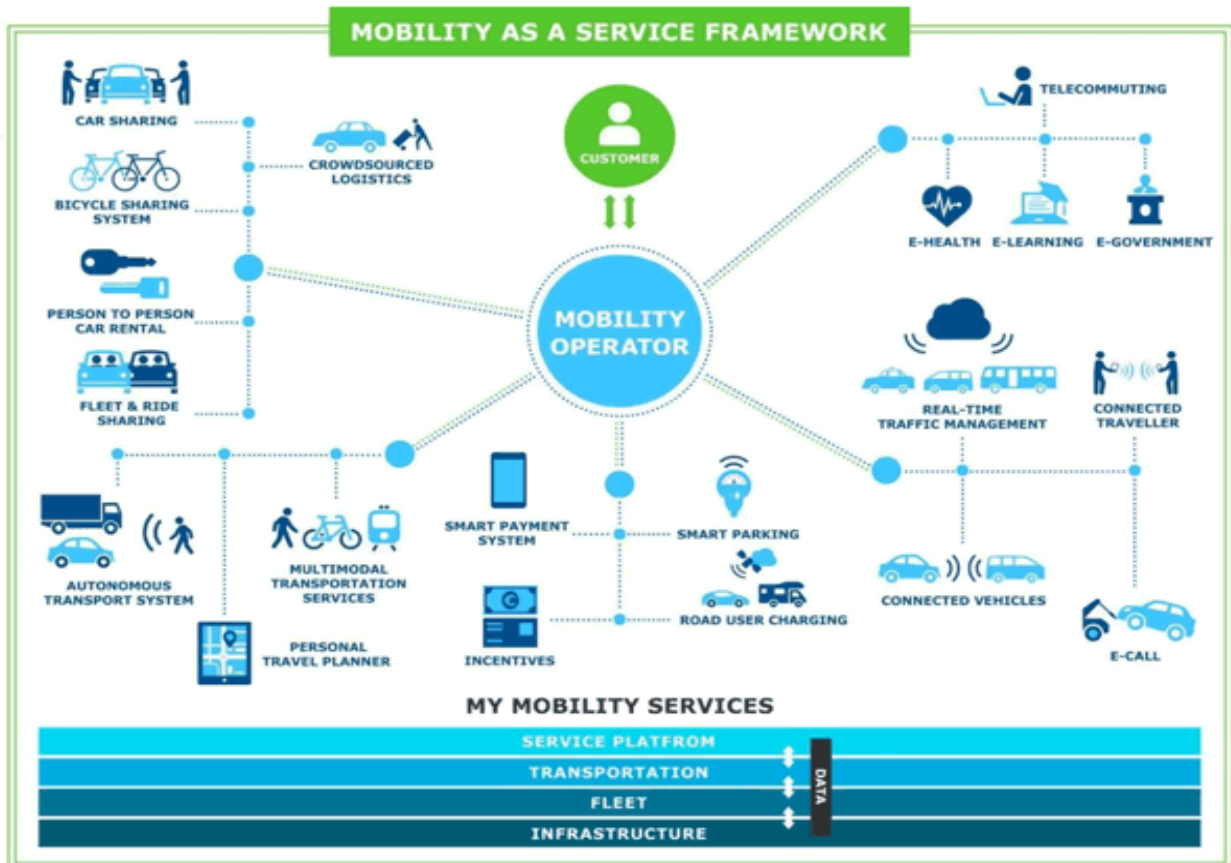# The social impact of Mobility as a Service (MaaS)

An assessment of the business models of MaaS-initiatives and the inequalities in the Dutch transportation system

MOBILITY AS A SERVICE FRAMEWORK

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Master thesis Spatial Planning:
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Preface

This is my master thesis about the potential social impact of Mobility as a Service (MaaS) and the equality of the Dutch transportation system. This research marks the completion of the master's degree program of Spatial Planning with a specialization in Urban and Regional Mobility. Of course, research of this size cannot be established without the help of others. I would like to dedicate this preface to thank a few people for their help in the process.

First of all, a few people within Sweco deserve an honorable mention. Sweco provided me with a very valuable opportunity to both write my thesis and gain relevant experience in the working field by working on projects. I would like to thank Willem Scheper for this opportunity. Furthermore, I would like to thank Rudy Stevens for teaching me multiple skills in the field of traffic engineering, which broadened my skill set as a spatial planner. Lastly, Jeroen Quee helped me with further narrowing down my research focus with his extraordinary knowledge regarding MaaS.

Then I would also like to thank Peraphan Jittrapirom as my supervisor from Radboud University. Like Jeroen Quee, he possesses exceptional knowledge regarding the subject of MaaS which really helped me in the initial phases of this research. In the latter phases of this research, I could always rely on his constructive and helpful feedback.

Some people within my personal life deserve an honorable mention also. I would like to thank my father Egbert, my brother Thijs and my girlfriend Jip, for supporting me in the process. Also, I would like to thank my mother, Marianne, who sadly is not around anymore, but who always helped me to succeed. Without the four of you, this would have never been possible.

Finally, I want to thank my other family, friends and my teammates from Brakkenstein football club. I could always count on you to provide some much-needed distraction and a beer or two, which is much appreciated.

Enjoy reading my master thesis!

Michiel Brouwer

Nijmegen, February 2019.

Abstract

The Dutch public transportation system is considered to be of high quality (Mebius, 2017), but groups like the elderly, the disabled, people with low income and people living in rural areas are most likely still experiencing problems with accessing the Dutch transportation system. Mobility as a Service (MaaS), a novel transport concept, can be an answer to these challenges, given the precondition that a MaaS service embeds social values in its business model to address inequalities within the transport system. In this study, I examine how the existing MaaS services, namely Whim, GoAbout, USP Campusbikes and Brengflex, incorporate social values in their business model. The study adopts Transport Justice (Martens, 2016) as its theoretical framework and uses the Triple Layered Business Model Canvas (TLBMC) (Joyce & Paquin, 2016) to construct a social business model canvas for MaaS.

The results of this study show that the existing MaaS-initiatives generally do not apply a social business model. Most MaaS-initiatives do not focus on reducing inequalities in the Dutch transportation system by providing a better service for the groups of people that currently experience an insufficient level of accessibility. Instead, the dominant value in the business model remains the economic value. Only the business model of Brengflex, a subsidized flexible bus line, can be considered social. All other MaaS-initiatives simply cannot afford to apply a social focus as the competitiveness of the mobility market is very high and profit margins are slim.

