's choices when they have just moved into a new residence, and they are thus not biased by either their travel behavior or their residence yet (Bamberg, 2006).

Trip and alternative factors

Trip and alternative factors include variables of given information such as the purpose of the trip, the travel time, the costs of the trip and the reliability of the means of transportation. For example, someone who has a job on the other side of the city, has several options on how to fulfil the purpose of getting to work. The options are given, and could include public transportation, car, cycle or by foot. The travel time and costs of each option are also given, and the reliability depends on how secure it is to reach the purpose within a reasonable amount of time. Behavior is connected to the choices people make and are in these cases a function of the before mentioned variables. A tradeoff between the variables exists, and people choose the option that fits them best. Not every area has the same range of choices when it comes to means of transportation. For instance, rural areas might not have access to a metro network (Chen et al., 2016). Not all available options are accessible to everyone. Someone who does not own a cycle, will most likely not switch to this option. Travel behavior thus depends on the available trip and alternative options (Kroesen, 2014).

Socio-demographics

Travel behavior relies on personal decisions, and it is thus important to explore the link between travel behavior, socio-economic characteristics and social psychology. Decisions on travels are usually based on activities. An activity could be work, meeting a friend, and more. There can be made a distinction between short term activity decisions, middle term activity decisions and long-term activity decisions. The first group includes daily decisions, such as shopping and recreation, or adjustments. Middle-term decisions refer to decisions such as workplace and residence. Both short- and middle-term decisions are made to satisfy a lifestyle decision, which is the long-term decision. Lifestyle in term is connected to socio-economic characteristics (van Acker et al., 2010).

Another reason to study social psychology, is because within a homogenous group of people, that for instance live in the same area and have the same type of household, there can still be a difference in psychological behavior (van Acker et al., 2010).

All in all, these four main categories all influence travel behavior. Why people travel certain patterns depends to some extend on these factors, and they thus have to be taken into consideration when implementing a new means of transportation.

2.1.3 Gothenburg and its Vision for the Future

In the background the challenges and changes that the city of Gothenburg is facing were already briefly mentioned. The city is growing immensely, and the transportation network has to be adapted to the development of the different areas. On top of that, the city wants to do this as sustainable as possible, by reducing emissions and the use of energy. Only like this the city can grow economically without increasing the impact on the environment. This is necessary to make the city to an attractive place to live and work in (Gothenburg 2035, 2013).

There are global, national, regional and local challenges that the city faces on the way to their goals. On a global level, the climate impact of the transport sector has to be reduced. Gothenburg can do this by modernizing their transportation network and introducing new means of transportation. More specifically, Gothenburg wants to reduce the emissions of carbon dioxide by 30% from the 1990 level in 2020. By 2050 the goal is to have a sustainable and equitable level of carbon dioxide emissions. Nationally, the use of cars has to be reduced and the offer of more sustainable means of transportation has to be increased. Regionally it is obvious that the city is an important hub in the area, for living, jobs and events. The challenge here is to make it easy to commute to the city, while at the same time reducing the use of cars. A starting point of this came in 2009 with the introduction of the congestion tax. Locally, the challenge in Gothenburg is to offer an innovative transportation network within the new dense city, that is not restricted by natural barriers such as hills and water. Another local challenge is to reduce the negative health impacts of travel. The air quality has increased over the past years, but it still does not meet the quality norm that they want to reach. Three of Gothenburg's environmental quality objectives are therefore clean air that does not harm people's health, a well-built environment that reduces noise, and only natural acidification within forest use (Gothenburg 2035, 2013).

To handle all these challenges, the city of Gothenburg has set up several strategies and goals for a close-knit city for the future ranging to 2035. These strategies are the Planning Development Strategy, the Transport Strategy, and the Green Strategy. The Transport Strategy focuses on three different areas, which are the goods transport strategy, travel strategy, and urban space strategy. Within the goods transport strategy the objective is to make Gothenburg to the logistics center of Scandinavia. The main objective within travel strategy is to create an easily accessible regional center where a well-connected network makes it effortless to reach key places in the city. In the urban space strategy, the focus is on improving the areas where people live, work, study and meet. However, in this thesis the focus is on people transportation, and thus the following will concentrate only on the Travel Strategy (See structure of Gothenburg's objectives and goals in Figure 3) (Gothenburg 2035, 2013).

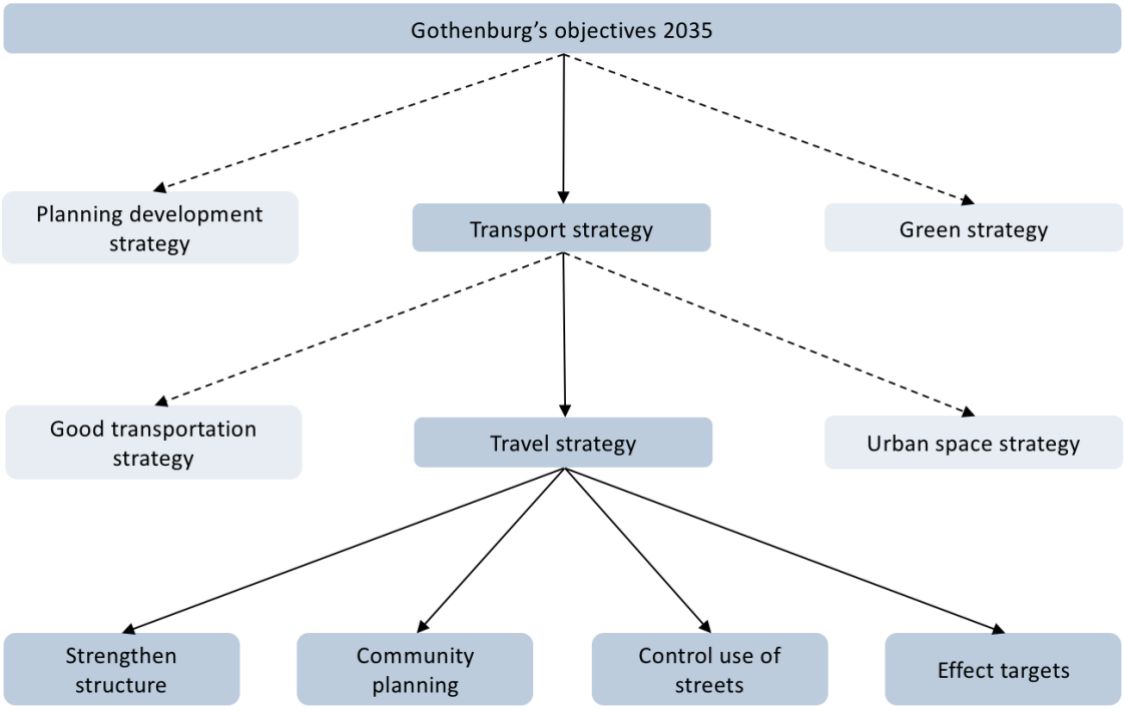

Figure 3 - Structure of the strategies of the City of Gothenburg (derived from Gothenburg 2035, 2013)

Within the Travel Strategy the first aim is to strengthen the structure between cores and key places, and especially increasing the quality and quantity of the network for sustainable transport, such as the cycle-network. Since cycling is the second most efficient, resource-economic and healthy transport mode after walking, it should have an easy and safe network in order for people to use it more. Important factors are the efficiency, separation and priority in the network. The connections should be good, there should be no conflict with other means of transportations, the lanes should be lit, and also safe parking should be offered. Since cycles tend to change a lot, for instance due to the introduction of electrical cycles and cycles with more than two wheels, the lanes should be adapted to the changed need. By improving the current network on these levels, cycling should become a larger part of the current used transport modes, which is important in order to reduce both congestion and emissions (Gothenburg 2035, 2013).

For the public transportation, the travel strategy follows K2020. This is a project set up by Västra Götaland Regionen, Gothenburg Region Association of Local Authorities, the City of Gothenburg, Västtrafik (public transportation of West Sweden), the National Road Administration and the National Rail Administration. In 2008 they introduced a public transport development program for the Gothenburg region. The main goal of this report is to optimize the connection between cores and key destinations, by shorten the travel times, increase the capacity and raise the reliability. Another aim is that 40% of all trips will be by public transportation in 2025. The goals are summarized in the "go-terms": GoTo, GoClose and GoFrequent within the city, GoFast to the near proximity, and GoFar and GoAway outside of the city. The transfer between modes should be easy and quick, so that not only the single terms are optimized, but also the total network. One of the important goals within the K2020 strategy is the development of a Västlänken for the city of Gothenburg. This will

connect areas further out of the center, together with the express busses. Along these connections, new parking facilities for both cycles and cars will be constructed (K2020, 2009).

Secondly a focal point lies on community planning to create safer and livelier neighborhoods, where they try to prioritize pedestrians and cyclist over other transport modes that cause pollution and congestion. This means that the separate neighborhoods will contain more key places such as meeting places, culture and food, in order to reduce the distances people have to travel to find these activities. With that, it is easier to reach important functions by foot or by cycle. This will be possible through the plans of densifying the city since new facilities can only open if there are enough potential customers. The pedestrian and cycle paths should be safe for both adults and children, in order for people to actually use them (Gothenburg 2035, 2013).

Third, the use of the streets is controlled to guarantee accessibility for every road user. These include measures within mobility management and informatics, that focus on the existing infrastructure. Having an accessible network reduces the need for a car (Gothenburg 2035, 2013).

Concluding, three effect targets for journeys are formulated for the concrete application of the travel strategy.
E1: By 2035 at least 35% of journeys in Gothenburg will be taken on foot or by cycle. This is almost 10% more as today and should be reached by densifying the close-knit city through which it will be easier to run errands on foot or by cycle.
E2: By 2035 at least 55% of motorized journeys in Gothenburg will be by public transport. This should be reached by reducing the use of car within the center.
E3: The travel time between two random cores or key destinations is a maximum of 30 minutes by car and public transport. Focus in development is therefore put on reducing times on trips that now take too long by public transport compared to the time it would take by car (Gothenburg 2035, 2013).

In the end it all comes back to the main objective of the travel strategy: to create an easily accessible regional center where a well-connected network makes it effortless to reach key places in the city.

2.1.4 Regulations

2.1.4.1 Cycles

There are laws and regulations regarding every means of transportation and every type of vehicle. For cycles there are several different regulations, depending on the exact features of the cycle. It can be a bicycle, having two wheels, or a cycle with more than two wheels. The main difference is found between non-electrical cycles, electrical cycles classified as cycle, and electrical cycles classified as a motor vehicle (European Commission, 2017).

The electrically power assisted cycle (EPAC, or often simply called e-bike) is a type of cycle that is equipped with pedals and an auxiliary electric motor, which cannot be propelled exclusively by this electric motor (Swedish Standards Institute, 2017). This type of cycle does not fall into the directive on motorized vehicles (2002/24/EC), because this directive does not apply to cycles with pedal assistance which have an auxiliary electric motor that has a maximum continuous rated power of 0.25 kW, of which the output is progressively reduced and finally cut off as the vehicle reaches a speed of 25 km/h, or if the cyclist stops pedaling. However, it does fall within the directive on machinery (2006/42/EC), which includes health and safety requirements related to machinery. The electrical cycle must conform these requirements in order to be allowed on the market (European Commission, 2017).

Not being classified as a motorized vehicle, the European laws and regulations for cycles apply for EPACs. A European standard (EN 15194) was implemented in 2009 for the electrical cycles that are classified as cycle. This standard was reviewed in 2017 and now fits the directive on machinery (European Commission, 2017).

Rules related to cycles are set in the Vienna Convention on Road Traffic (1968) by the United Nation. These rules apply to all countries in the European Union, and in addition national legislations can be defined. In this convention, requirements for being allowed on the road are stated. These include having an efficient brake, being equipped with a bell capable of being heard at a sufficient distance, a red reflecting device at the rear, and devices for a light at the front and a red light at the rear (United Nations, 2018).

Cyclists are also obliged to follow specific rules to ensure safe travels, such as holding the steering wheel with at least one hand, not be towed by another vehicle, keeping right of the road and not riding with multiple people next to each other. A European rule is that cycles are obliged to use cycle lanes and are not allowed to use motorways or similar. If they want to use the sidewalk, they have to push the cycle (European Commission, 2018). Contrary, according to the Swedish regulation, cycles are allowed to use other roads than the cycle lane if that is more convenient, even if cycle lanes are available (Trafikförordning, 1998).

2.1.4.2 Public Transportation

In most European cities, public transportation is provided by the public sector and thus working as a monopoly. Hence, there is no competition within one means of transport, and the only alternative would be to use another means (Schiefelbusch and Dienel, 2009). In 2012 the Public Transportation Act (2010:1065) came into force in Sweden, which allows public companies to establish commercial transport, in order to increase the competition and with that the use of public transportation. At the end of 2015, a follow-up of this act came which includes the rights of passengers (Riksdagen.se, 2018).

The public transport operators are usually excluded from civil law obligations. For instance, a ticket does not guarantee a certain journey, but only gives the permission to use if the vehicle passes by. Consequently, the legal situation of passengers of public transport is rather unregulated (Schiefelbusch and Dienel, 2009). However, to make public transportation

attractive, the European Commission (2011) decided on passenger rights legislation to ensure a basic level of service quality. They set following 10 rights that apply regardless the means of transportation:

1. non-discrimination;
2. access and assistance for disabled passengers and passengers with reduced mobility;
3. information;
4. choice to cancel trips due to disruption;
5. rerouting or rebooking;
6. assistance in event of long delay;
7. compensation;
8. carrier liability;
9. easy complaint handling;
10. effective enforcement on rights.

The 10 rules apply to all means of transport, and on top of them, there are separate regulations on respectively air, rail, waterborne and bus transport (European Commission, 2011). While having these rules, often a public entity cannot do much about a complaint. However, it is a good way to find out where possible problems lie and how they can improve their service (Schiefelbusch and Dienel, 2009).

2.1.4.3 Taxis

Taxis tend to be less regulated and owned by private companies. First of all, this means there is usually some kind of competition between the providers and the customer can choose the operator themselves. Secondly, this means that legal regulations for customers are lacking. Voluntary consumer protection instruments are often introduced by the single taxi companies (Schiefelbusch and Dienel, 2009). Taxi operators are obliged to inform the passenger about the tariff before the travel starts. The tariff must be of such nature that the passenger can estimate the price in advance and tariff is never allowed to be changed during the trip. If the price is estimated to be higher than 500 SEK, the driver must inform the passenger before the trip starts (2012:211 §17, Riksdagen, 2018c).

Another type of taxi-service is focused on people that have any type of difficulty in moving on their own or travelling by public transportation. In Sweden, this type of taxi-service (so-called Färdtjänst) follows the Public Transport Act (2010:1065). Anyone who falls into this category can apply and might be granted with permission (§6). The applications are tested by the municipality where the applicant is registered. They will then decide if the applicant will get permission, which means of transportation may be used, in what area the person may travel, and how many trips the permit covers. The permit is either valid for a certain period of time, or until further notice (§9). The municipality is responsible for ensuring a service of good quality within the municipality, or between multiple municipalities. The municipality also determines the basis for the fees of the service, which is usually much lower than the fees for regular taxis (1997:736) (Riksdagen, 2018b).

In order to be allowed to operate a taxi vehicle in Sweden, a taxi driver ID issued by the Swedish Transport Agency is required. According to the Swedish regulation (Taxitrafiklag 2012:211) taxi traffic means traffic carried by a car or a van, of which the drivers are available for the transport of persons for payment. Hence, there are no regulations on such services carried out by other means of transportation (Riksdagen, 2018c).

2.2 Concepts

2.2.1 The gig economy

The gig economy is a form of service and goods exchange that is rising rapidly. In short, the gig economy is a term for a platform-based model, where people share, sell and buy services and goods on these platforms. As a key aspect of the gig economy, jobs are temporary and give you money, but no career or any other binding to the company. There is no commitment, through which people can decide themselves when, for who and how much they work (Parigi & Ma, 2016).

Platform-based work models are part of a long-term trend that started already in the 1980s, to secure flexibility and save costs (Healy, Nicholson & Pekarek, 2017). The trend exists both in low-end jobs and high-end jobs (Friedman, 2014). Existing companies are changing their business models, labor management practices and regulations to adapt to the gig economy, and startups focusing on connecting buyers and sellers arise in large numbers. The best-known example is Uber, which offers a ride-sharing service through their platform. Uber has developed an application where both buyers and sellers can register, while they are only responsible for the allocation of work, working conditions and the base of prices. The "sellers" are not their employees, and they also do not take ownership of the service that they are allocating. The "buyers" in this case are the customers that need a ride and can buy a ride they prefer from any seller on the platform (Healy, Nicholson & Pekarek, 2017).

For anyone that is working within the gig economy, there are both advantages and disadvantages. Working hours are not fixed, which means anyone can offer flexible work, and possibly even work for several platforms. The platform can usually not control this since the workers are not employees but rather freelancers. The downside for workers is that they have no job and income security, and it is hard to build a career (Healy et al., 2017). The platform can avoid certain obligations by not hiring fix personnel, and they can adjust wages according to demand conditions. This means that the uncertainties and economic risks are shifted to the workers (Friedman, 2014).

The drawbacks of this model facilitate concerns about the way platform companies work. Some opt that workers should be employed, whereas others state that that is exactly what the gig economy wants to go against. A compromise could be to introduce a special labor law that covers platform work. A complicated element is that workers can work for several platforms at the same time, through which the exact working hours are hard to determine. While waiting for a job to come along on one platform, a paid job can be performed at

another platform simultaneously. Another concern is that the labor market will further fragmentize, and the workers will get exploited (Healy et al., 2017).

Despite the drawbacks, the model offers optimistic possibilities. The workforce is flexible, and workers can decide themselves how much and when to work. The platform companies match workers to jobs and can so reduce the unemployment. Not only the unemployment can be cut down, it can also offer opportunities for workers that for any reason cannot work full time. However, gig jobs still have certain standards that the worker has to meet. It can thus be questioned if the gig economy really reduces the unemployment and underemployment. Even though the percentage of gig workers is growing in every economy, it still is only a small part of the current labor market (Healy et al., 2017).

It is rather unsure how the gig economy will develop, but Healy et al. (2017) present possible directions in which the gig economy might go, that both shows threats and possibilities:

1) *The business cycle:* the biggest question is if the gig economy will make it to the next step to the business cycle. The conditions seem to be conducive with low business confidence, low wages and underemployment. However, if the labor market will improve, the gig economy might have a tough time to stay attractive compared to fixed jobs.
2) *New and expanded regulation*: it can either help or destroy the gig economy if more regulations are introduced. On the one hand that will improve the conditions for the workers, on the other hand the high flexibility is exactly what the gig economy is about which would be endangered.
3) *Bridges and traps*: gig work might give inexperienced workers new skills, through which they can step up to a job where they are properly employed. At the same time, it is a perfect market to use as a bridge for graduates. However, people might also get trapped in the gig economy without moving on into the mainstream labor market.
4) *Moving upstream*: the gig economy mostly suits the lower end of the market, where jobs do not require highly developed skills. It might be tough to move upstream into more complex jobs, however some platforms are arising that offer services in accounting, consulting and legal work. If these platforms continue to exist, the gig market might become a serious alternative to the mainstream labor market.
5) *Workers as owners*: the fifth possible direction is a movement in ownership of the platforms to a co-ownership among the sellers. This business model might be more reliable than the current model where the sellers are completely free.