The results imply that the government has an important role in ensuring accessibility for all. Principles of justice should be implemented in the transportation planning policy, as is done in other policy areas such as housing, health care and education. It is important that the government considers a sufficient level of accessibility as a basic need. Having a sufficient level of accessibility enables people to access health care, jobs, social contacts and educational institutions. Governmental regulation of MaaS-initiatives can be done by setting up rules that force these initiatives to have a broader focus than just profit-making in order to fulfill the accessibility goals of the government. Subsidies can make sure that these MaaS-initiatives will still be profitable while also focusing on loss-making transport lines.

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1. Introduction

1.1. Background

The Dutch public transportation system is considered to be of high quality when compared on an international level in terms of punctuality and frequency of the service (Mebius, 2017). A train departs every ten minutes between big cities, which is more frequent than any other country (Mebius, 2017). Furthermore, the recent implementation of the 'OV-chipkaart', which is the national public transportation card, enabled users to access different modes of transport such as trains, buses, trams, metros and shared bicycles, using a single smart ticket.

The Dutch bicycle system is another factor that stands out when analyzing the quality of the Dutch transportation network. There is a highly developed and intensively used bicycle infrastructure in the Netherlands. Distances between cities are relatively short and densities, especially around bigger cities, are really high, which makes most areas and destinations very accessible by foot or bicycle. The combination of these characteristics makes the Dutch transportation system of high quality, in which people generally will not experience any problems when moving around and reaching their destination.

However, even though the Dutch transport system is of high quality, there are certain groups of people that still experience challenges in their travels. For example, citizens in rural areas often experience a lack of accessibility as there is stagnation, and sometimes even a decrease of the quality of public transport between smaller cities, outskirts of cities and rural areas (Rover, 2016), which leads to a high car-dependency. This can give accessibility problems when these people do not have access to a car, because they cannot afford one or when they are incapable of driving a car. Furthermore, it is important to consider that a car is not always the most efficient transport option, for instance, because of heavy traffic, road work or the inability to park at the destination. The lack of public transport service towards rural areas can thus lead to a lack of accessibility for people living in these areas several situations.

Furthermore, the elderly and those with physical disabilities often experience challenges to use the public transport system due to their physical limitations. They simply lack the capabilities to walk or cycle to the closest access points to public transport service (Welzen, 2014). In other cases, while the distance to these transport services may not pose a challenge, the service itself is not accessible due to the lack of necessary facilities, such as wheelchair access (Rijksoverheid, 2017).

Although the Netherlands is considered a wealthy and developed nation, there are currently 221.000 Dutch households (3,3%) living below the poverty line for a long-term[1] period (Nu.nl, 2017). This poverty line has been defined by the government as the level of income "sufficient to realize a certain consumption level that is seen as minimally necessary in the Netherlands" (CBS, 2017). In addition to their ability to afford access to transport, there are also several pre-conditions to access the transport system that can potentially hinder the poor from accessing the system. For example, to acquire an OV-chipkaart, each traveler is required to have a home address, a bank account and access to the internet. These requirements demonstrate examples of implicit challenges for the poor and those with low incomes to access the Dutch transport system.

Mobility as a Service is new and innovative transport concept, thought to be a transition in mobility, in which the consumer buys mobility, instead of investing in 'owning' modes of transport, such as the car (Connekt, 2017). The aim of MaaS is to offer an integrated platform, in which all modes of transport, including conventional public transport, on-demand transport and private or shared vehicles are combined (Hietanen & Sahala, 2014). With MaaS, all transport modes are combined to offer the consumer a tailored mobility package (Jittrapirom et al., 2017).

This bundling of mobility modes can start a shift from an ownership-based transport system towards an access-based one (Jittrapirom et al., 2017). The potential effects of this transition is a transport system that is more flexible, affordable, and as convenient as owning a private vehicle (Hietanen & Sahala, 2014). If successful, MaaS would make private car ownership unnecessary. The integrated platform in MaaS will be accessible for travelers through a Smartphone app. This app can then be used to plan, order and pay for the desired transportation. MaaS can potentially provide the consumer with a more responsive and more efficient transport system (Ministerie van Infrastructuur en Milieu, 2017).

There are a few key driving forces behind the rise of MaaS. The first one is reliability. MaaS can offer a more reliable and flexible transport system (Connekt, 2017), because the user is no longer relying on only one mode of transport, but instead, this person can use multiple modes of transport. The possibility to use different modes of transport gives a lot of flexibility to the user. It means that when one mode of transport is not an efficient option on a given day, for instance, because of congestion due to heavy traffic or because of problems with the train, it is possible to switch to another mode of transport. With the current transportation system, this person would be either stuck in traffic or waiting for another train. MaaS can provide consumers with alternatives which will make their travel

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[1] More than four years

time more consistent, and this will give travelers more certainty that they will reach their destination on time.

Efficiency is another important driving force. This driving force of efficiency consists of two parts. The first part is concentrated on the more efficient use of available cars. Currently, a privately owned car is standing still for 96% of the time (Connekt, 2017). MaaS can use this fleet of cars more efficiently, which can than result in a reduction of the fleet of cars needed to transport all people towards their destination. A smaller fleet of cars would mean less parking space needed, which opens up space for other things, such as green structures in a neighborhood. At the same time, the remaining fleet of cars can be used more efficiently, which can lead to less peak travel and less congestion (Ministerie van Infrastructuur en Milieu, 2017). With MaaS, people can also choose for a last-minute switch from a congested transport mode to a transport mode that has still free spaces, for instance from (shared) car to public transport or vice versa.

The driving force of efficiency is also important from an economic point of view. Mobility is currently the biggest expense of a Dutch household (Connekt, 2017). The flexibility and comfort level of an adequately implemented MaaS-system should make it unnecessary to privately own a car. MaaS can increase the accessibility for households while decreasing the transport related expenses.

Given the mentioned attractive benefits of MaaS, MaaS can improve the Dutch transportation system's accessibility, making it inclusive for all. There are a number of reasons the Netherlands can be considered a suitable country to implement MaaS (Connekt, 2017). Firstly, the OV-chipkaart provides a strong basis for the integration of payment in the Dutch transport system. The OV-card integrates different modes of transport and enables a pay-as-you-go tariff, which is a relatively similar system as MaaS. This means that potential users are already used to the idea and implementing MaaS would require fewer adjustments to the transportation system.

Secondly, the relatively dense cities, short distances and the extensive use of the bicycle are other reasons to consider the Netherlands as a possible test area for MaaS. On top of that the Netherlands always had a progressive view in the field of transportation innovations and tries to be one of the frontrunners (Ministerie van Infrastructuur en Milieu, 2017), and it is therefore expected that the Dutch government will explore the possibilities and opportunities of a transportation system including MaaS in the near future.

Furthermore, MaaS could treat some challenges and threats the Dutch transportation system faces, which will further stimulate the Dutch government to explore the possibilities of MaaS. For instance,

the Netherlands is experiencing increasing pressure on its road network, leading to a high level of congestion during peak hours. The level of congestion is expected to worsen in the coming years. The National Market and Capacity Analysis (NMCA) shows that the number of travel movements in, around and between Dutch cities will keep on growing (Ministerie van Infrastructuur en Milieu, 2017). This increasing pressure on the Dutch road network presents the government with large-scale accessibility- and sustainability challenge. The Dutch infrastructure network is reaching its maximum capacity, especially around cities (Metronieuws, 2017). This means that there has to be put more effort into alternative solutions, apart from investing in public transport and infrastructure, in order to prevent high levels of congestion on the Dutch road system.

Also, the Netherlands is facing a shrinking of its regional cities, due to a decline in population in the rural area. In these shrinking areas, the demand for transport decreases and becomes more inconsistent. Currently, buses are used to provide transport in rural areas. However, conventional (public) transport services, such as the bus or train, are not suitable to support such a low and inconsistent demand. This makes it unattractive for bus companies to cover rural areas, which has led to the disappearance of several bus lines (Omroep Gelderland, 2014). People living in these areas are thus no longer connected to the public transport network and rely solely on private transport to reach desired activities.

The implementation of MaaS in the Netherlands is likely to have significant impacts at the spatial and social level. MaaS can bring a significant change to the transport system, reducing the need for a private vehicle and enables travelers to utilize public transport system more effectively (Hietanen & Sahala, 2014). This research focuses on the change that MaaS brings. At the moment there is not a lot known about the consequences of MaaS, as this is a relatively new subject. This research is focused on taking a closer look at these consequences. In particular, the social dimension. This perspective is chosen for two main reasons.

Firstly, there is a lack of literature in the area in dealing with the implications of MaaS on a social scale. Existing literature on MaaS (such as; Goodall et al., 2017; Sochor, Strömberg & Karlsson, 2015) recognizes the importance of a social focus. However, these studies do not explicitly deal with the social impacts of MaaS. Given the inequalities in the current transportation system, it is important to look deeper into possible social consequences of MaaS that can make a future transport system more equal.

Secondly, the concept of MaaS stems from the recognition that the organization of a transport system should be focused on the people. When looking at current literature on MaaS, a lot has been

said on how MaaS will make the transportation system more efficient, flexible, comfortable, and eventually better for all people (Hietanen & Sahala, 2014; Connekt, 2017). This should include people that currently experience problems with accessing transport services. MaaS has the potential to improve travel for all groups of people, and not just for people that live in the right place and who can afford it.

Finally, the impact that MaaS will have on society will be strongly dependent on the business model that is adopted, and what key values are determined in the business model canvas. A business model canvas is a tool for describing, analyzing and designing business models (Osterwalder & Pigneur, 2010). It describes the strategy of an organization in developing, delivering and capturing value. The impact that a business has on society as a whole will always be very dependent on the values that are embedded in the business model canvas.

For instance, when MaaS adopts a business model that is focused on the value of profit-making then this will most likely only increase the inequalities in the transport system as it will improve the gap between the rich and the poor. Furthermore, adopting such an economic-focused business model, MaaS is likely to overlook the accessibility issues in rural areas, as providing a service in these areas is likely to be unprofitable. In other words, for MaaS to have positive social effects, additional values than the economic one should be embedded in its business model canvas. The question is whether it can be expected that MaaS-initiatives will implement social values into their business models themselves or if this requires regulation of some kind from the government. This research aims to answer this question.

1.2. Research aim and questions

The aim of this research is to *provide insights into the social dimension of the current business model of MaaS services and to identify possible improvements using Transport Justice as a framework to realize the desired social effects in the Dutch transportation system.* This research will focus on the Dutch transport system as its case study.

Furthermore, this research will be focused on the main research question, which is as follows;

"What kind of business model should Mobility as a Service adopt in order to have the desired social effects that lead to a more 'equal' or 'just' transport system in the Netherlands and how can this be achieved?"

In order to answer the main research question, the following sub-questions will be addressed:

> 1. What are the characteristics of a just and inclusive transport system and how can this be achieved using a social business model?
> 2. How do existing MaaS-initiatives address or influence the social dimensions of the transport system and what are possible enhancements?

1.3. Research relevance

1.3.1. Scientific relevance

Given its innovative nature, there is currently limited scientific literature on MaaS. Nevertheless, there is an emergence of literature on the subjects as the concept become increasingly well-known and a number of MaaS-pilots are being implemented. Hietanen (2014) first introduced MaaS and its possibilities, providing an overview of how the system could potentially be better than owning a car and how it could address accessibility issues in the region of Helsinki.

Holmberg, Collado, Sarasini & Williander (2016) later gave a comprehensive description of the framework of MaaS, including an explanation of the MaaS concept, giving examples of MaaS, describing the role MaaS can play in the eco-system and doing recommendations for future research. Furthermore, Jittrapirom et al. (2017) give a critical review of definitions, assessments of schemes and key challenges for MaaS. In this research, nine core characteristics of MaaS are given based on a literature review.

However, to the best of my knowledge, there are only a handful of studies that focus on the business model aspects of MaaS. For instance, Sarasini, Sochor & Arby (2017) examine how business models for MaaS can generate sustainable value, the value that goes further than traditional economic value and belongs to the environmental or social dimension of sustainability. The research concluded that MaaS can create and capture sustainable value in numerous ways, including reduced congestion and emissions, improved accessibility, reduced environmental impacts in vehicles' production phase and travel time savings. This research is perhaps the only study that explicitly focuses on the formulation of a business model for MaaS. The lack of literature addressing the business models for MaaS illustrates a knowledge gap in the subject, which this research can contribute to.