2.2.2 Mobility as a service

With the development in technology and IT, combined with an increasing number of mobility service options in cities, the concept mobility as a service (MaaS) was introduced. Since the concept is relatively new, there is yet no exact definition. However, Jittrapirom et al. (2017) describe the concept as an innovative transportation solution which includes

different means of transportation. To further describe MaaS, Holmberg et al. (2016) define it as a combined mobility service that includes public transportation in combination with other means of transportation, such as taxis, car- and bike pools (Holmberg et al., 2016). Industry professionals argue that MaaS is likely to disrupt the current mobility network in urbanized areas across the world, since it enables users to adopt the means of transportation that is best suited for them at various occasions (Jittrapirom et al., 2017). MaaS offers the user a tailored mobility package based on individual demands where the users, through one single platform, can plan their trip, reserve the needed means of transportation and pay for the service. The combination of different mobility options might result in a change of the current mobility network. Jittrapirom et al. (2017) further argues that the introduction and growth of MaaS can generate a shift from the current ownership-based mobility network to an access-based mobility network. Moreover, since it offers a tailored mobility solution to the user, where various means of transportations are included, it is believed to become a great substitution to car ownership (Jittrapirom et al., 2017).

Since congestion is increasing due to the higher number of citizens in urban areas, transportation planners across the world must embrace innovative ways in order to solve problems related to congestion. As mentioned earlier in the paper, adding new infrastructure capacity can be slow and is extremely costly. Whilst the population in urban areas are continuously growing, in many cases faster than the infrastructure, MaaS can provide an alternative way of mobility in a faster and cheaper way that has less impact on the environment than current transportation systems. By adding additional means of transportations, and thus more variability to the supply side, MaaS can enable a more flexible transportation system when comparing to current, often considered as inflexible, mobility options (Goodall et al., 2017). The concept of MaaS is currently implemented in a few number of cities worldwide. However, Goodall et al. (2017) argues that there are three reasons to believe in a rapid growth for the concept. First, the benefit for cities is considered to be of high value. To continuously expanding the infrastructure network by building new roads, train tracks and parking spots is not a durable solution. Besides the benefits for cities, the benefits for individuals are believed to be of high value as well. In many cities, getting from point A to point B is complicated due to fixed routes and schedules which not always meet the demand from the users. The concept of MaaS will however enable the user mobility based on their individual demands at every specific occasion. Lastly, the required technology for a successful implementation of MaaS is already existing and is therefore not considered as an obstacle for the introduction of improved and innovative mobility solutions in urbanized areas (Goodall et al., 2017).

Sharing Economy

The continuously developing technology and the increased usage of Internet are considered two main drivers for future economic growth and employment. From this, the concept of shared economy has evolved, which is also known as peer-to-peer economy, collaborative economy or access economy. It is defined as "collaborative consumption made by the activities of sharing, exchanging, and rental of resources without owning the goods" (Puschmann & Alt, 2016, p.95). Hence, the principle of shared economy is to eliminate the need of ownership, but to provide access to goods and services as they are needed. The

sharing economy can further be described as a broking service which provides the required goods or service to the user by matching the buyer to a seller. The sharing economy is primarily focusing on markets related to transport, on-demand delivery services, short-term accommodation and rental of cars (Das, 2018). Denning (2018) likewise argues that the sharing economy is enabling for enormous benefits by providing access to use goods or services while saving money, space and time. The increased growth of sharing economy will further benefit the environment by reducing the impact through increasing efficiency, reducing waste and lower the surplus which is created by over-consumption (Denning, 2018).

However, sharing resources is nothing new. For example, libraries, self-serving laundries and car rental has existed for years. What is argued to be innovative is the growth of consumer-to-consumer (C2C) transactions which have resulted in new business models. Puschmann and Alt (2016) discusses three drivers for the increase of C2C-business. While ownership have been the most known model for using goods in the past, there has been a *change in consumer behavior* in recent years. As society is getting increasingly more aware of environmental sustainability and the convenience and cost-efficiency of eliminating the need of ownership, consumers have realized the attractiveness of temporary usage which have resulted in the rise of sharing economy. *Mobile devices and electronic services* are considered as important enablers in order to access goods or services conveniently and efficient. Moreover, in order to link the user to the appropriate owner of the goods or service, *social networks and electronic markets* plays a vital role. This ensures lower transactions costs and enables for various functions such as rating, feedback and payment (Puschmann and Alt, 2016).

As shared economy is growing and increasing momentum, the concept of shared mobility has evolved. In the recent years, there has been an increase in shared mobility systems such as bike and car sharing programs. Car sharing systems has gained popularity as a substitute to owning and using a private vehicle since it brings benefits such as reducing congestions and reducing the impact on the environment. In addition, shared mobility systems serve as a good complement to public transportation as a convenient solution to the first and last part of a trip (Raviv and Tzur, 2015). In 2016, the total shared mobility industry worldwide was valued at $54 billion and is expected to continuously grow (Grosse-Ophoff et al., 2018). Laporte et al. (2015) argues that shared mobility will continue to grow due to high fuel costs, limited and expensive parking and the increasing demand for people mobility in developing countries. A fast-emerging market in the shared mobility industry is one-way car sharing. In this type of service, the customer can use the car as desired, without the need of returning it to the pick-up point. Another benefit for this concept is that the user only pays for time when using the car, but to a lower price than in a taxi service (Le Vine, Adamou and Polak, 2014). Additional modes of shared mobility systems include lift sharing, bike sharing and peer-to-peer car sharing. Lift sharing is when a passenger pays a fee in order to travel with the private car owner. Bike sharing is described as short-term rental of a bike, normally point-to-point and peer-to-peer car sharing is when a private car owner gets paid for letting others use his/her vehicle.

A key problem that shared mobility system operators are facing is to manage to supply a sufficient number of vehicle at every station. For the operators, it is how high importance to

understand the demand since too many vehicles at one station can interfere the return of vehicles whereas too few vehicles at a station can result in a loss of customers. In addition, determine where to locate stations, chose the adequate number of vehicle available at every station and moving vehicles between various locations are issues that operators will face in order to be able to deliver a high-quality service to customers (Laporte et al., 2015).

2.3 Theoretical Framework

Summarizing the literature review, factors that will influence the potential for the cycle taxi service can be identified. From each chapter several factors could be extracted that influence one of the steps defined in chapter 1.3 - Research Question.

The first step is investigating the current network. Factors that influence this step were mainly found in the theory on travel patterns and travel behavior. Travel patterns show how people travel, which is important to keep in mind when investigating the potential for a new means of transportation in order to decide on the right locations and destinations. The built environment refers to how the city and neighborhoods are designed. This is important to consider when implementing a new means of transportation, in order to see if there are possibilities and space for this product. Next are residential choices. This factor defines where people live, which impacts the use of the different connections. Trip factors include characteristics such as the price and availability of different means of transportation. When implementing a new means, the trip factors of the existing means are important to consider in terms of competition. The last factor extracted from travel behavior is social psychology. Within this factor it is described why people choose what they choose. People's choices influence the success of a means of transportation, and thus also the potential for this particular new means. The last factor that is part of the current network are the regulations on cycles, public transportation and taxis. Regulations offer limitations to the market and its possibilities.

Subsequently, the challenges within the current network have to be defined. From the literature on urban transportation several challenges arose. A main factor is urbanization, which is of meaning here since it implies a change in travel demand. Connected is the congestion problem, and last but not least sustainability forms an extensive challenge within cities and transportation.

Moving on from the current market and the challenges, the desired market can be defined. According to chapter 2.1.1 - Urban Transportation, a more efficient use of the current infrastructure is desired instead of building new infrastructure. Next, the city of Gothenburg formulated a strategy on the desired future city. The main goal of this strategy is the creation of a so-called close-knit city in which it is easy to move around and where key places are easy to reach. Last but not least, the two concepts investigated, the gig economy and MaaS, form opportunities for the future city and are thus places in the third column.

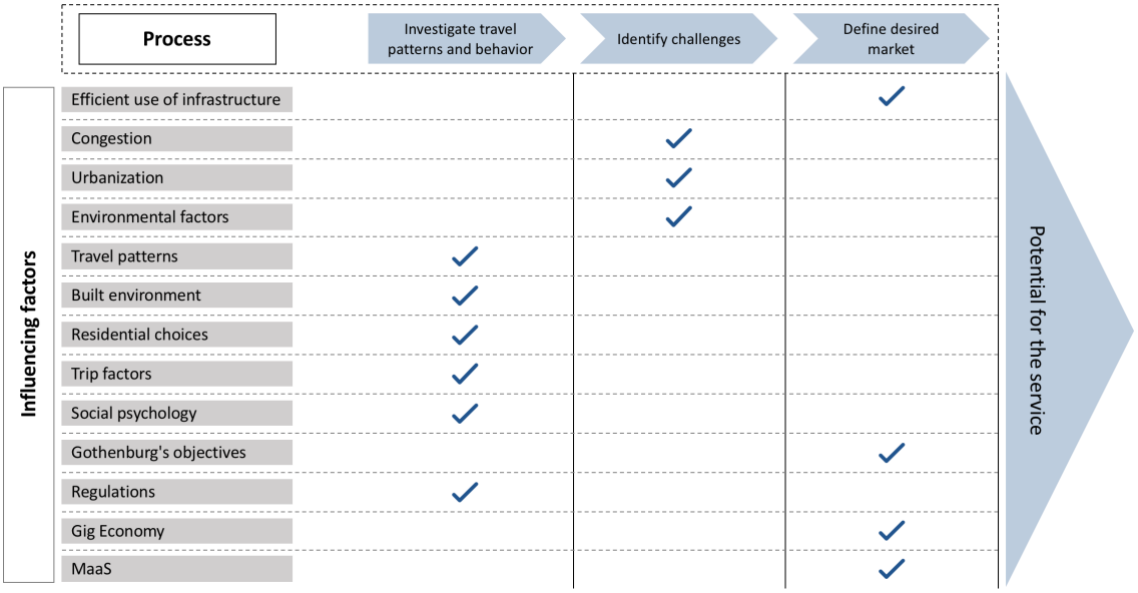

Figure 4 - Theoretical Framework

All factors are connected to the process identified in chapter 1.3, and together form the theoretical framework (Figure 4). Horizontally the process is shown, vertically the identified factors are listed. The steps that are influenced by the single factors, are marked with the symbol ✓. The steps and factors together will form the potential of the service.

3. Methodology

In this chapter the authors will present how the research was organized and conducted. Furthermore, the chapter will provide an understanding of how the data was collected and analyzed.

3.1 Research Strategy

A research strategy is a general orientation of business research and starts with a distinction between qualitative and quantitative research. This thesis is a qualitative research, that focuses nominal data rather than the quantification of the data. This strategy is more flexible, sees social reality as a continuously shifting process, focuses on the way individuals interpret the social world, and emphasizes an inductive approach. In fact, the conducted research is based in an inductive theory. Inductive research is defined as the process of drawing theories and recommendations out of observations. In the case of this thesis, the market is observed to find the potential for the product. This is the opposite to deductive research, which means that theory guides the research. For this thesis this is not possible from the beginning, because of the lack of existing literature on similar topics. However, the process involves some deduction as well, it is a back-and-forth process. Literature is used, but not to test in the empirical findings, rather to build a base for the empirical findings. To provide an outcome, the empirical findings will be analyzed with help of the theory (Bryman & Bell, 2015).

3.2 Research Design

First and foremost, this research is designed as a case study. Performing a case study means to study a single case intensively and in detail by using a variety of methods (Bryman & Bell, 2015; Collis & Hussey, 2014). The study is conducted together with Addvelo, to which the results will offer suggestions on how to introduce the service. This thesis is thus a case study for which Addvelo forms the single case. The authors of this paper are further supported by The Space, which also acts as an advisor to Addvelo. Next to the company interest, this case study can be used as a general framework for the implementation of this particular new means of urban transportation for other modern cities that focus on sustainability and innovation. Since this concept has hardly been studied before, it can be called an exploratory study.

To find answers on the research question formulated in chapter one, the main method used for this thesis is market research. Market research can be used for the organization and information gathering about target markets and customers (McQuarrie, 2006), which fits the purpose of the thesis, namely finding the potential customers and market possibilities for the cycle taxi.

3.3 Research Method

Several methods can be used in a single case study for exploratory market research, of which the results can complement each other. These techniques can include both qualitative

techniques and quantitative techniques (Collis & Hussey, 2014). For the literature review, secondary data is used to gain knowledge that is important when implementing the cycle taxi. For the empirical findings, several different methods are used. First, data sources from the city and company reports are consulted to find data about the current travel patterns. For additional information, interviews are conducted with several industry experts. All interviews are set up as semi-structured interviews. This is chosen in order to get the answers needed, while still leaving space for new ideas (Bryman & Bell, 2015). To get information and ideas from a sample of potential users, a survey is set up. Surveys are designed to collect data from a sample of which the results can be generalized after. The survey is of a descriptive design, since it aims to provide a representation of phenomena at one point in time (Collis & Hussey, 2014). An overview of the used research methods can be seen in Figure 5.

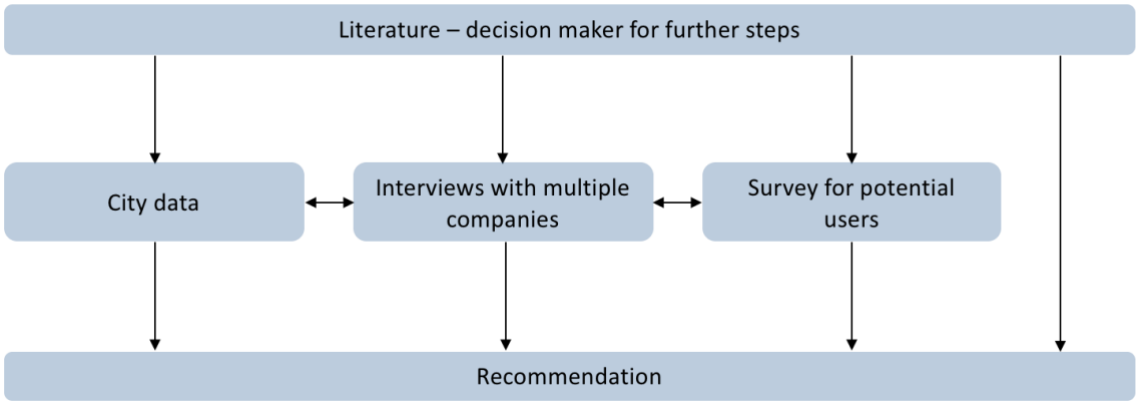

Figure 5 - Used research methods

The choice for multiple methods relies on the idea that a concept that is not investigated before, needs information from as many perspectives as possible. The findings of these different methods are combined and complemented by the theory, to come to a best possible recommendation for the company.

3.4 Literature Review

The purpose of the thesis is clear and in line with what Addvelo wants to be investigated, namely the potential for electrical cycle taxis in Gothenburg. In order to build a framework around the concept, literature had to be defined. This was done along the way, by brainstorming about what is needed to find the market potential and with that give a proper recommendation to the company. Meetings with the supervisor, The Space, and Addvelo have been helpful to find necessary topics for the theoretical framework. While already getting several empirical findings, new topics that had to be investigated more in detail came up, through which the chapters have been adding up over time. The information mostly comes from existing literature as well as from information from the city of Gothenburg, that owns information on the current transportation situation and the desired development of that. Focus was put on data that is as new as possible. Basic definitions can be some years older, but information on trends and the changing city should be from 2015 or newer, in order to make it actual.

As there is no literature available that covers this exact topic, related topics were analyzed. In order to apply the literature on the cycle taxi, the most important factors are put together with the different stages of the process, to build a theoretical framework. This framework will then be used for the analysis.

The main databases used are Web of Science, Google Scholar and the University Library. The search criteria within these searches are:

- Urbanization, urban transportation, regulations on cycles, public transportation and taxis, future of Gothenburg, travel demand, travel patterns, travel behavior, mobility as a service, gig economy

3.5 Data Sources

3.5.1 Primary Data

Interviews

A large part of the primary data is based on the conducted interviews. All interviews are set up as semi-structured interviews. The framework created in chapter 2.3 was used as a starting point for the questions of all interviews, however the more exact interview guides can be found in Appendix B. An overview of the interviewees can be found in table 2.

First of all, meetings with Eric Zinn and Per Östling were held continuously throughout the process to exchange ideas and discuss the progress and direction. For the rest of the interviews, companies were selected based on different factors. All of them have different expertise in the field and thus a different perspective on the investigated service.

First travel data of Västtrafik was discussed with Elena Marsiglia and relevant information was derived from the received information.

The next interview is held with Johan Erlandsson, who is the co-founder of both Velove and Pling. Since Velove develops the cycle for Addvelo, this interview was chosen to gain a deeper insight on the product. Pling is using the same cycles for the transportation of goods within Gothenburg, and thus have knowledge about the actual usage, benefits and drawbacks of the cycle.

Third Jonathan Lannö at Bzzt is interviewed. Bzzt runs a similar service in Stockholm, with the difference that their vehicle is not classified as a cycle, but as a motor vehicle. Despite this difference, the market they operate in is very similar, through which insights into the market for innovative taxi services could be given. The product shows both similarities and differences, and it is interesting to compare and discuss the advantages and disadvantages of each product.

The next interview is conducted with Oskar Carlsson and Julius Laurell at Electricab, which is a Gothenburg-based innovative taxi company driving only with Tesla cars. Electricab has

expertise about the taxi market and users specifically in Gothenburg, which is of importance when identifying the challenges and opportunities for the developing cycle taxi.

As fifth interviewee, Peter Norling from the City of Gothenburg is interviewed, more specifically the department "Serviceresor" which is in charge of service trips for people that are less mobile. This is chosen after discovering the enthusiasm from elderly people for the product. Topics of interest are their existing vehicle fleet, how the users are experiencing the service today, and the potential for the cycle taxi in relation to the service provided by the City of Gothenburg.

The last company that is interviewed is UbiGo, a company that developed mobility as a service. They have had a successful trial of the service in Gothenburg and are now starting their service in Stockholm. UbiGo was chosen to discuss the potential of including the cycle taxi in a MaaS network. Furthermore, Hans Arby (CEO of UbiGo), has been part of developing the Strategy of Gothenburg, because of which he has know-how of the general development of the city.

Interviewee	Function	Company	Type	Date
Eric Zinn	Product owner and founder	Addvelo	Face-to-face & Email	Continuous
Per Östling	Inspirer and Advisor	The Space – First to Know	Face-to-face & Email	Continuous
Elena Marsiglia	Controller	Västtrafik AB	Email	2018-02-12
Johan Erlandsson	Co-founder & CEO	Velove and Pling	Face-to-face	2018-02-14
Jonathan Lannö	Project manager	Bzzt	Email	2018-02-19
Oskar Carlsson & Julius Laurell	Founders	Electricab	Face-to-face	2018-03-06
Peter Norling	Head of department	Elderly Mobility Service	Email	2018-03-06
Hans Arby	CEO	UbiGo	Face-to-face	2018-04-03

Table 2 - Overview of interviews

All interviews were recorded and transcribed. The interviews with Bzzt and Färdtjänst were conducted in Swedish and translated to English to be able to include them correctly into the empirical findings. The other interviews were held in English. The content was later reorganized per topic before being added to the empirical findings. The number of interviews can be considered as rather few. However, the authors argue that these interviews cover all areas of interest related to the thesis and offer a wide perspective. An interesting addition would have been to interview another existing taxi company. The authors have tried to set up a meeting with the largest taxi service of Sweden, which unfortunately was not successful.