In addition, there is also a lack of literature that explicitly addresses the role of the government in MaaS. The Dutch government is responsible for its transportation network and in providing accessibility for the people. It is still unclear what the effects of MaaS will be to the level of accessibility of a given area. Will it bring about improvements for those currently experiencing

accessibility problems to reach their desired locations in the current transport system? Or will it intensify the problems of these groups? What is the role of the government in ensuring that all people have access to the transportation system under the MaaS concept? This research also aims to answer these questions to contribute to building knowledge about the desired role of the government in the implementation of MaaS.

Furthermore, there is a lack of scientific knowledge on the social inequalities in the Dutch transportation system, even though numerous groups of people experience them, as previously mentioned in the introduction section. The most important research considering equality in transport is Martens' (2016) concept of Transport Justice. This research will use the principles of Transport Justice to address the equality of the Dutch transport system. The aim is to identify possible improvements in the business model of MaaS services, in order to realize the desired social effects that would make the transport system more equal.

1.3.2. Societal relevance

The potential societal contributions of this research are two folds. Firstly, this research raises awareness of inequalities in the Dutch transportation system. There are certain (groups of) people that are experiencing an insufficient level of accessibility for various reasons, such as their physical conditions, financial limitations, and their geographical locations. Due to the insufficient level of accessibility, it may be difficult for these individuals to participate in their desired activities, such as work, school, health care, family and friends or other leisure activities. It essentially becomes challenging to participate in society and this could result in social inequalities. The existence and consequences of these inequalities are currently underexposed. Furthermore, this research elaborates on how these social inequalities can be addressed with MaaS. If MaaS can provide these 'vulnerable' group of people with a higher level of accessibility, it will have great, positive effects on society.

The findings and recommendations of this research can be used to further improve the Dutch transportation network. MaaS possesses the characteristics to potentially be of great value for the groups of people that are currently experiencing problems when accessing the transportation network. For instance, a transportation system in which you only pay for the use of transportation, instead of owning transportation, can make it cheaper and easier accessible for the poorer groups of people, as it will no longer be necessary to personally own a car. Furthermore, a more flexible and demand-responsive system like MaaS can be a far better alternative in areas where the demand for transport is low and inconsistent, which can provide a more suitable service for people living in rural

areas. Simultaneously, a demand-responsive and flexible service can be of better service for people who need specific and personal attention, such as the elderly and the disabled.

Finally, the societal relevance of this research is that it aims to contribute to a change in perspective {on?}. Having access to transport should be seen as a crucial precondition to participate in society. It should be considered just as important as having access to health care, housing and education. In these policy areas measures are implemented to limit inequalities and to give access to certain groups of people that would otherwise have problems acquiring these basic needs. This research contributes to this change in perspective and it strives to stress the importance of a certain level of accessibility. The transportation policy should implement similar principles based on equality and equity as observed in other crucial policy areas.

2. Theoretical framework

In this chapter, the relevant theoretical concept selected for this research is further elaborated.

2.1. Transport Justice and its implications to transport planning practice

Transportation planning practice was first developed in the United States in the 1950s (Martens, 2016). The practice was initially focused around solving the increasing levels of congestion, in order to ensure an effective and efficient movement of people and goods (Shiftan, Button & Nijkamp, 2007). Although transportation planning in itself has always been politicised; it involves interventions and decisions that affect different groups of people in different ways (Martens, 2016), this aspect is often disregarded. The way political interventions affect the people, and the often systematic way it negatively affects the same groups of people, is often ignored (Levine, 2013; Martens, 2016).

In responding to these gaps, researches focusing on inequalities and social inclusion in transport began to emerge (Lucas, 2011). The first study took place in the United Kingdom, where policymakers started to be interested in the social impacts that a low level of accessibility could have (Social Exclusion Unit, 1998). In 2003, the UK Social Exclusion Unit released a report on the subject. The report provided evidence of certain economically and socially disadvantaged groups in the UK experiencing a lack of transport and consequentially becoming socially excluded (Social Exclusion Unit, 2003). Similar studies have since been undertaken in other countries to investigate the relationship between transport and social exclusion (Lucas, 2011).

The concept of Transport Justice has provided a new paradigm for transportation planning (Martens, 2016). It examines how a fair transportation system, a system that provides a sufficient level of accessibility for all under most circumstances, can be implemented. Under the concept, transportation planning is based on principles of justice, instead of focusing on eliminating congestion, minimizing environmental impacts or maximizing efficiency. It takes a human-centered approach, which is in contrary to the conventional practice. The key principles of justice can be found below.

The four principles of justice for transportation planning
1. An injustice is done whenever a person experiences an insufficient level of accessibility. This holds in virtually all cases.
2. All persons are entitled to a set of insurance schemes that guarantee a sufficient level of accessibility in virtually all cases. These insurance schemes are a key component of a fair scheme of mutual cooperation.
3. In order to achieve a sufficient level of accessibility for all, the proceeds from the insurance schemes are to be used to reduce and ultimately eliminate existing insufficiencies in accessibility in virtually all cases.
4. Interventions in the transportation system, in land use patterns or service delivery policies are only just, and thus only justified, if they do not result in an increase in the number of persons experiencing insufficient accessibility levels or in a further reduction in the accessibility levels experienced by these persons.

Table 1: The four principles that form the core of transportation planning based on principles of justice (Martens, 2016).

However, there are challenges in implementing the concept in practice. For instance, a sufficient level of accessibility can be very subjective. Martens (2016), also highlights the difficulty in giving an operational definition of 'sufficient accessibility'. A possible solution to this challenge is to develop an approach and agreement on what can be considered a sufficient level of accessibility and to come up with a sufficiency threshold. The sufficiency threshold is set up by real-life agents, independent actors who monitor and provide a rating to a person's level of accessibility.

These real-life agents should place all people into a so-called accessibility spectrum. To be able to assess where these people should be placed, the agents can draw on the relationship between accessibility and activity participation (Martens, 2016). This means that in their analysis they would take into account the earlier explained social exclusion literature and look at possible access to education, jobs, social contacts and health care. When analyzing the accessibility level of different persons, the real-life agents will agree that the persons on the absolute bottom of the spectrum, who cannot engage in any activities, do not experience a sufficient level of accessibility (Martens, 2016).