Survey

The survey was conducted in order to collect the opinion on the product from potential users. The survey contains answers from 167 respondents and the demographic of the respondents was divided into four age groups: 18-30, 31-45, 46-65 and 65+, and three

occupation groups: student, working and retired. This was done in order to better understand what type users that potentially will be interested in the cycle taxi service. The first set of questions is related to the travel patterns and behavior of those people, after which a picture of the Quicab is shown and opinions are asked. The survey consists of 14 questions with both open and closed questions. The goal of the survey is to identify potential users and their ideas and suggestions on the product. The complete survey including answers can be found in Appendix C.

3.5.2 Secondary Data

The secondary data in the empirical findings of this thesis contains travel data. The travel data was obtained from Trafikkontoret (traffic organization of Gothenburg) and Västtrafik, who own all the data on total trips and trips by public transportation in Gothenburg. The primary source for gaining information was Teknisk Handbok (2017), where travel patterns and travel behavior of the current market were obtained. Additional sources for information were reports and strategy plans provided by Trafikkontoret, Västtrafik and City of Gothenburg.

3.6 Data Analysis

The analysis includes the interpretation of the data to develop a richer understanding of correlation of the different data, and the connection to the theory (Collis & Hussey, 2014). In this thesis the analysis is conducted somewhat differently than usual, since theory on the concept of cycle taxis is not existing yet and can thus not be directly compared to the empirical findings. To find the potential of the cycle taxi, all strengths, weaknesses, opportunities and threats found in different sources, are connected to each other in the SWOT analysis. They are displayed in a figure, and further consolidated into six main topics. After, the factors found to be important from the theory, are each checked separately again in the empirical findings and compared to what the theory says.

3.7 Research Quality

3.7.1 Validity

Validity refers to the extent to which a test actually measures and represents what the researcher wants to measure. Research errors can reduce the validity, such as imperfect procedures, poor samples and imprecise measurements. Internal validity measures whether or not the researchers' findings match the ideas they develop. External validity refers to the generalizability and if the research can be applied in other cases or settings (Collis & Hussey, 2014). Internal validity is rather hard to measure in a qualitative study since it is very subjective. However, in this thesis, the internal validity is ensured by using multiple sources and including people that are experienced and highly involved in the topic. The interviewees all had knowledge on more specific areas, and the respondents of the survey are actual potential users. By using sources that view the same topic from a different angle, biases are minimized. Through this it can be guaranteed that the findings match the reality. External

validity however cannot be reached, since this is a single case study performed for one company in one, mid-sized city. Moving the research to another situation, results will vary depending on the company and the size of the city (Bryman & Bell, 2015).

3.7.2 Reliability

Reliability indicates how well the results of a study can be replicated by other researchers with the same result. Qualitative research is often criticized for being too subjective, meaning that the qualitative findings rely on what the researchers find important (Bryman & Bell, 2015). In social science, reliability can be problematic since human behavior and observations are not static and might change over time. What is more important in a qualitative research is whether the results are consistent with the possessed data (Merriam, 1998). Since the empirical findings in this research are mainly based on interviews, there is a possibility that the results in another study would be different from the results in this study since the exact interview settings are hard to replicate. However, since the interviewees are thoroughly described and have the right knowledge and experience for a proper data collection, the authors of this study believe that similar results are likely to be found if replicating this research.

4. Empirical Findings

In this chapter the empirical findings are presented that are based on travel data, the survey, and the interviews. The chapter is divided into three parts, which are defined by the process introduced in chapter 1.3. First, the current situation is described, which explains the current travel patterns and travel behaviors in Gothenburg. Second, the challenges related to the market and the product that were identified in the literature, are investigated in Gothenburg. In the last part all information related to future desirability for the city is discussed.

4.1 Travel Patterns and Travel Behavior

The current infrastructure has been examined in regard to what means of transportation are included in the public transportation network, how people are using the network, and for what reasons they are using it. The examination will also cover how people travel by car and by cycle. In more detail, the findings in this chapter will cover current travel patterns and travel behaviors of the trips in Gothenburg.

Travel Patterns

There are almost 1.500.000 trips performed daily in Gothenburg[1]. Included in that are pedestrians and cyclists, taxis, cars, mobility services, public transportation and freight transportation (Goteborg, 2018b). In 2016, almost half of the trips in Gothenburg were performed by car, and 30% were performed by public transportation. The use of public transportation is however increasing. Comparing the usage of public transportation in Gothenburg between 2011 and 2016, there is an increase by 3 percentage points (Trafik- och resandeutveckling, 2016). When comparing these numbers to travel patterns in the city center of Gothenburg[2], there is a difference. The most common means of transportation in the city center are cycling and walking, which together combine for almost 40% of the trips. The use of public transportation in the city center is as well roughly 40%, and the least common means of transportation is car, which only accounts for 20% of the trips in the city center (Teknisk Handbok, 2017).

In the city center of Gothenburg, roughly 65% of the trips by all means of transportation are below 5 km and almost 40% of the trips are shorter than 2,5 km (see Figure 6) (Teknisk Handbok, 2017). Similar answers were found in the survey, where half of the users of public transportation used the service for 10-30 minutes daily. The answers of the survey further showed that roughly 20% of the users of public transportation use the service for less than 10 minutes whereas 30% use it for more than 30 minutes. Taxis are said to be mostly used for trips between 10 and 30 minutes; only 10% of the respondents travel longer than 30 minutes by taxi.

[1] Gothenburg includes following districts: Angered, Askim-Frölunda-Högsbo, Centrum, Lundby, Majorna-Linné, Norra Hisingen, Västra Göteborg, Västra Hisingen, Örgryte-Härlanda, Östra Göteborg (see Appendix A, Figure 9)

[2] The city center of Gothenburg only includes the district Centrum, which includes following sub-districts: Krokslätt, Johanneberg, Landala, Guldheden, Lorensberg, Vasastaden, Inom Vallgraven, Stampen, Heden (see Appendix A, Figure 9)

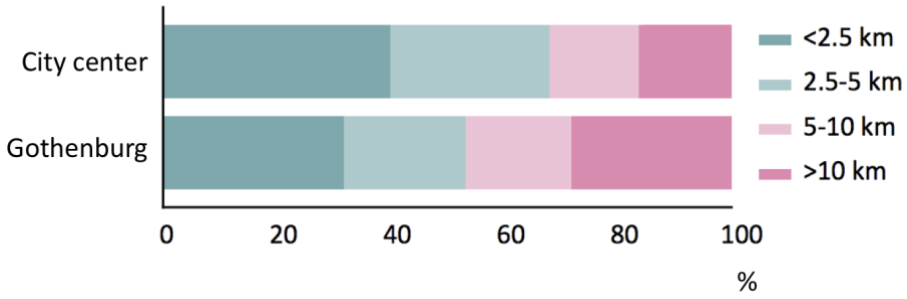

Figure 6 - Length of trips in Gothenburg (Teknisk Handbok, 2017)

Combining the data on car transportation that is available in travel patterns of the city center of Gothenburg (Teknisk Handbok, 2017), an approximate calculation of the number of short trips that are performed daily by car in the city center can be made. In the city center of Gothenburg there are 30.000 trips every day performed by car. Of those trips, 35% are less than 5 km, meaning that there are about 10.500 trips every day that are shorter than 5 km (Teknisk Handbok, 2017).

In the area which Västtrafik defines as 'city traffic', which is much larger than the area Trafikkontoret defines as 'city center', there were approximately 218 million trips performed by public transportation in 2017. Västtrafik divides these trips into three means of transportation, namely tram, bus and boat, where tram and bus accounts for roughly 98% of the total trips. Only taking bus and tram trips into consideration, which is of highest interest to this thesis, roughly 600.000 trips are performed daily by Västtrafik in Gothenburg (Marsiglia, 2018). Västtrafik does not have any data available regarding the lengths of the trips. However, by looking at the survey it can be concluded that a vast majority of the trips performed by public transportation in Gothenburg were less than 30 minutes long.

Travel Behavior

The purpose of the trips less than 5 km performed by car is mainly trips to and from work, business trips, purchases and others. As Figure 7 shows, trips to and from work in combination with business trips constitute for roughly 30% of the trips less than 5 km. Calculating on that number, it can be estimated that there are roughly 3.200 business trips, including travel to and from work, performed daily in the city center of Gothenburg that are less than 5 km. According to the survey, trips by public transportation have the same purpose, and showed that the most common reason for using the service was going to work and school and to reach free time activities.

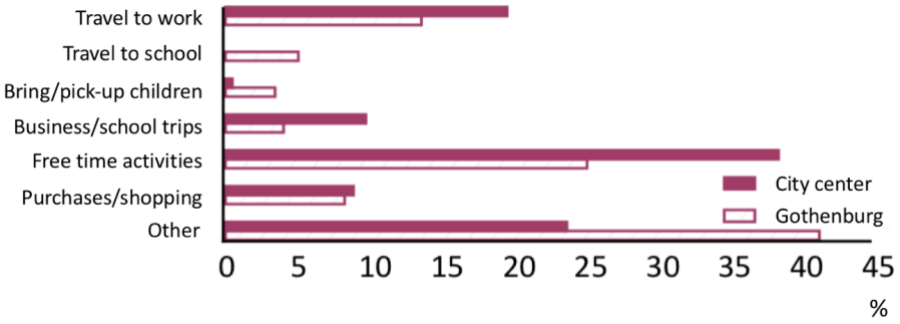

Figure 7 - Purpose of trips in Gothenburg (Teknisk Handbok, 2017)

As mentioned, the number of trips by sustainable means of transportations are increasing in Gothenburg. What is argued to be one of the reasons for that change is the introduction of congestion tax (Trafik- och resandeutveckling, 2017) which was implemented in 2013 (Riksdagen.se, 2018a). In 2017, the trips by public transportation increased by 6% whereas the trips performed by car were the same as previous year. In fact, the only means of transportation that is developing in line with the objectives is public transportation (Trafik- och resandeutveckling, 2017).

Despite Gothenburg's well-developed cycle infrastructure comparing to other European cities (Erlandsson, 2018), the development of cycle trips has been stable. The increase of car trips from 2015 to 2016 was as low as 1,3%, and for the same period of time public transportation experienced an increase of 6,4%. The reason for this increase is believed to be a result of the increased population in combination with a higher number of people commuting to Gothenburg from outer suburbs. From 2011, Gothenburg has had a total increase in population by 5,3%. In combination with that, the employment rate has increased by 3%, which is argued to be one of the reasons for the growth of commuters (Trafik- och resandeutveckling, 2016).

User opinions on the current market

Based on the answers of the survey, the public transportation service is perceived as positive. Only 6% of the respondents perceive the service as "bad" and the rest either had no opinion or experience the service as "good". For the comfort, the double number of respondents said it was "bad", but that still leaves about 85% of answers that were "neutral" or "good". Regarding the speed, the opinions were rather diverse, however the majority of the people is still positive. Continuing to the price, the answers were also relatively spread, but with a higher tendency towards "bad", namely 40%. Both the accessibility and safety were found very positive, with 60% of the people answering "good". The flexibility was to some extend spread, with most answers in the "neutral" box (Survey, Appendix C).

In addition to the data collected from Trafikkontoret and Västtrafik, the respondents of the survey answered questions about travel patterns related to taxi services. Contrary to public transportation, a majority of the respondents "only occasionally" uses a taxi service and 25% of the respondents never use a taxi service. Similar to the trips performed by public transportation the taxi trips were between 10 and 30 minutes and only few of the trips exceed

30 minutes. The reason why the respondents are using a taxi service differ from the purpose of using public transportation. The major reasons for using a taxi service are for business trips and free time activities, and contrary to public transportation hardly no one uses taxi services to travel to and from work and school. The aspects of comfort, flexibility and speed where all positively perceived, whereas the price where experienced as too expensive (Survey, Appendix C).

4.2 Challenges in the Market and for the Quicab

4.2.1 Market

Urbanization causes a growth in travel demand

As seen in the current market, Gothenburg's population has been increasing yearly and is expected to continue to grow with the same trend. A growing population directly means a growth of trip demand, which forms a large challenge for the city. The City of Gothenburg (2018) wants that the increased demand will be supplied by more sustainable means of transportation. The number of trips by public transport has increased, and the trips by cycle even with as much as 26%. This shows a movement towards the sustainable means of transportation. However, with the continuous growth of the city, it will remain a challenge to supply enough transportation which is as sustainable as possible.

Increasing congestion is becoming a challenge in urban areas

Related to a growing travel demand, there is a risk of increasing congestion in the city. According to Carlsson and Laurell (2018), congestion is not a problem yet in Gothenburg since the city is relatively small. However, this can change when the city grows immensely. Looking at Stockholm as a larger city, the congestion problem is confirmed by Lannö (2018). Mainly during rush hour, Bzzt copes with this challenge to the same extent as cars do. It would make a change if they would be allowed to drive on bus, taxi or cycle lanes as well to avoid congestion. The biggest problem with congestion is that the customer pays per meter, so the hourly income decreases (Lannö, 2018).

Cycle infrastructure is not developed for larger cycles

A challenge connected to the growing number of cycle trips, is having a good cycle infrastructure. Erlandsson (2018) states that the cycle lanes are not overcrowded yet, but this will change when more cyclists and cycle cargo companies are using the bike lanes. Regular two wheeled bikes are around 76 centimeters wide across the steering, and adding a bit of swing to that, the space used is about 90 centimeters. Trouble arises because of new types of vehicles, such as family trikes and electrical bikes, that need more space on the cycle lanes. To solve this issue, the cycle infrastructure has to develop. Roads are widened because of the wide trucks, and similarly the cycle lanes have to be widened for cargo bikes. Trucks are generally accepted because people see the need of them, and when they understand the benefits of cycle cargos, they will accept an enlargement of cycle lanes as well. Copenhagen already increased the cycle infrastructure, so it could be used as an example for Gothenburg (Erlandsson, 2018). If these types of vehicles will be implemented, there will be a lot of

discussions about cycle lanes. Too small cycle lanes might be a challenge when there are too many large cycles on the lanes. The vehicles might be directed to the regular streets when there are too many for the cycle lanes (Arby, 2018).

Challenges in public transportation

Within the city's infrastructure, there are several challenges to be found for the different means of transportation. Starting with public transportation, several drawbacks were mentioned in the survey. Many people complain about the unreliability of public transportation. This includes delays, cancellations and disruptions through traffic problems. Another frequently mentioned disadvantage is the flexibility. First of all, there might be a better route possible, however, no bus or tram line is using that route. Secondly, public transportation is not flexible due to the timetables they follow. Waiting times can run high, and the transfer time between two means is also not optimal. On top of that, the same schedule does not run at nights or on the weekends, which many people complain about. The accessibility is also not perfect. There is no door-to-door transportation possible, and some people have to walk relatively far to the stop. Next there is criticism on the price. In many cities it is possible to pay per stop, whereas in Gothenburg it is not. This makes it expensive for people travelling short distances, but since the price rises outside the center zone, it also gets expensive for people living further away. The control system is not very intensive in Gothenburg, which allows many free riders to use public transportation, which in turn raises the prices for the tickets. A last drawback mentioned is the comfort. Respondents of the survey complain about the crowdedness, safety, cleanliness, the number of seats, noisiness, and dirt (Survey, Appendix C).

Challenges in the taxi market

The main downside of taxis according the respondents is the price. In the survey, people are satisfied with other aspects of taxis, such as flexibility, reliability, travel time and more, and the reason to not take a taxi is mostly related to the high price (Survey, Appendix C). A different type of taxi is Färdtjänst, which is meant for people with a disability. For them the challenges lie within the vehicles, that are not perceived convenient enough by the users. The door openings of the cars are rather tight, and it is often hard to enter the vehicle. Besides, there are many pedestrian areas and other limited areas in Gothenburg, because of which door-to-door transportation is not always possible. Plan of building terror-preventing obstacles will impact the accessibility of the city center as well (Norling, 2018). The pod taxi Bzzt in Stockholm is also a taxi service but has different characteristics, and therefore copes with different challenges. It cannot offer transportation on longer distances, or as fast as regular taxis can. This is not a problem in the city centers but limits the number of potential users. Another drawback is that they cannot transport more than two people at a time, whereas public transportation has a much larger capacity (Lannö, 2018).

4.2.2 Product and Service

To find out the potential of the product and the service, potential users and interviewees were shown a picture of the Quicab including a short explanation, after which they could

give their first opinion on the question if they would consider using the cycle taxi. The rather negative answers form challenges for the product and are thus presented here.

Price and profitability

The major challenge is by far the price and the profitability of the service. This concern was raised by every interviewee. There has been a trial of the taxi service by using Pling vehicles, and Erlandsson (2018) gained some insights on this topic. First of all, there is a large investment needed, since the service will only work if many vehicles are rolling. Users do not want to wait for 15 minutes, so it is not profitable to start with one, or even ten vehicles. An amount of 50 vehicles might be a good start. However, empty vehicles cost a lot of money as well, so the challenge is to balance the waiting time and the utilization rate. Carlsson and Laurell (2018) also see the price as an obstacle. They think that the costs are too high compared to possible earnings. As a taxi company, they argue that short trips are the least efficient trips because it often takes more time to pick up a customer than the actual trip is. Carlsson and Laurell (2018) made a short calculation on the costs of the service and concluded that the largest costs will be the labor costs of the drivers. He also states that a Quicab needs to earn about 300 SEK per hour to cover the costs, and that each taxi can manage three trips per hour due to waiting times and driving to the customers. This together means that each trip needs to cost around 100 SEK to reach the break-even point. A large part of these costs are the times that the vehicle is not running with users. The peak hours are in the mornings and afternoons, but in between there is much less demand. These costs have to be covered by the users. Carlsson and Laurell (2018) further mention that people might not be willing to pay for door-to-door transport, since this is not a big issue in Gothenburg, where most places are easy to reach. Owning a taxi service, they know how hard it is to earn money in this market, and therefore see a challenge for the cycle taxi service. They would not want to be the employer having to guarantee the salary to the employees and own the cycle taxis. Arby (2018) compared the service to Bzzt in Stockholm, who charge 30 SEK per kilometer. If their customers are willing to pay that, people in Gothenburg are expected to be willing to pay a similar price. In this case Quicab would be able to earn about 250 SEK per hour, which is okay if you employ cheap labor such as students. However, the vehicles must be used maximally to earn more per hour (Arby, 2018).