The opposite goes for the upper end of the spectrum, where all real-life agents will agree that these persons are experiencing a sufficient level of accessibility. It is expected however that these agents will start to disagree with each other about the sufficiency of someone's accessibility when moving closer to the center of the spectrum. In other words, this is where the subjectivity of 'sufficient'

comes into play. According to Martens, the real-life agents should start with setting upper and lower boundaries, which represent the groups of people they have reached agreement on. This means that the real-life agents all agree that the people below the lower boundary do not experience sufficient accessibility, and the people above the upper boundary do experience sufficient accessibility.
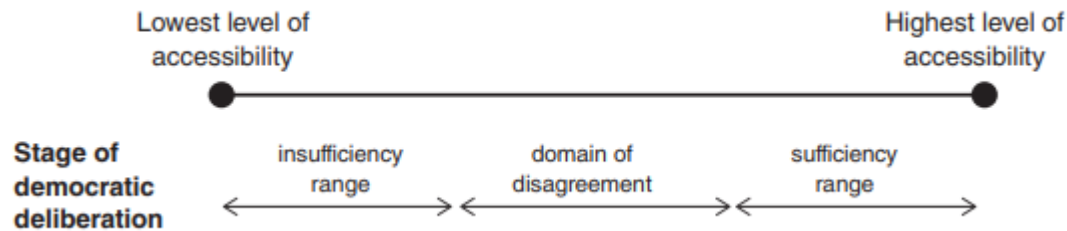
Figure 1: Graphic representation of setting the boundaries of sufficiency and insufficiency range. The 'domain of disagreement' contains the people on which the real-life agents cannot reach an agreement (Martens, 2016).

Martens (2016) argues that this sufficiency principle should be an important factor in transportation planning. For the people in the insufficiency range, improvements in accessibility are required in virtually all cases and these improvements should be financed by a fair scheme of taxation. In other words, the focus of a government's transportation planning should lie on investing in measures that improve the accessibility of persons experiencing an insufficient level of accessibility.

In this research, Transport Justice is used to assess the influence of existing MaaS-initiatives on the social aspects of the Dutch transportation. For a MaaS-initiative to contribute to a more equal transportation system, a certain focus must be present on the groups of people below the sufficiency threshold. Ultimately, a MaaS-initiative should raise the accessibility levels of such a group above the sufficiency threshold, providing a sufficient level of accessibility.

2.2. Social business models

The business model of an organization can highly influence its impact on society. In the following section, this research will examine different sorts of business models in order to come up with a suitable framework for a MaaS business model. This business model should embed values that will have the desired social effects on the Dutch transportation system. Chesbrough & Rosenbloom (2002) summarized the functions of a business model into six points as follows:

1. A business model articulates the value proposition, which relates to the value that is created for users by offering new technology.

2. A business model analyzes the market and determines to which users the technology could be helpful in order to generate revenue.

3.   A business model should define the structure of the value chain within the firm required to create and distribute the offering.

4.   A business model should also contain an estimation of the expected costs and potential profit of the technology.

5.   A business model should describe the position of the firm within the value network, linking suppliers and customers, including identification of potential complementors and competitors.

6.   A business model should formulate a competitive strategy that would give the business an advantage over other competitors.

Above these six functions, maximizing economic profit is generally the most important value and goal embedded within such a business model. Attempts to combine this economic value with other objectives, such as social objectives can often be problematic. However, research has shown that a focus on the social side can indeed pay off, both socially and financially (Yunus et al., 2010).

As observed by Joyce & Paquin (2016), there is an on-going transition in the values embedded in business models. In the early 2000s, business models were mostly focused on maximizing economic profit. However, during the latter part of the 2000s, social and environmental aspects were also being implemented in business models due to the ongoing pressure towards businesses to respond to sustainability concerns (Joyce & Paquin, 2016). In recent years it is becoming more and more common that issues such as economic and social inequalities, environmental events, material resource scarcity and energy demands are also embedded into the values of a business model (Joyce & Paquin, 2016).

This transition has led to the development of new business models (Sarasini et al., 2017). These new business models are increasingly linked with sustainability which has resulted in an increase in literature on sustainable business models (for example; Bocken, Short, Rana & Evans, 2014; Boons & Lüdeke-Freund, 2013; Stubbs & Cocklin, 2008). A sustainable business model is a tool that is used to describe and analyze the sustainable value of a business, which can be divided into the economic value, the environmental value and the social value. The sustainable business model gives an overview of the captured values and presents them to its customers and other stakeholders (Schaltegger, Hansen & Lüdeke-Freund, 2016).

There is a number of sustainable business models that focus on the social aspect in particular. Such social business models provide an alternative perspective in value capturing, as they do not focus on

the economic or environmental aspects of a business. Traditionally, conventional businesses focus on maximizing profit and shareholder value. A social business can be seen as a mix between these two. It looks to sufficiently cover the cost of its operation, including the invested capital but the business is driven by cause rather than profit (Yunus, 2010). Social businesses also differ from a non-profit organization, which exists solely to fulfill social objectives.

While the concept of social businesses is highly interesting, the question remains whether this concept will be applicable to future forms of MaaS. It can be expected from a new transport concept, such as MaaS, that profit-making will always be seen as an important value or the most important value. In other words, it may not be realistic to expect that a MaaS-operator will adopt a purely social business model. MaaS can work the other way around; while their initial goal may be profit-making, the characteristics of the service can potentially result in great social benefits.

However, there is another form of a social business model that could be a better fit for the value of profit-making that MaaS is striving for. For instance, the inclusive business model seeks to address inequalities in a community by focusing on the inclusion of lower-income communities, while still maintaining focus on generating profit (Michelini & Fiorentino, 2012). The exact definition of the inclusive business model can differ (Wach, 2012), but there is a general consensus that such a business model should be a profitable business activity that also addresses the needs of the poor and other disadvantaged groups (BIF, 2011). Because of the absence of a uniform definition or framework for the inclusive business model, it is hard to use this concept as a foundation for this research. However, the core values of focusing on disadvantaged groups while making a profit should be embedded in a social business model for MaaS.

Because of the described shortcomings of social business models and inclusive business models, this research will look at other forms of business models that could form the foundation for a social MaaS business model. The earlier explained sustainable business model can provide this framework. Such a business model looks to capture value that belongs to the economic, environmental and social dimensions of sustainability (Sarasini et al., 2017). In other words, sustainable business models are still looking to maximize profit, but simultaneously seek to capture social value, making it a more realistic foundation for a business model for MaaS. Furthermore, the sustainable business model does also provide a clear framework and operationalization, as will be further explained in the following section.

2.2.1. Operationalizing a social business model canvas for MaaS

There are tools that help to design business models. One of such a tool is the business model canvas, which is used to describe, analyze and design business models (Osterwalder & Pigneur, 2010).