In the last question of the survey, the potential users were asked what they would be willing to pay for a trip by cycle taxi between Central Station and Handelshögskolan. A comparison to public transportation and regular taxi was given. The answers varied as much as between 10 SEK and 100 SEK, with an average of 48 SEK. Most people based their answer on a comparison of what they usually pay for their current type of transportation. In Gothenburg it is very common to have the monthly Västtrafik card of 470 SEK or 625 SEK (age dependent), which comes to 15 SEK or 20 SEK per day (Västtrafik.se, 2018). These people are thus not willing to pay much more to use a different service, since they have already paid for public transportation. If the service would be included in the monthly card, they would however use it. People that compared to a regular taxi seem to be willing to pay much more: between 60 SEK and 100 SEK. Those eligible for elderly mobility, argued that they would pay the same or less than what they would pay for a trip with elderly service, which is 45 SEK (Survey, Appendix C). Arby (2018) argues that customers will only pay more for the

service if it actually offers something extra. When targeting customers that have a car or a monthly public transportation ticket, high value must be created for them, otherwise they will not be willing to pay for the service.

Challenges of the product

Next to the price, there are several other challenges seen in the product. First of all, the speed was mentioned frequently by the respondents of the survey. They argue that it is slower than a regular taxi, and they wonder if it will actually be faster by avoiding congestion. People that live on a hill are afraid that the vehicle cannot reach their home (Survey, Appendix C). Another issue is the distance the cycle can cover. Carlsson and Laurell (2018) question how long the battery will hold and if the vehicle is usable without a charged battery. They say that Bzzt needs to change the vehicle three times to cover one shift since the battery cannot be changed. For commuting between the center and the suburbs, the cycle does not seem to be competitive. The same goes for trips to the airport, which might be too long to cover by the cycle. On top of that, not much luggage can be carried, which is another drawback of the product. This is confirmed by Norling (2018), who argues that disabled people might need to bring a walker or a wheelchair.

The exposure in the vehicle is another point of worry for many people. Potential users argue that they would feel unsafe between regular vehicles and are afraid of collisions. Especially people with children see this as a large risk (Survey, Appendix C). For the similar product Bzzt, this is not a problem for their crash-tested vehicles. However, the safety for the workers can be endangered at night, which is why they have installed alarm systems in the vehicles in case something happens (Lannö, 2018). Yet another worry that relates to the exposure, is if the vehicle will be warm enough. People argue that they would only use it in summer when the temperatures allow it to be on a cycle. Norling (2018) discusses the same, for older people the vehicle might not be suitable all year long. The people over 65 that answered the survey, saw however a use for rainy days when they do not want to get wet. To avoid people getting too cold, Bzzt uses heating fans in the winter (Lannö, 2018).

Younger people see a use of the service at nights when they go home from a party. However, their concern is that it only fits two people, and that it is slower than regular taxis since at that time there is no traffic on the roads. This is also a concern for families with children, who would like to fit three or four people in the same vehicle (Survey, Appendix C). Erlandsson (2018) argues the same problem, however he does not see a problem in sending multiple vehicles to the same customer.

The respondents of the survey appeared still hesitant about the product and showed several insecurities and worries. A reason they give for this is that the product is unknown, and they cannot tell the benefits or drawbacks yet. For some people it does not seem to add anything to the current public transportation system. These are mainly people living close to the stops, or those having a monthly card of Västtrafik. Compared to Västtrafik, it is not a security that there is always a vehicle available. Comparing it to owning a bike, the Quicab does not solve problems they have with their own cycle, and on top of that there is no personal exercise

with the taxi. In the end many people said to be interested in trying it before deciding if it fits them (Survey, Appendix C).

Challenges of possible collaborations
With some of the interviewees, possible collaborations are discussed. Erlandsson (2018) and Arby (2018) see several challenges involved when starting a collaboration. First of all, nobody wants to own vehicles anymore. Taxi companies do not own vehicles, and even rental companies do not want to own cars anymore. A next challenge is to convince possible partners about the product. They mostly want to generate money from the collaboration, so you need to show them where it is positive for them and how they would benefit. Companies as Västtrafik could be skeptical since they might lose customers through the collaboration. Other companies could also be afraid of bad influence on their brand name. If something happens with the new product under their name, this is bad marketing for the company. Therefore, it is very important that the new product can offer excellent safety. Since the cycle taxi is not existing yet, it will be hard to convince companies of the benefits of a cooperation. A trial is needed, and the best place to do this would be to offer it at an event where decision makers of large companies are present, so they see the product without having to reach out to them (Erlandsson, 2018; Arby, 2018).

4.3 Opportunities in the Market and for the Quicab

4.3.1 Market

Successful competitors in the market
According to Erlandsson (2018), there are major advantages and benefits when using a cargo cycle comparing to goods transportation performed by vans or trucks. Pling's customers are experiencing double productivity compared to vans, meaning that Pling can deliver twice the number of parcels. Another driver for using cycles instead of other means of transportation is the cost of ownership. Erlandsson (2018) is experiencing halved total cost of ownership for cargo bikes comparing to motor vehicles. Cargo bikes are further enhancing city livability and gain sustainability advantages in energy and resource usage compared to motor vehicles. This is also a major competitive advantage for Bzzt compared to other taxi companies (Lannö, 2018). Erlandsson (2018) sees a potential in offering a hybrid product, meaning that the same cycle can perform both goods deliveries and people transportation. Offering this type of product will for cycle logistics companies result in expanded income sources and an increased utilization of the cycle. A future customer segment is the gig economy which is believed to continue to increase. That might result in 'giggers' owning their own bikes and can be employed on short term contracts to do goods deliveries and people transportation if a hybrid product is offered (Erlandsson, 2018).

According to Lannö (2018) Bzzt is planning to expand its business, both in terms of number of vehicles and geographical area. In order to be able to supply for the demand, Bzzt is aiming to have a fleet consisting of 200 taxi pods in 2019. Further, Bzzt plans to start operating the service in Gothenburg, however it is yet not clear when. The maximum speed of the vehicles

that Bzzt is using is 45 km/h, which is not considered as a problem since the taxi pods can keep up with the rest of the traffic. Carlsson & Laurell (2018) argue that mobility companies such as Bzzt must develop their business model to be able to both deliver goods and people in order to stay competitive in the future, since the costs are too high compared to the price that the customers pay to use the mobility service. Another reason is that the demand for mobility services are high in the mornings and afternoons. Expanding the business model to also deliver goods will enable a higher utilization rate of the vehicles. Carlsson & Laurell (2018) further argue that mobility services such as the cycle taxi are good for the users, since it offers a good complement to public transportation with a competitive price. The users of mobility services are also interested in new and innovative products as a substitute to gas and diesel vehicles. Taxi trips that are shorter than 3 km are very common and the market for this type of trips is big. However, taxi companies normally try to avoid these trips since it is difficult to make profit when driving short distances.

Artificial intelligence will change the mobility market

Both Erlandsson (2018) and Arby (2018) argue that artificial intelligence (AI) will revolutionize the mobility market and make travel more convenient. In the future, the customers will be able to book all types of mobility through their smartphones, which will eliminate the need of various apps for different means of transportation. According to Arby (2018), this service will be tough to compete with for other mobility services, and it will further most likely result in reduced car ownership since all means of transport will be available for lower prices than owning a car.

MaaS is changing users travel behavior

According to Arby (2018), customers that used the trial version of UbiGo's MaaS service experienced it as positive and the customers changed their travel behavior. The customers that used to own a car but now used the service without owning a car, experienced a much more positive transport situation where the fixed costs were reduced. Arby (2018) further argues that even though there will be an increase in MaaS in the future, people will still own and use private cars. One reason for that is that car prices will be reduced due to developed technology. However, car users will increasingly use on demand transportation services when, for example, travelling into the city center on weekends. In dense areas car ownership will, in contrast, decrease since other mobility options will be available and the parking spots will be reduced.

4.3.2 Product and Service

Potential for the Quicab

According to the survey, roughly 40% of the respondents would consider using the Quicab as a complement to public transportation. The door-to-door transportation that public transportation cannot offer is suggested to be the main reasons why the respondents would consider the cycle taxi as a means of transportation (Survey, Appendix C). This is also argued to be the main reason why customers choose Bzzt's taxi service instead of public transportation. This was seen to be a main reason especially for shorter trips, where the door-to-door service is considered to make the trip faster, more flexible and have a higher

accessibility (Lannö, 2018). It could be seen in the survey that the interest for the product increases when the weather is good and at night when there are less alternatives available. Reasons for using the cycle taxi is to move between bars and restaurants and to travel home late at night in a cheaper means of transportation than a taxi. Another major benefit that was seen in the survey is that the cycle taxi offers a more environmentally friendly and innovative option than what is available on the market today while still travelling in a comfortable means of transportation (Survey, Appendix C). This benefit is also experienced at Bzzt, where 66% of the users chose Bzzt instead of other options due to the environmental friendliness (Lannö, 2018). In the survey, respondents' opinions about the comfort of the cycle taxi is good, and a mentioned benefit is that the passenger will always get a seat and can travel and any desired time. The purpose why respondents of the survey consider using the cycle taxi is varying. Mentioned reasons were purchases, when being in a hurry and when the user of the service does not own a bike. Comparing the cycle taxi to a car taxi service, the answers from the survey were similar as comparing it to public transportation. Mentioned benefits were as well environmental friendliness, door-to-door transportation and that is a good option at night when Västtrafik's schedule is narrowed. Additional benefits that were mentioned in the survey is that the cycle taxi can operate at pedestrian streets, cycle lanes and one-way roads which is not possible in a normal taxi, making the route more flexible (Survey, Appendix C). According to Carlsson & Laurell (2018), the market for the cycle taxi in Gothenburg is business trips, where users travel short distances in the city center. However, they discuss that the biggest market for a product such as the cycle taxi is in countries with low labor costs. Countries in eastern Europe for example have low labor costs but it is expensive to purchase and own a vehicle. Therefore, Carlsson and Laurell (2018) see an opportunity to sell the cycle taxi to those countries.

The cycle taxi is a good complement to existing means of transportation

Lannö (2018) argues that the cycle taxi has a good potential to compete in the mobility market and that cities need more alternative options for mobility than what the market is offering today in order to solve problems related to fossil fuels (Lannö, 2018). The design is simple with good dimensions and a top speed of 25 km/h. Since the width of cycle lanes should be at least 1,5 meter, the 86 cm wide cycle taxi has no problem fitting into the existing cycle infrastructure (Arby, 2018). Moreover, the cycle taxi has good protection against wind and rain, which is a must in order to be able to operate such a cycle in Gothenburg. This is also confirmed by Erlandsson (2018) since customers were positive when Pling had a trial version of a cycle taxi service. According to Norling (2018), there are two main areas of application for the cycle taxi related to elderly mobility service. One of these is at big events in the city center, where road limitation is necessary. In this case, the users of Färdtjänst must walk the last leg of the trip, and that is a situation where the cycle taxi can function. The other option according to Norling (2018) is to enhance the quality of life. The cycle taxi can enable users of Färdtjänst to join cycle trips in, for example, Botaniska Trädgården or Slottsskogen. Comparing the cycle taxi to similar products and services, Carlsson & Laurell (2018) identifies the benefit of not having to charge the cycle as often as the vehicle that Bzzt use. They further see the possibility to include the cycle taxi in their fleet and network in order to compete in the market of short taxi trips.

Potential collaborations for the cycle taxi

Looking at the Quicab from a MaaS perspective, Arby (2018) states that the cycle taxi can be a complement to the other means of transportation included. Since taxi drivers generally do not want the short trip jobs, services similar to Bzzt and the Quicab can be a good complement to car taxis. Arby (2018) believes that a good way of introducing and establishing the cycle taxi and to gain the users trust is to collaborate with taxi companies. In this way, the booking system will recommend the cycle taxi instead of a car taxi when a customer wants to book a short trip. This is a good way of marketing the cycle taxi and the taxi company will gain by having satisfied drivers who can focus on the longer trips. Other possible partners to collaborate with according to Arby (2018) are hotels and event companies. To collaborate with hotels is a good way of marketing the product since many guests of the hotels needs a taxi to travel to and from the hotel and event companies in order to get pre-bookings to and from the event.

Regarding a future MaaS network in Gothenburg, Arby (2018) argues that the cycle taxi can be a good complement if the safety of the cycle taxis is secured and that the service is profitable. Important factors in a MaaS network is to ensure a good quality of each service and high availability. Another factor increasing the potential for the cycle taxi is that the traffic in central Gothenburg is complex. Hence, to be able to drive on cycle lanes will be beneficial in terms of accessibility and flexibility and can offer a proper door-to-door transportation to the customers.

5. Analysis

In this chapter the collected empirical findings are analyzed by first displaying, combining and analyzing the different data in a SWOT analysis. Thereafter, the empirical findings are compared to the theory by reviewing the Theoretical Framework introduced in chapter 2.3.

After putting down the empirical findings, it can be realized that different information relates to each other and influences each other. To properly analyze the empirical findings, the information therefore has to be combined in order to find relations and correlations. A SWOT analysis is the chosen approach to display the positive and negative sides of the cycle taxi and the externally influencing factors, which can then be further analyzed. In chapter 5.2 the influencing factors uncovered in the theory are retrieved. These factors are now compared to the empirical findings to learn if the data coincides with the theory.

5.1 SWOT Analysis

The following table (table 3) shows the strengths, weaknesses, opportunities and threats of the Quicab as a new means of transportation. The first two are factors that appear internally, the latter two are factors that influence the cycle taxi externally. It is important to mention that not all factors have an equally large impact. For example, one weakness could outweigh many strengths. This is essential to consider when analyzing the table.

After having displayed the SWOT, factors are combined and recombined in such a way that they can offer expertise for the implementation. This has been done by comparing the factors within strengths, opportunities, weaknesses and threats in every possible way. By doing this, the relations between the single factors can be identified to find out the combined influence on the implementation of the Quicab. Having done this, it became clear that all factors fall into six main topics. Hence, the factors are consolidated into the following six groups: product and service, market, competitors, collaborations, MaaS, and price & profitability. These groups will be discussed separately by combining all factors found in the SWOT related to each group.

Strengths	Weaknesses
1. Avoid congestion 2. Hybrid product 3. Low costs compared to other vehicles 4. Survey respondents are enthusiastic about the service 5. Door-to-door transportation 6. Comfort 7. Flexibility 8. Collaboration opportunities 9. Regulations → allowed to go on bike lanes; no taxi ID required	1. Implementation costs 2. Profitability 3. Ownership of vehicles and employees 4. Speed and range of the product 5. Some respondents are hesitant 6. Effort required to convince partners to collaborate
Opportunities	**Threats**
1. Urbanization → denser city 2. High demand of short trips 3. Increases livability and offers more sustainable trips 4. Business trips 5. Good option when Västtrafik is not running 6. Solves problems that other means of transportation have 7. Increasing congestion 8. Good cycle infrastructure 9. Successful similar services 10. Taxis do not want to do short trips 11. MaaS offering opportunities to combine the product with others 12. Gig economy → reduces ownership problem	1. People are satisfied with the public transportation and taxi service 2. People only occasionally use taxi → people not interested in such service 3. Price of public transportation is good / most people have Västtrafik card 4. Cycle infrastructure might be limited in the future 5. Bzzt in Gothenburg as competitor

Table 3 – SWOT of the Quicab

Product and service

According to the interviewees and respondents of the survey, the cycle taxi showed both positive sides as well as negative sides (see SWOT, table 3). For a new means of transportation to be successful, it needs to offer benefits in comparison to existing means of transportation. Comparing the Quicab to regular taxis, people see that it could be convenient in the city center. However, for the longer distances, the cycle is not suitable. This is mainly because of the comfort of both the driver as well as the passengers. In the survey it was found that the main reason for users to not use taxi services is due to the high price. Since the costs of operating a cycle taxi service are arguably lower than for a regular taxi service, mainly since the vehicle costs are lower, it should be possible to offer a lower price to the user. If that is possible, the cycle taxi might be able to attract users that are currently experiencing taxi services as expensive. Hence, the Quicab might win as a service on short distance from regular taxis.

Comparing the Quicab to public transportation based on the scheme presented by Woldeamanuel (2016), there are both benefits and drawbacks to be found. The main drawback compared to public transportation is the price. Public transportation is offering a price that is difficult to compete with, especially in the beginning since the cycle taxi service presumably will operate on a small scale. Therefore, it is crucial to offer other benefits to the customers, such as door-to-door transportation, accessibility and flexibility in order to attract people to use the service and justify the possible higher price. In addition, it was found in the survey that the majority of the users that frequently travel in the city center of Gothenburg by public transportation use a monthly Västtrafik card. This is considered as a barrier since that fact makes it even harder to attract customers to the cycle taxi service. However, respondents of the survey experienced disadvantages of the public transportation, such as crowdedness, in-flexibility and poor availability during night. Thus, if it is possible to convince the users that the Quicab can offer benefits on those factors, it can be possible to attract users to the service.

Many respondents argue that they would not use the cycle taxi when it rains or when it is cold. However, using the product might show them that it is actually dry inside and that you are protected from the wind. The reason why potential users are still hesitant regarding the benefits of the cycle taxi, is that the product does not exist yet and they can only speculate about the benefits and disadvantages of the product. People's hesitation will make it hard to put the product on the market. An option would be to start trials on a small scale first. For instance, offer the cycle taxi on events where potential users will be present. This could be a fair where business decision makers attend, or a festival where people need to go home at night after public transportation stops running. After having seen the trial, users have a more accurate opinion regarding the service, and if this is positive, they might use it and even spread the word to other potential users.

Market

As reports from Trafikkontoret and City of Gothenburg show, Gothenburg's population is expected to continuously grow in the future. Correspondingly, the travel demand will increase and the risk of congested roads and overcrowded public transportation is growing.

Combining this and that the City of Gothenburg is encouraging more sustainable means of transportation as substitute or complement to the current transportation network, it can be argued that there a potential market for the Quicab in Gothenburg. The main argument for the potential, which is confirmed by interviewees and respondents of the survey, is that the cycle taxi can avoid congestion. Since the cycle can use the cycle lanes and even enter pedestrian areas, this will result in a more flexible trip and better door-to-door service comparing to other means of transportation. It will further offer a higher accessibility, which together will lead to a faster and more efficient trip than current mobility services. Another argument that was confirmed by the interviewees and respondents of the survey, is the positive attitude towards more sustainable means of transportation, which is in line with the objectives for the city of Gothenburg. Introducing the cycle taxi service in a successful way will result in a decrease of motorized trips which lead to reduced pollution, noise and congestions. Moreover, the Quicab will offer increased livability and sustainability in the city center of Gothenburg, a win-win result for both the city and the users.

An additional key argument for the potential of the cycle taxi service related to the market, is the high demand for short trips in the city center of Gothenburg. As Carlsson and Laurell (2018) argue, taxi companies are not interested in short trips since the profit of such trips are too low. This argument is strengthening the potential for the Quicab, since the cycle taxi is believed to be a good complement to existing taxi companies by performing the short trips in the city center whereas car taxis do the longer and more profitable trips. During daytime, the main market for the Quicab is expected to be a complement for car taxis performing shorter business trips within the city center. During night time however, a market is seen in transporting people between bars and restaurants. In the latter case, the cycle taxi would be a complement to public transportation as well since these do not run at night after a certain time.

Today, the cycle infrastructure in Gothenburg is well-developed compared to other cities in Europe. That is an important criterion in order to successfully implement the cycle taxi service in Gothenburg. Since the cycle taxi is allowed to drive on cycle lanes, and since this infrastructure is well-developed in Gothenburg it is considered as a main benefit for a successful introduction of the product. However, since the number of cargo cycles is increasing, there is a risk that the cycle lanes will become crowded, and the benefits of the cycle taxi comparing to car taxis will be lost. Therefore, to secure a successful cycle taxi service for the future, the cycle infrastructure must be further developed and also adapted to larger cycles comparing to today.

Competitors

Currently in Gothenburg there is no company offering a similar cycle taxi service. Since the cycle taxi aims to be used for short distances, public transportation is considered to be the strongest competitor to the cycle taxi. To change users' travel behavior requires major benefits of the cycle taxi compared to public transportation. According to the respondents of the survey, the perception of the public transportation is good, and many of the respondents are using it daily to travel short distances in Gothenburg. However, as mentioned earlier in this paper, the respondents of the survey are also positive towards new

means of transportation, and in order to reach the environmental objectives the City of Gothenburg needs innovative means of transportation to compete with the existing transportation network.

In Stockholm the taxi company Bzzt is offering a new means of transportation similar to the cycle taxi, performing short trips in the city center. Bzzt is doing well, which shows that there is a demand for this type of service. Bzzt is aiming at expanding the business and start operating in Gothenburg, meaning that they will potentially become the strongest competitor for the cycle taxi. Having a competitor such as Bzzt can be argued to be negative, since Bzzt is a known brand that users are familiar with. Bzzt might thus be too hard to compete with, since there is a risk of them getting a too big share of the market. However, the fact that Bzzt is planning to expand their service to Gothenburg confirms that there is a market in the city. The Quicab might be able to offer a faster service than Bzzt's vehicles, since it is allowed to drive on cycle lanes through which it can avoid congestions. This shows the main difference between the two services, and they might be strong competitors to each other.

There are comparable companies to the cycle taxi service existing in other cities globally, such as Amsterdam, Copenhagen and cities in Asia. These offer a product that is even more similar to the cycle taxi than Bzzt is, since these are not classified as a motorized vehicle. Unfortunately, it has not been possible to conduct any interviews with companies operating a similar service. The fact that similar companies are existing and doing well, is however further confirmation that there is a market for short trips and that people are willing to pay transportation performed by a cycle.

Collaborations

As mentioned earlier in the subchapter Product and Service, a challenging phase when implementing the cycle taxi service is marketing the service. To make it easier during the start, but also for further existence, collaborations with other services are considered a necessity. Several collaborations were investigated, in which all potential collaborators were somewhat interested. First of all, a hybrid product could be offered together with Pling. The benefit of this collaboration is that they use the same bike, so a switch between a container for goods transportation and a trailer for people transportation is easy to realize. By collaborating, the utilization rate of the cycle could be increased by using it as taxi service during rush hours, and for cargo services at other times. Both companies would have to invest in less cycles in this scenario, through which costs can be saved and efficiency can be improved. For the cycle taxi, for which it is hard to make large initial investments, this collaboration would be particularly very beneficial. This collaboration can use gig workers in order to not employ people over a fixed time, but only when they are needed, which will also decrease the costs for both companies in the partnership.

A frequently mentioned collaboration is with regular taxi companies. Talking to Carlsson and Laurell (2018), it was found out that short trips are not beneficial for regular taxis. This gap could be filled by the Quicab, by performing the short trips with this product, while executing the longer trips with the regular taxis. This would higher the overall profitability of the particular company, and on top of that it could improve the image, through offering the

sustainable option of the cycle taxi. Since the cycle taxi will not be known in the market from day one, a collaboration with an established taxi company would work as good marketing for the Quicab. Collaborating with an established taxi company will enable the cycle taxi to have access to existing taxi users, and the Quicab can be offered to users that are requesting a short trip. In this way, the possibility will arise to convince the user that the cycle taxi has competitive benefits comparing to a regular taxi in city environment.

A third possible collaboration was found after talking to elderly persons. They were very enthusiastic about the service and would really like to try it. This led to an interview with the elderly mobility service to talk about a potential collaboration. They unfortunately could not see this as a complement to their regular vehicles, however, the elderly people might also be interested in using the vehicle as free time activity.

Having several options for collaboration, it might be hard to convince potential partners to work together. Since the service does not exist yet, the quality of the vehicle cannot be proven. However, the quality of the vehicle seems essential when going into a collaboration, since the service will be sold under the collaborators name as well. Again, a trial might solve the problem of the unknown qualities of the product. To increase the potential for a successful implementation of the cycle taxi, it seems necessary to collaborate with one or more other services. This will lower the initial investments, provide good marketing for Quicab, and lower the ongoing costs.

MaaS

Going one step further than collaborations, an opportunity has been found in including the cycle taxi in a MaaS network. MaaS is a service that includes multiple types of transportation and offers these as a package to their users. Given the fact that the Quicab will most likely need collaborations to survive, MaaS is a good service to enter from the beginning. Being part of a MaaS network would automatically lead to marketing of the product, since the option of taking the cycle taxi together with other means of transportation would be shown to the user on the platform. The product would thus be exposed to a high number of potential users who already are subscribers and users of the MaaS service. Presumably, the subscribers of a MaaS network live in the city center and are frequently travelling short distances. To be able to market the cycle taxi to this type of users is therefore a good strategy to successfully introduce the cycle taxi service to the market. People might not actively seek the service, but when it's offered, they might be willing to choose it. Therefore, entering a MaaS network is a large opportunity for the cycle taxi to get customers and a name in the market.

According to Arby (2018) and Erlandsson (2018), AI is a big threat to MaaS. In the future, when AI is more developed it can replace the need of mobility services such as MaaS. However, for the Quicab this might be a benefit to the same extent as MaaS is. If AI shows the option of taking the cycle taxi, this might lead to users. Any additional user, regardless through which platform the user books, leads to earnings.

Price and profitability

Since the cycle taxi service is not operating and no trials have been performed, no information regarding the costs of the service is available. Looking at the investment costs however, it can be argued that the costs of operating the Quicab are lower than for a car taxi service, mainly due to the vehicle costs. Accordingly, the price of using the cycle taxi service could be competitive compared to a car taxi service. According to the survey, the main reason why people are not using taxi services today is the high price. Therefore, introducing a cheaper alternative might attract users that are currently not using taxi services because of the high price.

The price that the respondents in the survey would be willing to pay for a 2 km trip was approximately 50 SEK. According to interviewees, that price is too low to keep the service profitable, since labor costs, operational costs and vehicles costs are too high. However, comparing to Bzzt, who charges 30 SEK per kilometer, the price of what respondents of the survey are willing to pay is similar and might thus be a reasonable price for the service.

As with all means of transportation, the costs of ownership and labor are the largest. The transportation business is really pressing down the prices, through which the possible profit is minimal. Other companies are interested in collaborating or offering the cycle taxi in their package, however they do not want to own the vehicles or be responsible for the labor. This will be a major problem for the whole concept, since there has to be someone who owns the vehicles to be able to implement the service. To solve this problem, one solution can be to target Gig workers that will own the vehicles. In this way, the companies that offers the services are not the one owning the vehicles or employing the personnel.

5.2 Review of theoretical framework

From the literature review, multiple factors could be identified that were expected to have an influence on the implementation of the cycle taxi. These factors are summarized in the Theoretical Framework, which can be seen again in Figure 8. After having performed a SWOT analysis, it will now be reflected back on the theoretical framework. Thus, the influencing factors will be compared to the empirical findings presented in Chapter 4 in order to identify similarities and differences in the theory and empirical findings.

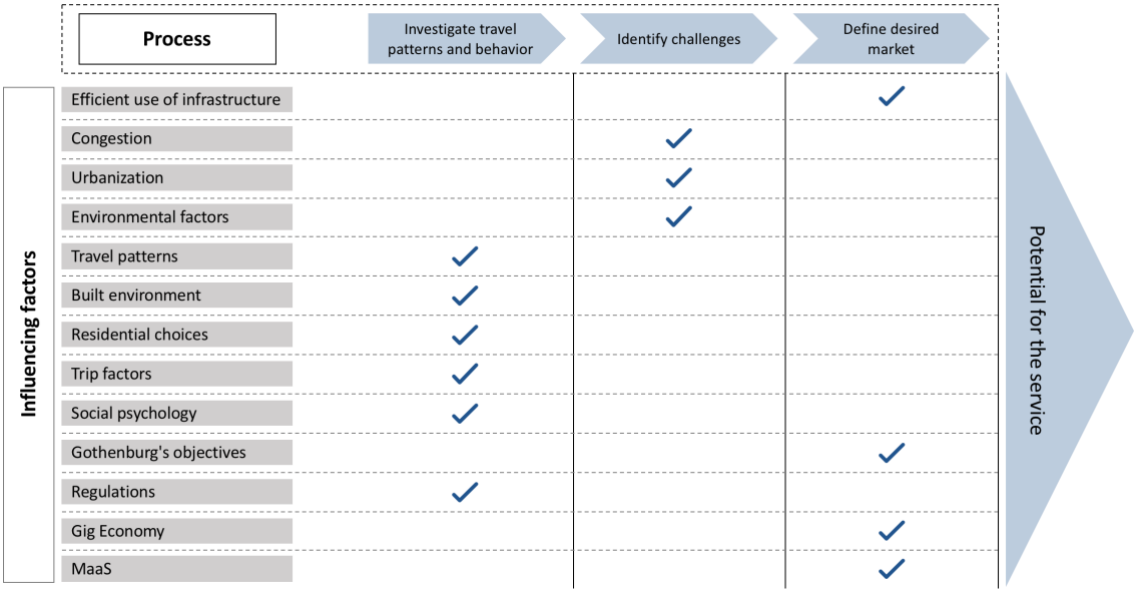

Figure 8 - Theoretical Framework

Efficient use of infrastructure

According to Enoch (2012), there are several ways to regulate the supply and demand of an urban transportation network. Supply-side solutions aim at increasing the capacity of the network by either building more or use the current network in a more efficient way. Demand-side solutions relate to adapting the transportation demand to better fit the supply. Looking at the cycle taxi, both a supply side solution and a demand side solution are used. Within the first, no new infrastructure is created, but the cycle lanes are used more intensely to increase capacity and reduce congestions on the roads. At the same time the cycle taxi offers a demand side solution. Offering a new and efficient means of transportation enables people to leave their car at home for a more sustainable solution, and thus reduce the demand of car use.

What has to be taken into account, is that the cycle infrastructure is limited to some extent. If there are too many cycle taxis or similar cycle services that use the existing cycle lanes, they might get overcrowded which would create congestion. However, this is in line with the theory extracted from the city of Gothenburg. Since they see the importance of a high-quality cycle network, they are planning on improving it. Reaching that goal would be very positive for the further existence of the Quicab.

Urbanization

Over the whole world there is a trend of urbanization, and also Gothenburg is expected to grow immensely, with a future labor market of about 1.7 million people. This means the need for transportation will increase significantly, which is a positive fact for the potential of the Quicab. The current supply will not be enough to cope with the increasing demand, so there need to be changes of the capacity in the transportation market. The cycle taxi being a sustainable means of transportation, this would be a good complement to the current supply in order to create more capacity. Seen both in the interviews and the survey, people are aware

of the need of new means of transportation and are positive of this type of new transportation.

Another problem with the ongoing urbanization is that more inhabitants and commuters in Gothenburg means more cars in the city and thus a parking problem. The Quicab reduces this problem in two ways. First, people using the cycle taxi means that at that moment they are not using their car. Second, the Quicab can be used as a service complementary to the parking services. People can park their car on a parking lot outside the city and travel into the center by cycle taxi. The Quicab could have a station there to increase the accessibility and transfer speed. This way cars stay outside of the center, which not only reduces parking problems but also congestion and pollution, which will be discussed after.

Congestion

As mentioned in the previous paragraph, a result of urbanization is congestion in the cities. This is largely emphasized in literature, however in Gothenburg not everyone agrees that this is a real problem. For example, Arby (2018) argues that it is already a problem in Gothenburg, whereas Carlsson and Laurell (2018) say it is not yet an existing problem, but it might be in the future. In order to anticipate this problem, it is good to already start looking for solutions to avoid the growth of congestion problems. A first step that the city of Gothenburg has already taken, is the introduction of congestion tax within the center. The same solution as for the parking problem can be used here: having parking spots outside the city center and go into the city by a Quicab would eliminate the costs of congestion tax and reduce congestions in the city center. Add this to the savings on parking compared to parking in the center, these benefits could outweigh the price of the cycle taxi and thus be a positive option for users.

The main reason why congestion is increasing is the increased car ownership. One of Gothenburg's objectives is to reduce the number of cars, which naturally would reduce the congestions. In accordance with Gothenburg's objective of reducing car ownership, Arby's (2018) vision with UbiGo is to eliminate the need of owning a car by offering a MaaS network. The cycle taxi is argued by Arby to have a good potential for being included in that network, and thus be part of reducing the cars in the city center. What is expected to further increase the congestion in the near future, is the construction of Västlänken. Several streets will be blocked by construction sites, which makes it harder to enter the city center by car. The cycle taxi can help transportation within the center in these times. Due to this reason, it seems to be a good time to start with the implementation of the Quicab simultaneously when the construction of Västlänken starts.

The objectives of the City of Gothenburg on creating a close-knit city and improving the pedestrian facilities and cycle infrastructure (Gothenburg 2035, 2013) are also positive aspects regarding the congestion. Some interviewees argued that many new cycle services could move the congestion from the roads to the cycle lanes. However, with the plans of the city on increasing the number of cycle lanes and widen them, this is not likely to happen soon. It might be a problem in the further future, so this has to be kept in mind when introducing more similar services.

Travel patterns

In the literature, not much could be discussed regarding travel patterns since these are very specific to the location. Nevertheless, this is one of the main components when investigating if there is a potential market for introducing a new service. Having analyzed Gothenburg's travel patterns, it can be concluded that there is a market for the Quicab, consisting of a high demand for short trips in the city center. According the travel data, short trips are existing in a large number. Approximately 65% of all trips in the city center are below five kilometers and could thus be served by the cycle taxi. About 10.500 trips below five kilometers are daily performed in the city center of Gothenburg by car. These trips should mainly be targeted, since this is the main means of transportation that should be reduced in order to improve the congestion problem and the sustainability problem. Responses of the survey show that 70% of the trips by public transportation are shorter than 30 minutes. Time is not exactly comparable with the length in kilometers, however, the reason for not asking for kilometers in the survey, is that people usually do not know how many kilometers they travel, but they know the time. An approximate comparison can be made by using this data. Part of these trips can be served by the cycle taxi in the future, since they fall into the range of short to medium length trips.

Also, according to the survey, 22% of all taxi trips are less than 10 minutes, which is considered as a short trip. This means that is an additional market for the cycle taxi, especially since regular taxis do not want to perform these trips and due to the high price. Therefore, the cycle taxi should be able to compete with regular taxis on short trips by offering a cheaper service and better flexibility with a competitive price.

Built environment

In the literature five factors related to the built environment are mentioned that influence travel behavior, which are density, diversity, design, destination accessibility and distance to transit. The first factor is in line with the objective of Gothenburg to create a dense close-knit city rather than expanding the city to a larger area. Since the cycle is only usable on shorter trips, a city should be designed in such way that key places are reachable by short trips. For example, if a neighborhood has diverse facilities, such as stores, restaurants and sport facilities, people from that same neighborhood can easily reach these places by cycle and cars are not needed. This is also directly related to the destination accessibility. While these factors being mentioned in the strategy of Gothenburg, they were not mentioned by any interviewee or respondent.

Residential choices

According to the literature, it is easier to change people's behavior when they recently have moved to a new residence and do not have transportation habits yet. Currently, most people seem to be happy with the transportation possibilities offered and have their habits within these options. In general, it is hard to change people's habits and convince them to change their way of transportation. This is a likely problem when implementing the Quicab. It has to be well considered how this service will be marketed to convince people to use the service. According to the researched literature, people that might be easier to convince would be the ones moving into the newly planned areas in Gothenburg, since they do not have any travel

habits yet. Combining this to the fact that the city of Gothenburg wants to develop the cycle lanes in a close-knit city, these new neighborhoods are a very likely market for the cycle taxi, next to the short trips in the city center.

Trip factors

Trip factors relate to the available options people have in terms of transportation. From the survey it can be found that the majority of the respondents perceive the public transportation as good. Some challenges were however mentioned and those include, among others, that the public transportation is unreliable, which is mainly caused by cancellations and delays. Another mentioned drawback of the public transportation is the inflexibility. This includes that the bus or tram is taking an inefficient route which makes the trip longer than needed for the user and that it is following a fixed timetable which does not always fit the users demands. The last frequently mentioned drawback of public transportation is the lack of door-to-door transportation, resulting in that many of the respondents of the survey must walk a long distance to and from the bus or tram stop. All these mentioned drawbacks can arguably be solved by the implementation of the Quicab. However, the price for using the cycle taxi service will presumably be higher than using public transportation. Therefore, to succeed with the introduction of a cycle taxi service, the users must be convinced and attracted to use the service based on other factors than the price. Further, one of the main reasons why Bzzt's customers choose their service is because they can offer a high degree of door-to-door transportation which the public transportation cannot. Since the cycle taxi arguably has better accessibility than Bzzt's vehicles, it can therefore be argued that the Quicab has a good potential to succeed in Gothenburg.

Social psychology

Within social psychology it is important to look at the activities people do on a daily basis. This can be short-term decided activities such as purchases and free-time activities, or long-term activities such as choosing a workplace. Looking at the travel data and the survey, different activities are found within the different means of transportation. The main activities by car are going to and from work and performing business trips. The main activities done by public transportation are going to work and school and to reach free-time activities. The purpose of using a taxi differs from public transportation. Hardly anyone uses this means of transportation to travel to work or school, but it is more frequently used for business trips and free time activities. Before implementing the cycle taxi service, it is therefore important to look at the activities that Quicab would suit, and if these activities are short-, mid- or long-term decisions. Expected after the interviews and survey, is a use of the taxi for rather short-term decisions. These could include using the cycle taxi to travel home late at night, for a business trip within the city, to travel when it rains, and more. Nobody mentioned using the taxi on a daily basis to, for instance, travel to work or school.

Gothenburg's objectives

As discussed in the literature review, the city of Gothenburg has developed several strategies in order to deal with future environmental challenges. In line with Gothenburg's objectives is the perception of the cycle taxi from the respondents of the survey. Many of the respondents perceive the cycle taxi as positive since it is environmentally friendly and will

result in less pollution and noise in the city center. The cycle taxi might further be a good complement to existing taxi services for short trips, since it has been found throughout the study that taxi companies rather drive long distances than short. Therefore, the cycle taxi which is more environmentally friendly than regular cars taxis, might have a good potential since it can offer a new means of transportation that is accordingly with the strategies that has been developed by the City of Gothenburg.

Regulations

The regulations related to the cycle taxi that were found in the literature review were shown to be positive and favorable for the concept. For example, the driver of a cycle taxi requires no taxi- or driver's license, which means anyone can be the driver. Since it is classified as a cycle, it can be driven on both bike lanes and roads, and even in pedestrian areas. This is considered as the main competitive advantage since the cycle taxi can avoid congestions and chose flexible routes in comparison to regular taxi services. Both Bzzt and Pling, who operate a service similar to the Quicab, confirmed that there are no regulations that are restricting their services. In the future, when a higher number of cargo cycles and other big cycles are present on the streets, restrictions might arise. However, when these possible restrictions will arise and what they will include can only be speculated about. Therefore, the restrictions that influence the cycle taxi service today are considered as beneficial.