Traditionally, this business model canvas has always focused on the value of profit-making. However, with the rise of sustainable business models, this has changed. Joyce & Paquin (2016) have developed a canvas for a sustainable business model, namely the triple-layered business model canvas (TLBMC).

The TLBMC adds two new layers to the classical economic layer; an environmental layer and a social layer. The key idea of the social layer of the TLBMC is to extend the original business model canvas with a stakeholder approach (Joyce & Paquin, 2016). The additional social layer looks to capture the organization's most important social impacts that derive from its relationship with the stakeholders into nine components. It provides insight in ways to innovate a company's business model to maximize the social value that is created.

As stated earlier in the introduction, one of the challenges of MaaS is to focus on the future users and their needs and the social dimension of the transport system. Adding a perspective to the business model that concerns all stakeholders can make sure that more attention is given to these future users, which makes Joyce & Paquin's (2016) TLBMC an appropriate foundation for constructing a social business model for MaaS. Following the concept of Transport Justice, values such as equality and accessibility for all should be embedded in the social business model in order to address people that are currently experiencing an insufficient level of accessibility.

The literature on sustainable business models has been examined in this research (for example; Bocken, Short, Rana & Evans, 2014; Boons & Lüdeke-Freund, 2013; Stubbs & Cocklin, 2008). The TLBMC purported by Joyce & Paquin (2016) is chosen as the framework of this study because neither of the other literature provides a canvas for a sustainable business model in their respective researches. Furthermore, the TLBMC provides a clear separation between the three different aspects of a sustainable business model, which makes it possible to zoom in on the social aspects exclusively. It would be harder to apply this focus when using one of the other literature as a framework because in these researches the different aspects of sustainability are more intertwined.

An example of the social layer of the TLBMC is shown in Figure 2 below, filled in for Nespresso (Joyce & Paquin, 2016). This research looks to do the same for each of the cases in the case study, which will provide an overview of the social values, or lack of social values, incorporated in the social business

model of each MaaS-initiative. The figure also shows the position of the social layer within the TLBMC. The red frame represents this research's focus.
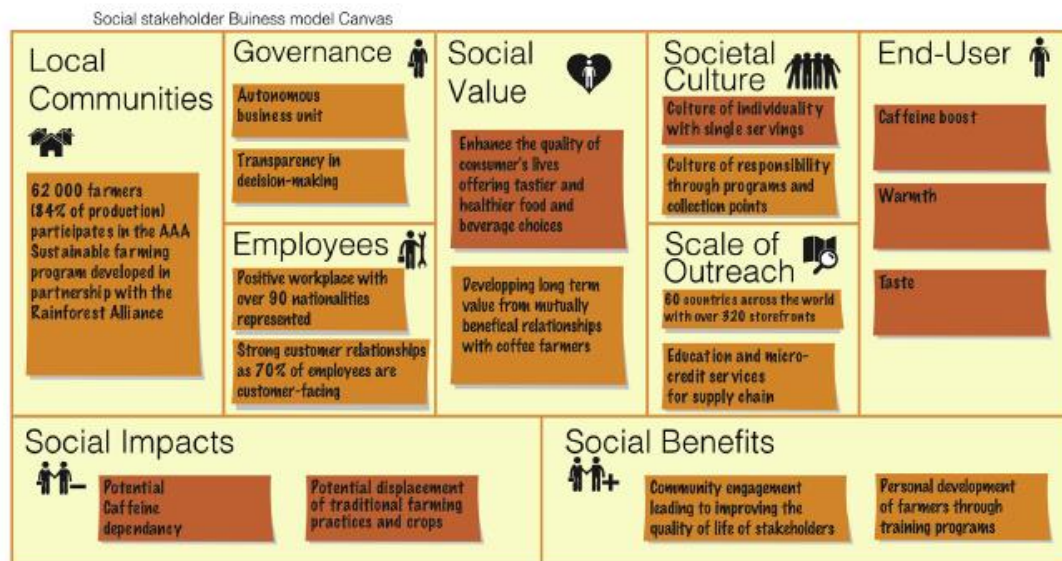
Figure 2: An example of the social layer of the TLBMC, filled in for Nespresso (Joyce & Paquin, 2016).
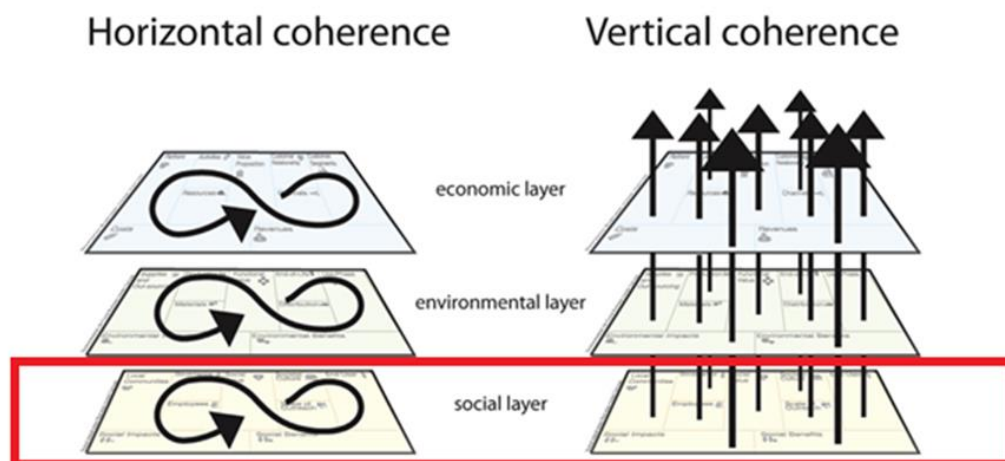
Figure 3: The position of the social layer within the TLBMC (Joyce & Paquin, 2016). The red frame resembles this research's focus (Joyce & Paquin, 2016).

It is important to take a deeper look into the social layer of Joyce & Paquin's (2016) TLBMC and to further operationalize its components. The social layer of the TLBMC consists of nine different components, namely; social value, employees, governance, communities, societal culture, the scale of outreach, end-users, social impacts and social benefits (Joyce & Paquin, 2016). In the next paragraphs, a summarized description of each component is provided along with how it can be utilized in the case study of this research.