Gig economy

Even though it is not clear how the gig economy will develop in the future, it is expected to influence the potential for the cycle taxi. If the gig economy will experience an increase and rapid development, there will be a shift from workers being employed to workers performing jobs on short-term contracts, such as parcel delivery and taxi services similar to Uber. Accordingly, the worker can decide how much to work and what type of work tasks to perform. In the empirical findings it was found that both the interviewees and the respondents of the survey saw a potential in the cycle taxi. However, many of the interviewees confirmed that there is a big challenge in the ownership of the cycle taxis and employees. Even though there is a market for short trips in the city center of Gothenburg, taxi companies are currently experiencing a high pressure due to low margins and to invest in cycle taxis and employ labor is considered as a high risk. Therefore, an alternative customer segment has been found in the gig market, where gig workers can purchase the cycle taxi and use it for both goods delivery and people transportation. By offering this hybrid product, the cycle taxi will get a higher utilization rate, and thus the investment risk will be reduced. By taking advantage of the gig economy, taxi companies can use the cycle taxi to perform short trips in urban areas without employing labor or investing in the vehicles.

MaaS

As previously mentioned in the literature review, MaaS is expected to enhance travel in urban areas and the concept is by various scholars argued to disrupt the mobility industry. MaaS will promote a shift from ownership-based mobility to shared- and access-based mobility, where the biggest change is argued to be reduced car ownership. As discussed previously in the paper, transportation planners must embrace innovative strategies in order to reduce problems related to congestion. Both the literature review and the interviewees have

confirmed and agreed upon that MaaS will most likely reduce congestion and enhance city livability in urban areas. Further, the empirical findings suggest that the cycle taxi can be a good fit in a MaaS network, since it offers a sustainable means of transportation, that will most likely reduce congestions and enhance livability by reducing noise and pollution. Including the Quicab in a MaaS network is argued to increase the potential of a successful introduction of the product to the market. In this way, the cycle taxi will be exposed to the right type of customers and thus increase the brand awareness.

6. Conclusions

The thesis has investigated both benefits and challenges related to the implementation of the Quicab in Gothenburg. The chapter will start by presenting the main findings which provide answers to the research question and the sub questions. Later, recommendations on how to implement the service will be presented.

6.1 Main findings

In order to answer the research question, three sub questions were formulated. These questions have to be answered first in order to present the current market, challenges and the desired market before it can be defined where and how the cycle taxi has the best potential to succeed. Thus, the sub questions are used to answer the main research question. The answers are based on the findings of the investigation and are supported by information found in the literature review. In this conclusion, only the main and most important findings are presented.

Sub question 1: What are the current travel patterns and travel behavior in the city of Gothenburg?
Travel behavior showed that different means of transportation were used for different purposes, which have to be considered when implementing a new service. These decisions are based on the built environment, the residential choices, trip factors and social psychology. The result of the research on travel patterns showed that most trips in the city center of Gothenburg are short, of which most are below 5 km, and a large part even below 2,5 km. Car takes the smallest share of the total trips, which is perceived as very positive regarding the environment.

Sub question 2: What are the challenges in the current market?
The main challenge in the current market is the growing travel demand which is a result of the increasing urbanization. Correspondingly the car ownership is increasing, causing congested roads in the city center of Gothenburg. The high travel demand is further causing challenges for the public transportation since overcrowded trams and buses are influencing the comfort of the trips negatively. The cycle infrastructure is also facing challenges. The current cycle infrastructure is not developed enough to handle the increased demand of cargo cycles and other larger cycles that are growing in the market. Thus, with no development of existing cycle lanes there is a risk of cycle lanes becoming overcrowded as well. Challenges related to the taxi industry are that the users perceive the price as high, and thus rather choose other means of transportation if possible.

Sub question 3: How does the desired market look like?
Combining the current market with the challenges in this market, a desired market can be defined. To overcome the challenges, the objectives of the city of Gothenburg have to be implemented. These are mainly related to offering solutions that make it possible to reach key places in a short time, while reducing the environmental impact. The main conclusion is that the number of offered transportation has to be increased, while reaching this as sustainably as possible. Thus, innovative means of transportation and transport services are desired.

Research question: What is the potential for a cycle taxi service as a new means of transportation in the city of Gothenburg?

To summarize the literature review and empirical findings, various factors have been found that are considered to strengthen the potential for success for the Quicab. First, it was discovered that the demand for short trips in the city center of Gothenburg is high, and thus there is an existing market. Combining that with the fact that the cycle taxi presumably will offer a lower price to the users comparing to car taxi services, the authors believe that the cycle taxi has good potential to succeed in the mobility market. Next, introducing Quicab in the mobility network in Gothenburg will likely contribute to environmental advantages. Those advantages include the reduction of congestions, less pollution and reduced noise in the city center. The fact that the cycle taxi is more flexible than other means of transportations will offer an efficient trip since the route to a high degree can be optimized and thus reduce the travel time.

Given the success of the mobility company Bzzt, the authors believe that users might be attracted to the cycle taxi service as well. From their success it can be concluded that users value and appreciate new and innovative means of transportation causing less damage to the environment to a comparable price of public transportation.

What has been found as a key factor in order to reach success when implementing the service, is to include it in a bigger network and consider collaborating with partners. Including the Quicab in a MaaS network will enable to reach out to key customers and users that are in demand of mobility services. The MaaS network will thus facilitate efficient marketing and to reach out to the right user segment. Another possible collaboration is with existing taxi companies. Users are believed to be less hesitant towards new and innovative products and services if they can be purchased and ordered through known and established company brands. Collaborating with taxi companies might therefore lead to proper exposure to users in demand of trips that the Quicab can offer.

There are also several factors found that weaken the potential for the cycle taxi service. The main problems are said to be the ownership of the vehicles and the employment of the personnel. Even though interviewees would be interested in offering the service, if there is no one willing to own the vehicles and the personnel, the concept will not get off the ground in the first place. This also has to do with the low willingness to pay of potential users. Customers are skeptical towards the earnings of the service compared to the costs. This was only one weakness that the cycle taxi offers, however this is a major point that would change the overall success.

The users are further somewhat skeptical towards the product and service, since it is a concept they are not familiar with yet. They see several problems of the product itself, such as the safety and the exposure to the weather, as well as of the service, including for instance the speed. It will be hard to convince users of the not yet known service, which can possibly only be successful by operating in collaborations.

6.2 Recommendations

From the analysis of the findings of the research, suggestions can be derived for a successful implementation of the cycle taxi service can be given to the company involved; Addvelo.

First of all, one of the customer segments of the Quicab that Addvelo should aim at, are gig workers. These gig workers can then offer their labor and product to the companies that offer the actual service. As said in the previous chapter, the companies willing to offer the service, are not interested in owning the vehicles or employing the drivers. They would thus not be the customers of the product for Addvelo, which can be solved by selling the product to gig workers.

Secondly, a single service of cycle taxis without any collaborations will most likely be hard to realize, especially since the product is not known yet. The authors strongly suggest introducing the Quicab on the market by collaborating with existing services. These can be a local taxi service or a MaaS service. Since these companies already have a market share, it is easier to convince users of the cycle taxi. This way, the user gets the option offered without actively searching for it, which could convince them to try it. Also, existing taxi companies are good marketing for the product. If a user sees that an existing company offers this service, it is much more trustworthy than it would be on its own. Another form of collaboration would be to work together with cargo cycle services. This is a way to increase the utilization of the vehicle and thus reduce expensive idle time.

Another way to market the product is to use trials. An example could be to offer the service to visitors of a congress or exhibition, where decision makers of companies are attending. If these people are satisfied by the service, they will likely recommend the service within their network. The authors believe that taking these three suggestions into consideration strengthens the potential of the Quicab.

6.3 Further research

To further investigate the potential of the cycle taxi service, a trial is necessary in order to analyze the experienced problems and benefits. From the trial, a proper cost analysis could also be performed, which would show the real costs of owning the vehicles and thus also present the potential profit that the service would generate.

Due to time constraints, there are more possible collaborations that have not been investigated in this research. A collaboration that might strengthen the potential for the cycle taxi service and thus should be investigated is partnership with hotels in central Gothenburg. Another possible collaboration that the authors believe is of value to investigate is a partnership with buses and trains arriving at Central Station in Gothenburg, where the cycle taxi service can perform the last mile of the customers trip.

The authors further recommend expanding the investigated market and investigate the potential for the cycle taxi in low labor costs countries. Since challenges related to ownership

of vehicles and employing personnel frequently has been mentioned throughout the investigation, the cycle taxi service is believed to have better potential for success in countries where labor costs are low. Related to expanding the investigated area, a proper benchmarking could be performed by interviewing companies operating similar services in for example Amsterdam. By analyzing these companies, challenges and benefits which they have encountered could be helpful when implementing the service in Gothenburg.

Even though this research has been focusing on Gothenburg, the theoretical framework that has been derived is considered to be generalizable and can thus be used to implement new means of transportation services in other cities. However, the fact that the framework is containing the objectives that have been set in Gothenburg is something that must be reviewed and changed in order to use the framework in other cities.

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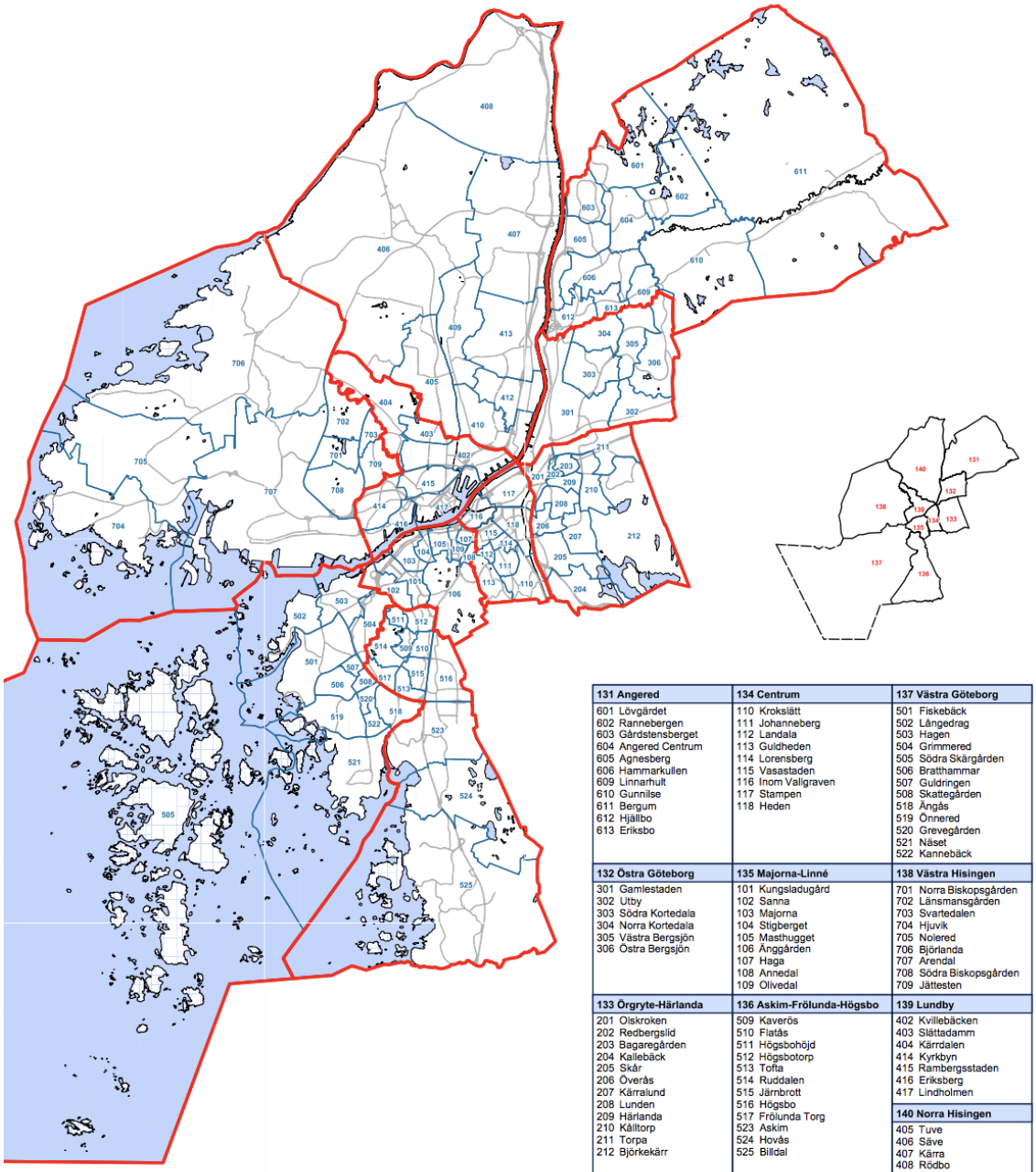
Östling, P. (2018). Inspirer and advisor at The Space – First to Know. Personal meetings and email contact throughout the project.

Appendix A - Images



131 Angered	134 Centrum	137 Västra Göteborg
601 Lövgärdet 602 Rannebergen 603 Gårdstensberget 604 Angered Centrum 605 Agnesberg 606 Hammarkullen 609 Linnarhult 610 Gunnilse 611 Bergum 612 Hjällbo 613 Eriksbo	110 Krokslätt 111 Johanneberg 112 Landala 113 Guldheden 114 Lorensberg 115 Vasastaden 116 Inom Vallgraven 117 Stampen 118 Heden	501 Fiskebäck 502 Långedrag 503 Hagen 504 Grimmered 505 Södra Skärgården 506 Bratthammar 507 Guldringen 508 Skattegården 518 Ängås 519 Önnered 520 Grevegården 521 Näset 522 Kannebäck
132 Östra Göteborg	**135 Majorna-Linné**	**138 Västra Hisingen**
301 Gamlestaden 302 Utby 303 Södra Kortedala 304 Norra Kortedala 305 Västra Bergsjön 306 Östra Bergsjön	101 Kungsladugård 102 Sanna 103 Majorna 104 Stigberget 105 Masthugget 106 Änggården 107 Haga 108 Annedal 109 Olivedal	701 Norra Biskopsgården 702 Länsmansgården 703 Svartedalen 704 Hjuvik 705 Nolered 706 Björlanda 707 Arendal 708 Södra Biskopsgården 709 Jättesten
133 Örgryte-Härlanda	**136 Askim-Frölunda-Högsbo**	**139 Lundby**
201 Olskroken 202 Redbergslid 203 Bagaregården 204 Kallebäck 205 Skår 206 Överås 207 Kärralund 208 Lunden 209 Härlanda 210 Kålltorp 211 Torpa 212 Björkekärr	509 Kaverös 510 Flatås 511 Högsbohöjd 512 Högsbotorp 513 Tofta 514 Ruddalen 515 Järnbrott 516 Högsbo 517 Frölunda Torg 523 Askim 524 Hovås 525 Billdal	402 Kvillebäcken 403 Slättadamm 404 Kärrdalen 414 Kyrkbyn 415 Rambergsstaden 416 Eriksberg 417 Lindholmen
		140 Norra Hisingen
		405 Tuve 406 Säve 407 Kärra 408 Rödbo 409 Skogome 410 Brunnsbo 412 Backa 413 Skälltorp

Figure 9 - Districts of Gothenburg (Göteborgs Stad, 2018)

Appendix B - Interviews

Interview Guide Johan Erlandsson - Velove

- Who are your customers at the moment?
- How many cities/countries are you operating in at the moment

- What have you experienced as the biggest benefit in your product compared to goods transportation with vans and trucks?
- Have you experience any problems in your product compared to normal goods transportation performed by vans and trucks?

- How do you perceive the bike infrastructure in Gothenburg?
- How do other cyclists experience your product when they meet you on the bike lanes?
- Do you think an increase of cargo bikes changes this opinion?
- When no bike lanes are available, how do you do then?

- Do you see any benefits of the Bzzt product or of this product compared to each other?
- Have you tried similar products as well?

- Do you see a big potential in the concept of the bike taxi?
- Do you see a big potential in offering a hybrid product? Combine goods transportation with people mobility?
- What do you think are potential customers for the taxi service? Are tourists potential customers as well?
- For a taxi service with this product, have you thought about the price?

Interview Guide Jonathan Lannö - Bzzt

- What are the benefits with Bzzt compared to a 'normal' taxi and public transportation?
- What are the drawback with Bzzt compared to normal taxi and public transportation?
- How do your customers experience the trip with Bzzt? (safety, comfort, accessibility etc.)
- Do you know why your customers choose your service instead of other means of mobility? (taxi, public transport etc.)
- How does your drivers experience the trip in a Zbee (the vehicle)? (safety, comfort, accessibility etc.)
- Is there a reason why you do not operate in Gothenburg at the moment?
- Do you consider the maximum speed of the Zbee, 50 km/h, as a problem?
- Would it ease your operations if you were allowed to drive on bike lanes?

- Do you plan to expand your business, such as a bigger fleet in Stockholm or expand to other cities?
- Do you see any potential in the cycle-taxi?
- Do you see any drawbacks with the cycle-taxi?
- Do you have any additional comments or any topic you want to raise which have not been discussed?

Interview Guide Oskar Carlsson and Julius Laurell - Electricab

- Why did you choose to operate with only electrical vehicles?
- Why do customers choose your product/service instead of your competitors?
- How many taxi cars are operating daily?
- Who is your typical customers?
- How many of the trips are short? Less than 3 km?
- Do you consider congestions and traffic jams as a big problem for Electricab?
- Do you think the cycle taxi can function as a complement to your fleet? Ex: perform short trips whereas cars perform longer
- How did you market this product when introducing it > how do you market it now?

Interview Guide Peter Norling - Elderly Mobility Service

- How do the users of elderly mobility service perceive the service?
- Are you experiencing any drawbacks with the vehicles you are using today?
- Do you experience a problem regarding accessibility in city environment? For example, problem to deliver door-to-door transportation
- Do you see any potential with the cycle-taxi? For example, as complement to shorter trips in city environment
- Do you see any drawbacks with the cycle taxi? For example, safety, comfort

Interview Guide Hans Arby - UbiGo

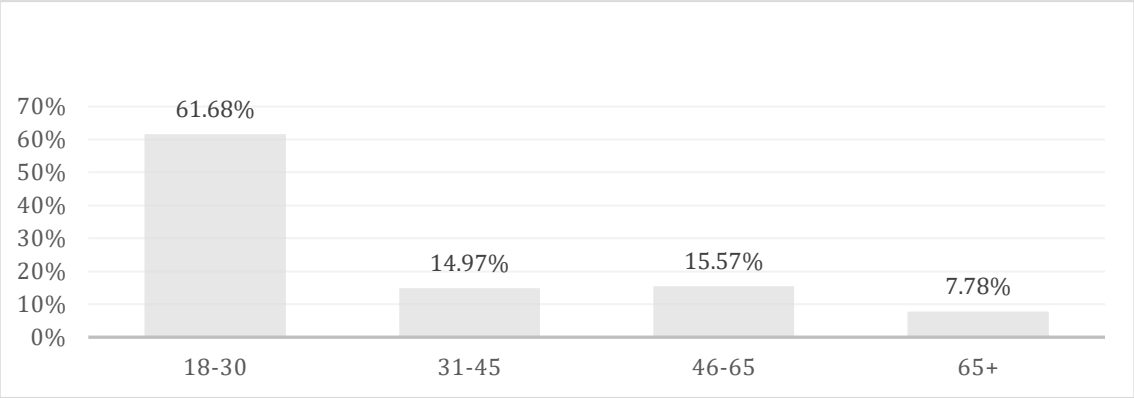
- Can you describe what UbiGo is? How does it work, how much does it cost, why do you think you are a benefit to the existing market?
- What are your biggest challenges in order to succeed? Any regulation you must adapt to?
- What do you think about future mobility? Car ownership, gig economy
- What do customers think about it?
- Why are you starting in Stockholm and not in Gothenburg?
    - How do you think UbiGo will impact the market (in Gothenburg)?
    - How do you think our product will impact the market (in Gothenburg)?
- Opinions about the cycle taxi, do you think it can fit in a MaaS network? Price/costs
- How does the ownership work? Do you buy 'services' or product which you operate yourselves?

    - Would you be interested in buying the cycle taxi without a service?
- Have you had any discussions about including Bzzt in the network as a cheaper alternative to other taxi companies?
- Do you have any suggestion on who else we could / should talk to?

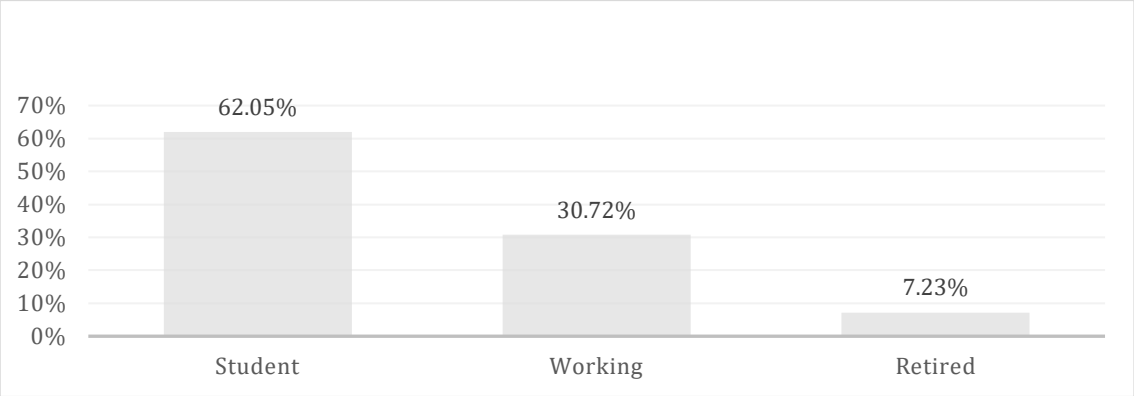
Appendix C - Survey

This survey was performed in Gothenburg in order to get opinions from potential customers. The questions asked and the answers are presented below.

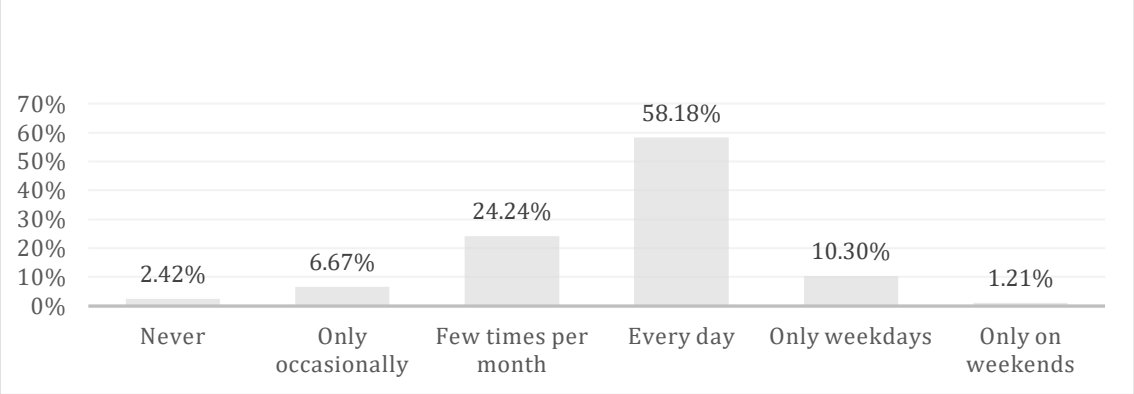
1. Age



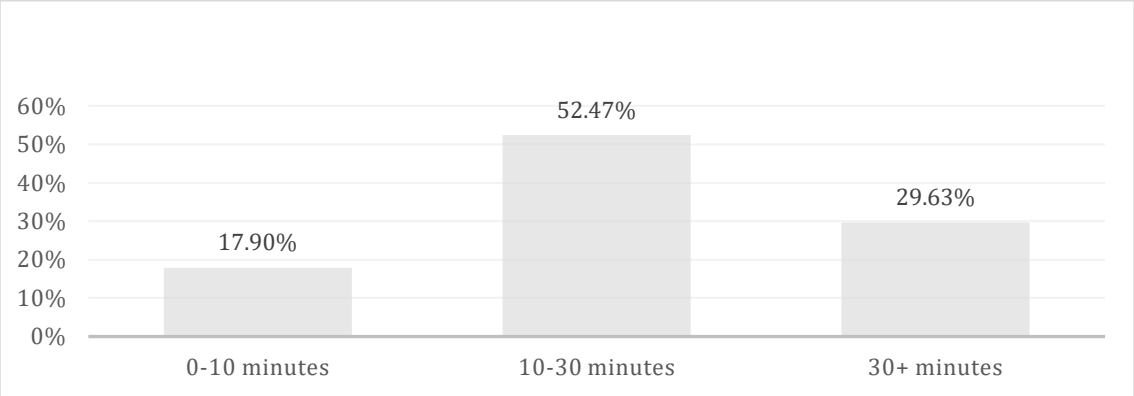
2. Occupation



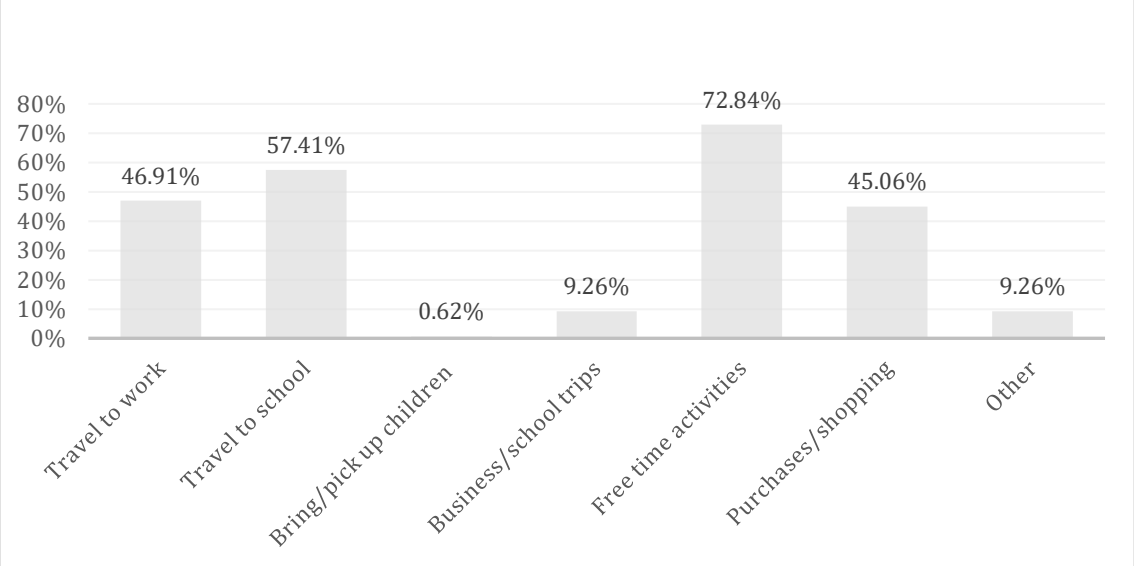
3. How often do you use public transportation?



4. How long do you usually travel by public transportation?



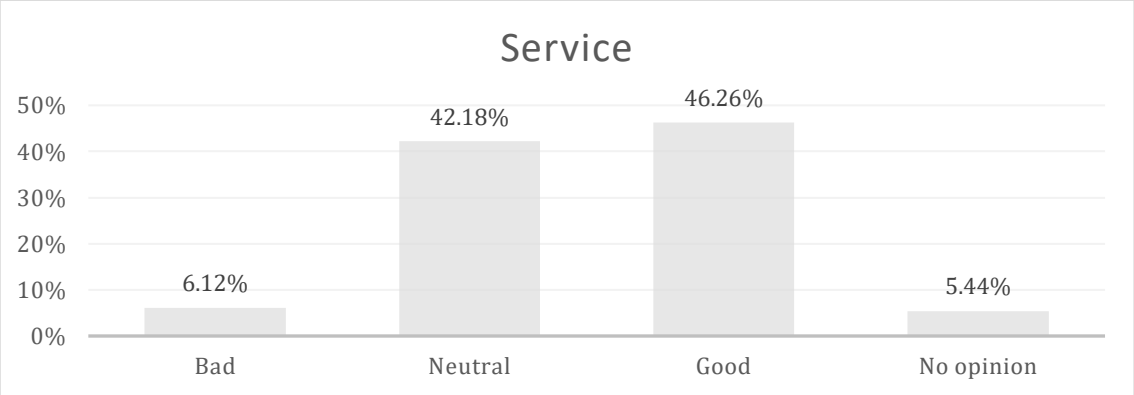
5. What purpose do you use public transportation for?

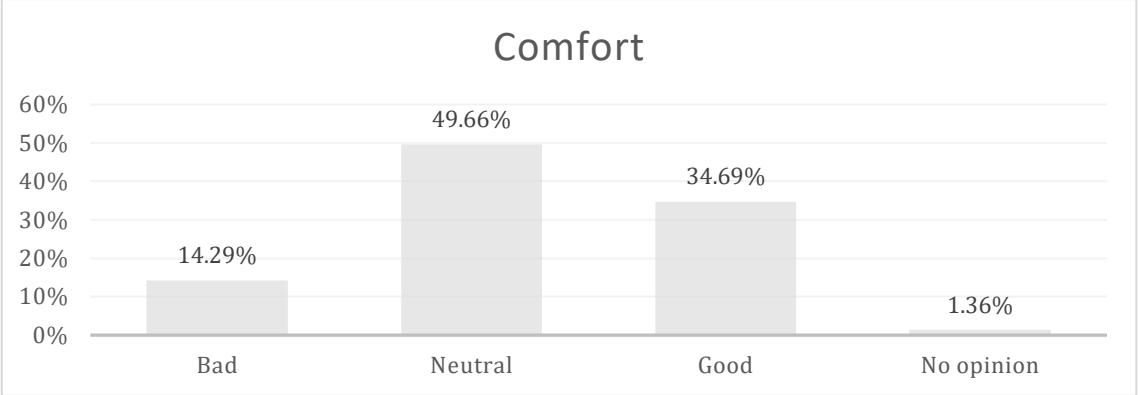


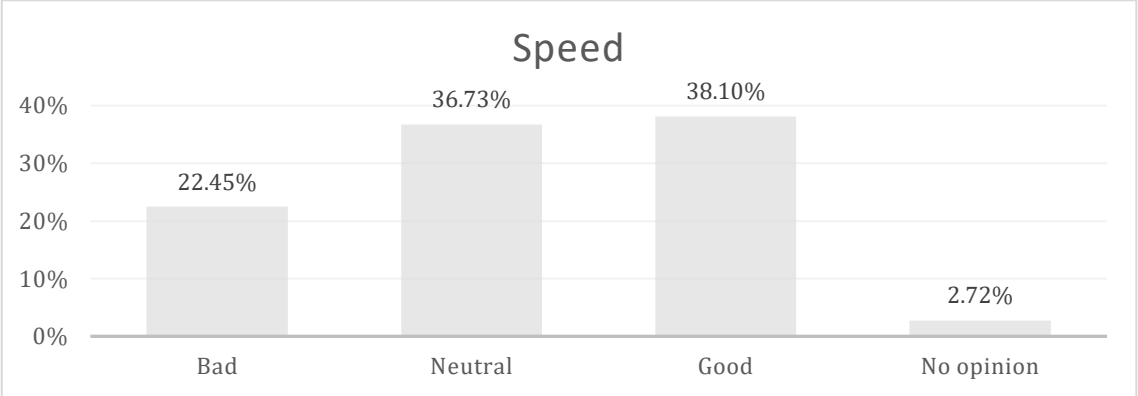
6. What do you think are the drawbacks of public transportation?

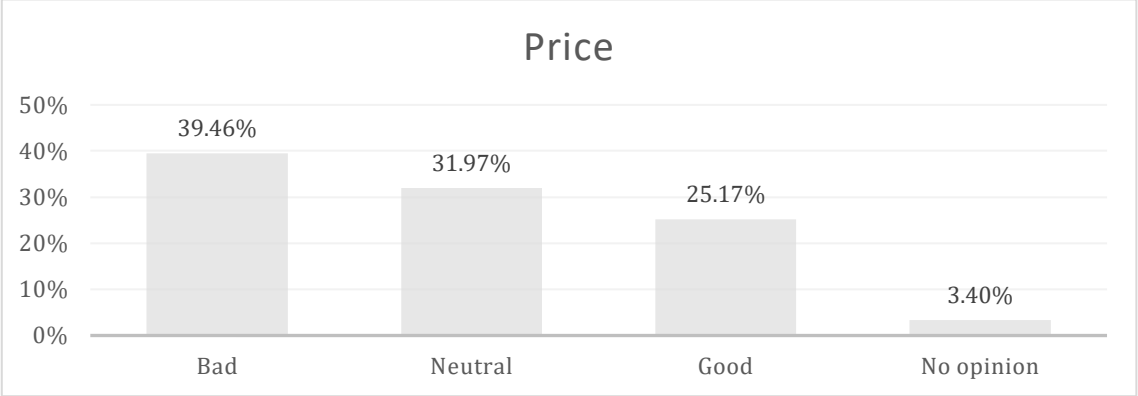
……
……
……

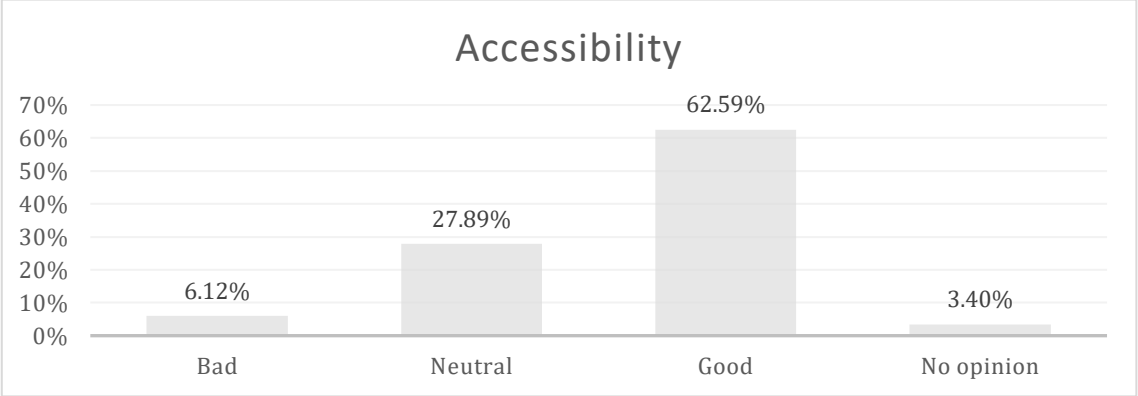
7. How do you experience following aspects regarding public transportation?

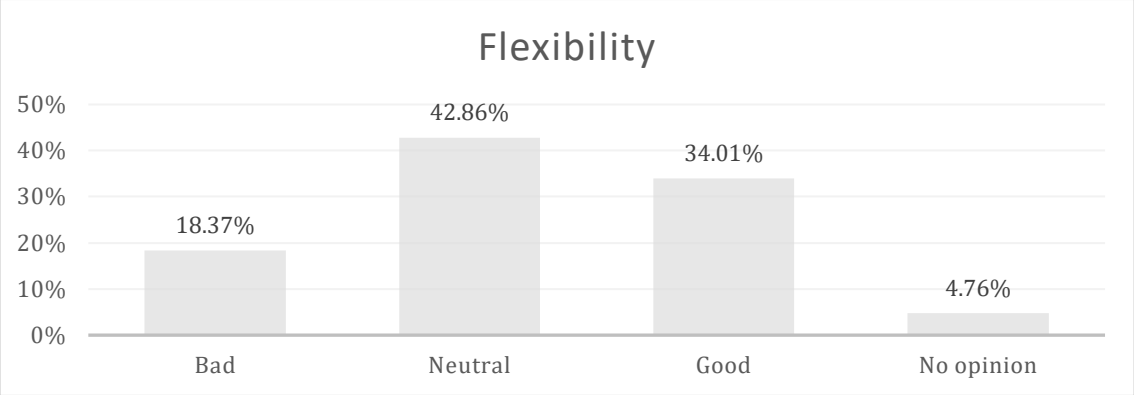


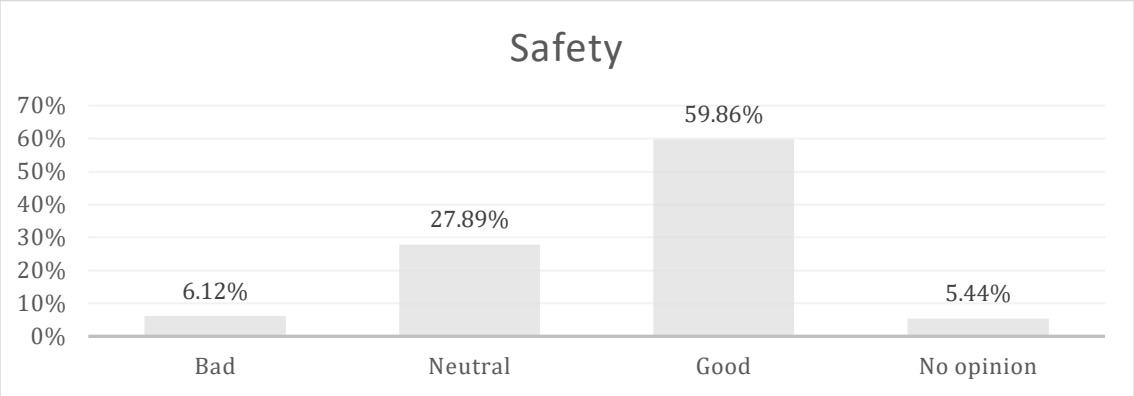

Comfort
60%
50%
40%
30%
20%
10%
0%
14.29%
49.66%
34.69%
1.36%
Bad
Neutral
Good
No opinion