The social value in the TLBMC refers to the mission of a company to create benefits for its customers and society as a whole (Joyce & Paquin, 2016). In the case of MaaS, it is the possibility to enhance travelers' living standard by providing them with an enhanced additional travel option. This means

that the MaaS-initiative provides the consumer with either 1) a more comfortable trip, 2) a cheaper trip, 3) a reduction in travel time and 4) improvement to the consumers' accessibility. When one of these four criteria is met without significant disadvantages in one of the other areas then it can be said that the consumers' life is enhanced.

The employee component in the TLBMC consists of the role employees have as a stakeholder and their training and development (Joyce & Paquin, 2016). This component may be challenging to address because this information may be confidential or classified. Additionally, current MaaS-initiatives are mostly small-medium sized firms, meaning that not much information is available. Still, information can be used to indirectly address this component. For example, what training is given to the employees to enable them to provide the consumer with a better service?

The governance component examines the structure of an organization and its policy regarding decision making (Joyce & Paquin, 2016). It defines stakeholders the company will identify with, and how they will do this (Mitchell, Agle & Wood, 1997). In the case of MaaS, the organization will look to identify with the future users, in order to find those who will prefer MaaS over the current transport options. MaaS-initiatives should thus analyze the groups of people for who they can provide a more suitable transport option and identify themselves with these groups. To contribute on a social level, special attention should also be given to people currently experiencing an insufficient level of accessibility.

The community component refers to the social relationships that are being built with the suppliers and the local communities (Joyce & Paquin, 2016). The relationships can be mutually beneficial and highly influence the success of an organization. In the case of MaaS, mutually beneficial relationships can be formed when a MaaS-platform and a transport provider work together to set up a MaaS-initiative in a certain area that experiences accessibility problems expressed by the local community. In this case, the MaaS-platform has the available resources to provide the necessary fleet of vehicles, while the transport provider acts as a 'launching-costumer' and addresses the communities' accessibility problem. The MaaS-platform expands its service area and its exposure, and thus its target audience, which makes it a mutually beneficial relationship for all stakeholders involved.

The societal culture considers the way an organization manages the impact it can have on society as a whole (Joyce & Paquin, 2016). It looks at possible social threats the service can cause in the future and how they can adjust their actions to make sure that they achieve a positive influence on society. There are a few general social impacts or threats concerning MaaS that can be addressed here. Smartphone-dependency can be a threat concerning MaaS, as people with a lower income, the elderly and disabled people often either cannot afford one or are not capable of using one. At the

same time, it is expected that the number of the elderly in the Netherlands will increase due to the aging population. Furthermore, MaaS' initial focus on heavily used transport lines and commuters can lead to a decreasing service along lesser used transport lines, potentially leading to isolation and social exclusion of certain groups who rely on these lesser used transport lines. When an organization has a good societal culture, it will address these social threats by providing alternatives.

The scale of outreach refers to the quality and quantity of an organization's relationships with stakeholders. (Joyce & Paquin, 2016). This concerns how and whether an organization addresses social differences in a certain area and it analyzes its geographical impact. For a MaaS-initiative, it will be crucial to recognize and address social differences in order to help equalize the Dutch transport system. A certain focus on groups that experience an insufficient level of accessibility, being the elderly, disabled people, people in rural areas and/or people with a lower income is thus necessary.

End-users are the persons that 'consume' the value proposition. This component addresses how the needs of the end-user are met by the product or service (Joyce & Paquin, 2016). End-users have different needs based on their personal characteristics such as age, income, and living area. They can also be divided into groups based on these characteristics. This component looks deeper into which needs of which groups have been met, and which needs have not been met.

The social impact describes the eventual social costs of an organization (Joyce & Paquin, 2016). It is an extension of the financial costs and the environmental costs in the other two layers. Currently, there is no general agreement on what social impacts must be considered or how to quantify them. (Joyce & Paquin, 2016). With MaaS, social impacts can consider a decrease of certain groups' accessibility levels, an increase in the gap between people with a high level of accessibility and people with a low level of accessibility or the possible isolation of certain groups of people.

The component of social benefits captures the positive social value that is created (Joyce & Paquin, 2016). As with the social impacts, social benefits can be very broad and hard to measure. Concerning MaaS, the most important social impact is an increased level of accessibility. However, to be considered as a social business model it is important that this increase of accessibility is also done for the groups of people that currently experience an insufficient level of accessibility, and not only for the people with favorable personal characteristics.

2.3. Linking Transport Justice and the Social Business Model

Next, the connection between Transport Justice and the Social Business Model Canvas will be made. In particular, I focus on how the TLBMC can be used to evaluate the social dimension of current

MaaS-initiatives. From the previous sections, it is apparent that certain components of the Social Business Model are in line with the principals of Transport Justice.

The most important characteristic of Transport Justice is that transportation planning should be done on principles of justice, meaning that an intervention in the transport system should aim to take away inequalities and subsequently lead to a more equal transport system. This value should therefore be embedded in the business models of MaaS-initiatives, otherwise the business model of such an initiative cannot be considered social.

Striving for a more equal transport system begins with the governance component. Here, the organization analyzes which stakeholders it is looking to identify with. According to the principles of Transport Justice, MaaS-initiatives should identify with those who experience an insufficient level of accessibility. Otherwise, improvements to the transport system and the advantages these bring are only done for the (groups of) people already experiencing a sufficient level of accessibility, which does not contribute to a more equal transport system.

Following the principles of Transport Justice, this focus on people currently experiencing an insufficient level of accessibility should then also be applied to the components of social value and the end-user. A MaaS-initiative will have social value if it enhances the lives of people using the initiative. However, when only improving the lives of people who already experience a sufficient level of accessibility, the initiative does not contribute to a more equal transport system.

This then means that considering the needs of future users cannot just be done for those who possess favorable personal characteristics, who can afford the service and who live in the right location. People who currently experience problems when trying to access the Dutch transportation system should also be considered in these parts of a social business model, as this will contribute to a more equal transportation system.

Two components of TLBMC, namely social impacts and social benefits, can be linked to Martens' (2016) Transport Justice. For MaaS, social impacts can refer to the social costs of a MaaS-initiative. According to Martens (2016), a MaaS-initiative may not have such social costs that it results in more people experiencing insufficient levels of accessibility. At the same time, interventions in the transport system may not result in a further reduction of the accessibility levels of those already experiencing an insufficient level of accessibility. In both cases, the interventions in the transport system are not justified.