Speed
40%
30%
20%
10%
0%
22.45%
36.73%
38.10%
2.72%
Bad
Neutral
Good
No opinion

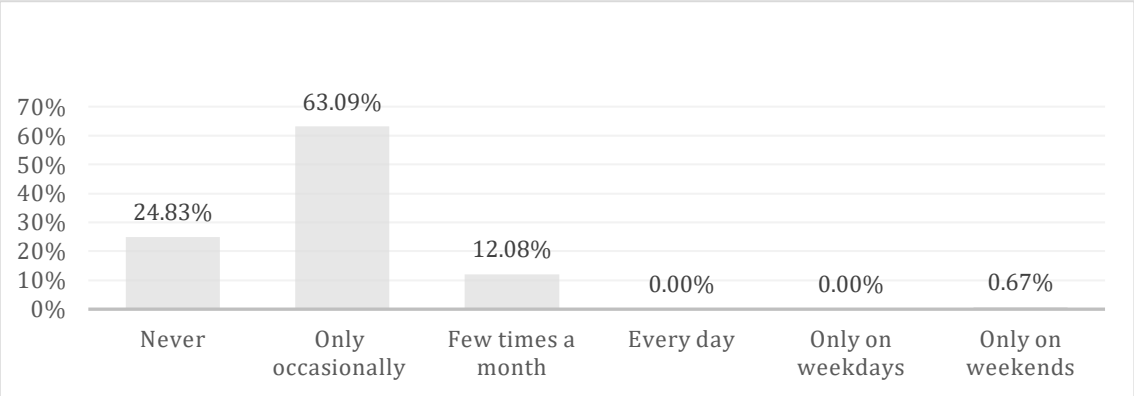

Price
50%
40%
30%
20%
10%
0%
39.46%
31.97%
25.17%
3.40%
Bad
Neutral
Good
No opinion


Accessibility
70%
60%
50%
40%
30%
20%
10%
0%
6.12%
27.89%
62.59%
3.40%
Bad
Neutral
Good
No opinion

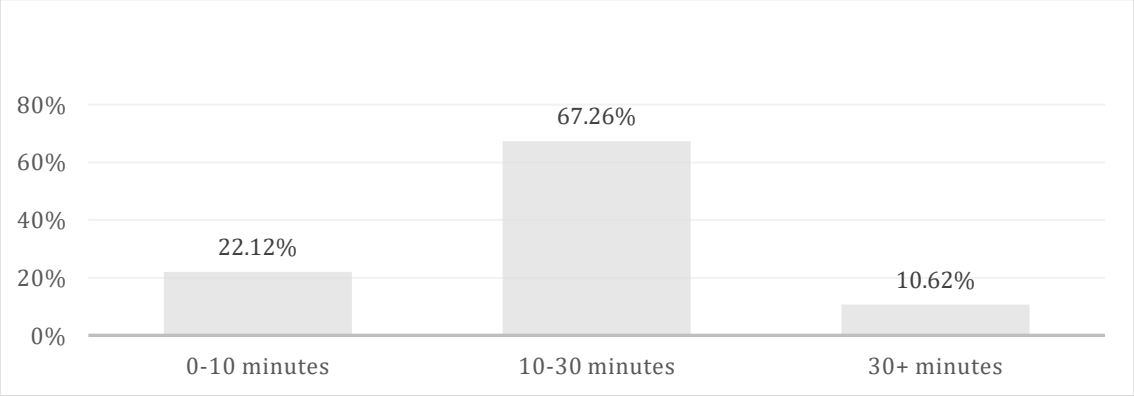




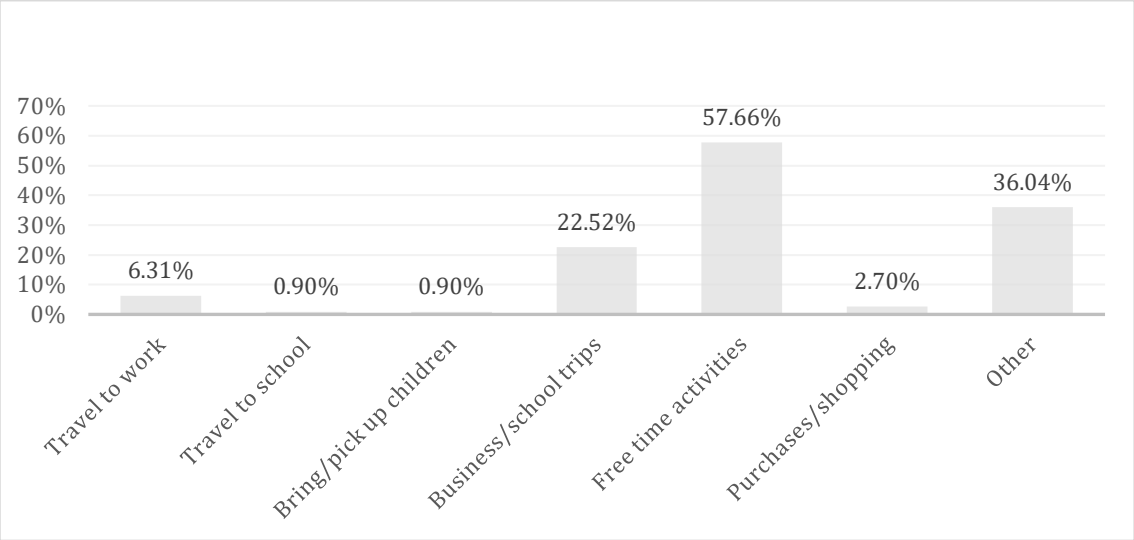
8. How often do you travel by taxi?



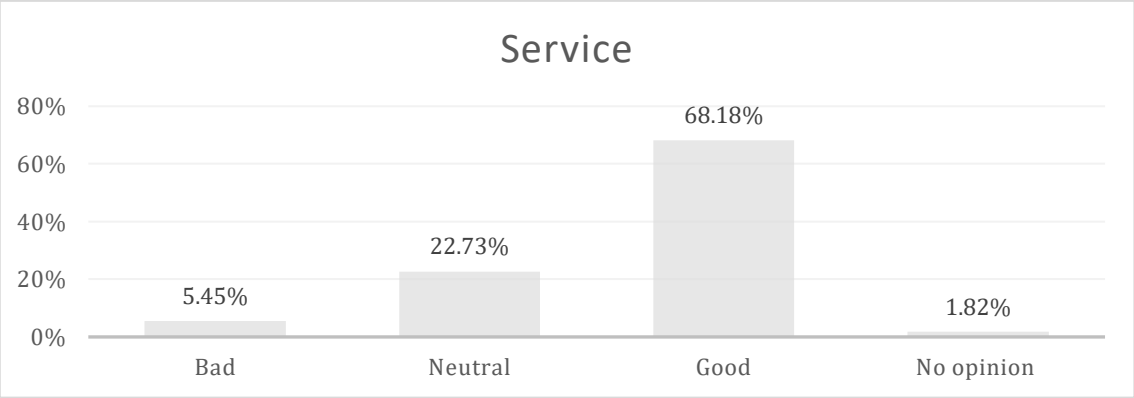
9. How long do you usually travel by taxi?

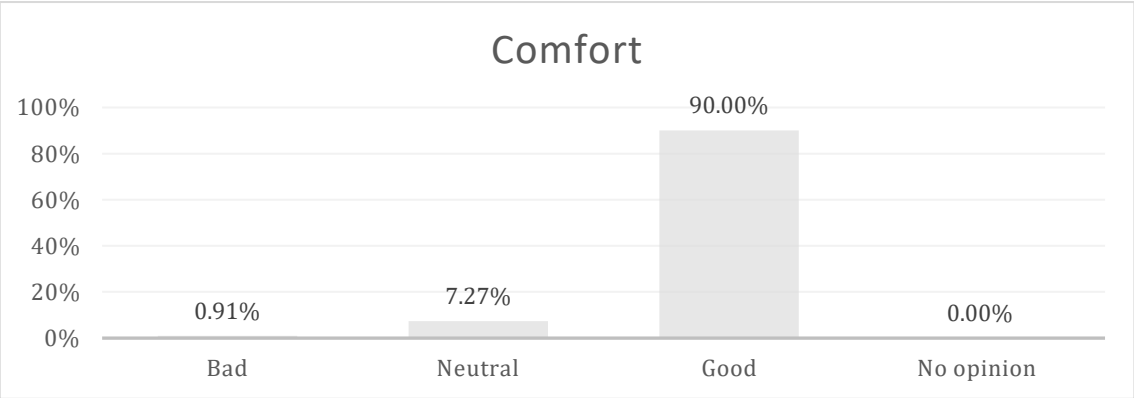


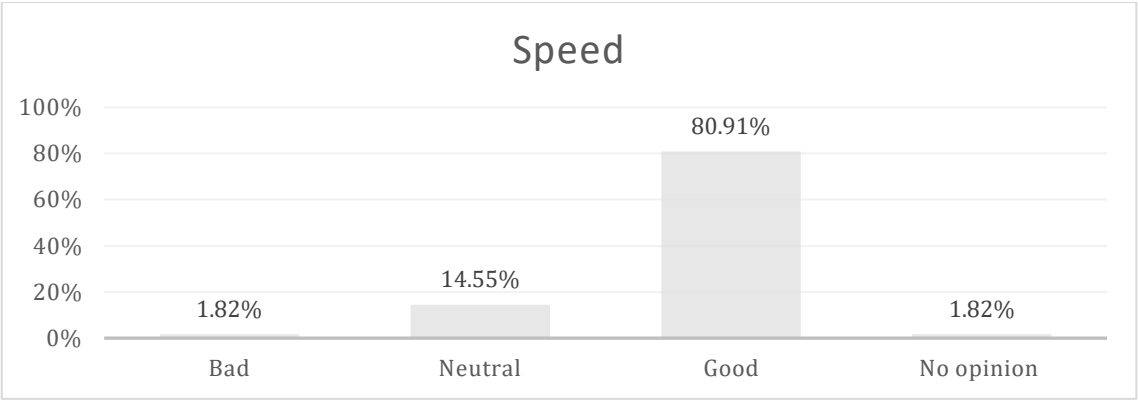
10. What purpose do you use taxi for?



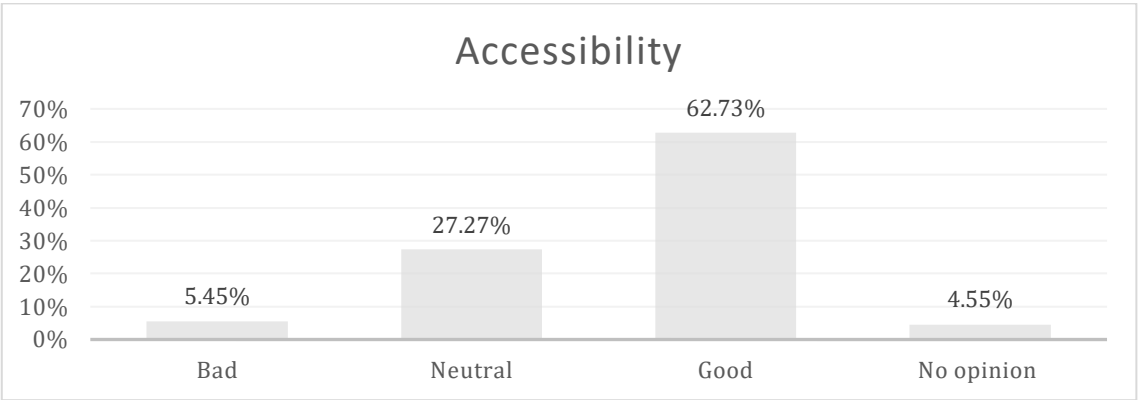
11. How do you experience the following aspects regarding taxi?

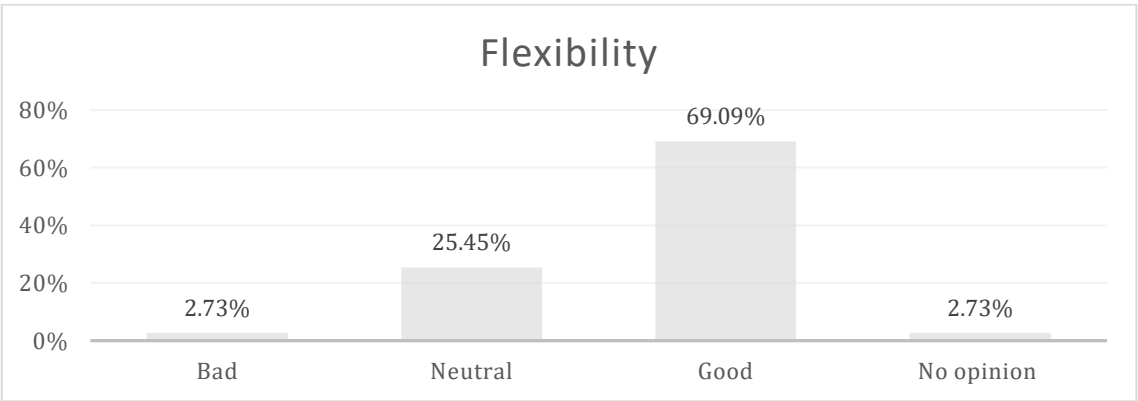


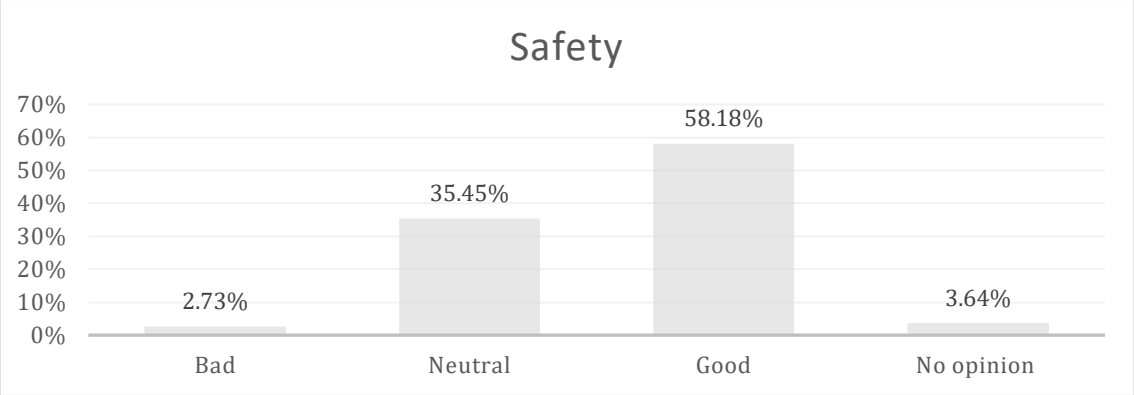



Speed
100%
80%
60%
40%
20%
0%
1.82%
14.55%
80.91%
1.82%
Bad
Neutral
Good
No opinion

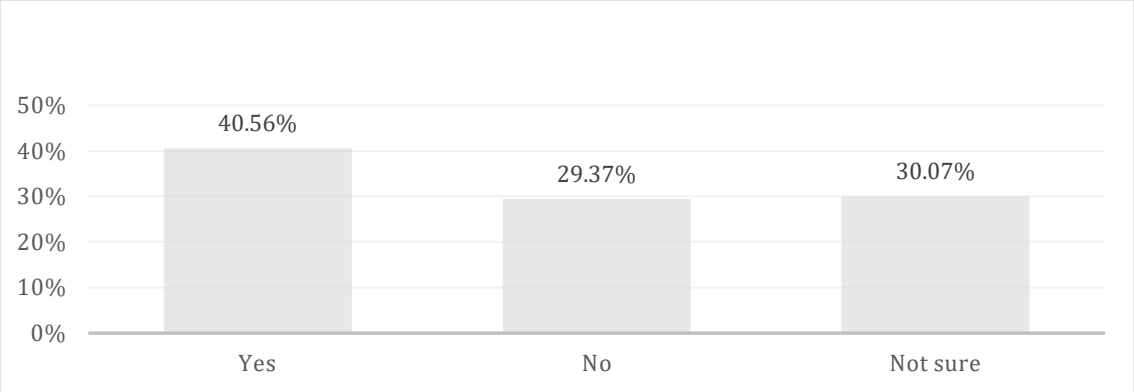

Price
70%
60%
50%
40%
30%
20%
10%
0%
63.64%
26.36%
9.09%
0.91%
Bad
Neutral
Good
No opinion


Accessibility
70%
60%
50%
40%
30%
20%
10%
0%
5.45%
27.27%
62.73%
4.55%
Bad
Neutral
Good
No opinion

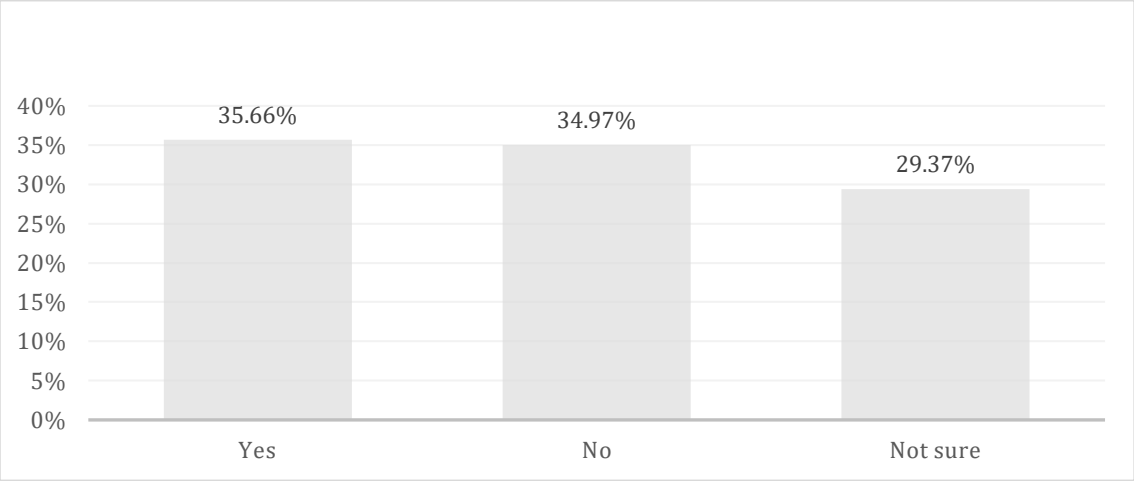

Flexibility
80%
60%
40%
20%
0%
2.73%
25.45%
69.09%
2.73%
Bad
Neutral
Good
No opinion



12. On the picture you can see a cycle-taxi that fits two passengers. Would you consider using this service as a substitute for public transportation?
    Facts: Fits two passengers, allowed on bike lanes, avoids congestions, door-to-door transportation



13. Would you consider using the cycle taxi as a substitute for a regular taxi?



14. How much would you be willing to pay for this service?

    Imagine a trip from Central Station to Handelshögskolan. By tram this trip would take approximately 15 minutes (waiting time included) and cost 27 SEK. By taxi this trip would take approximately 15 minutes (waiting time included; when there is no traffic) and cost approximately 160 SEK. The same trip by the cycle taxi takes approximately 10 minutes. How much would you be willing to pay for this service? Same price for both one or two passengers.

Average answer: 48 SEK