The TLBMC component in social benefits is probably the most important link with the Transport Justice framework. The main idea of Transport Justice is to raise the accessibility levels of people

above the sufficiency threshold. The component of social benefits captures the positive social value that is created. The most important social benefit that is considered here is raising people's accessibility levels. Ideally, a MaaS-initiative raises the accessibility level of someone who before experienced a lack of accessibility and raises it above the sufficiency threshold, which would give this person a sufficient level of accessibility.

After aligning the concept of Transport Justice with the theory of the Social Business Model, a social business model canvas to assess MaaS initiatives to ensure equality within the Dutch transportation system is shown in Table 1. This canvas is used in this research to analyze the business models of current MaaS-initiatives to determine the extent of the social contribution of these initiatives.

The Social Business Model Canvas				
Local Communities A social MaaS-initiative works together with local residents or local authority to identify accessibility problems experienced by the local community or by certain individuals.	**Governance** A social MaaS-initiative identifies with those who experience an insufficient level of accessibility. **Employees** A social MaaS-initiative trains its employees to be of better service for its users.	**Social Value** A social MaaS-initiative enhances people's lives by improving the current service. The improvements to people's lives should be felt by a broad spectrum of users, and not solely by those with favorable personal characteristics.	**Societal Culture** A social MaaS-initiative fights social threats to reach a culture of social inclusion. **Scale of Outreach** A social MaaS-initiative addresses social differences and analyzes its geographical impact.	**End-user** A social MaaS-initiative meets the needs of the end-user. But most importantly: A social MaaS-initiative meets the needs of groups experiencing an insufficient level of accessibility.
Social Impacts A social MaaS-initiative may not result in: - an increase in the number of people experiencing an insufficient level of accessibility. - A further reduction in the accessibility levels experienced by these persons.		**Social Benefits** Ultimately, a social MaaS-initiative addresses the accessibility of people who initially experienced a lack of accessibility and raises it above the sufficiency threshold. This gives these people a sufficient level of accessibility.		

Table 2: This research's social business model canvas (Own creation).

2.4. Conceptual model

The connection between the relevant theories and approaches of this research are shown in the conceptual model, which can be found below.
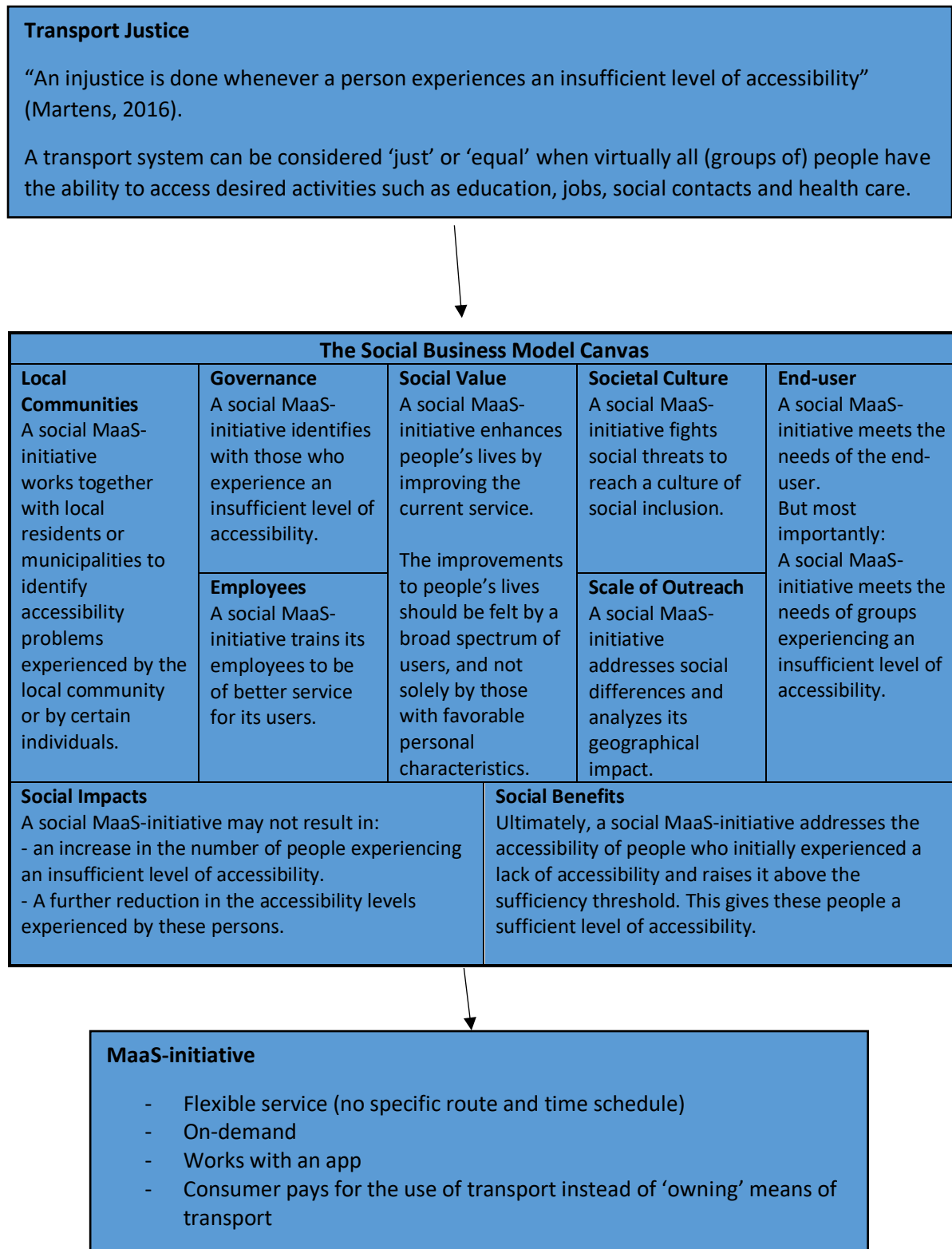
Transport Justice

"An injustice is done whenever a person experiences an insufficient level of accessibility" (Martens, 2016).

A transport system can be considered 'just' or 'equal' when virtually all (groups of) people have the ability to access desired activities such as education, jobs, social contacts and health care.

The Social Business Model Canvas				
Local Communities A social MaaS-initiative works together with local residents or municipalities to identify accessibility problems experienced by the local community or by certain individuals.	**Governance** A social MaaS-initiative identifies with those who experience an insufficient level of accessibility. **Employees** A social MaaS-initiative trains its employees to be of better service for its users.	**Social Value** A social MaaS-initiative enhances people's lives by improving the current service. The improvements to people's lives should be felt by a broad spectrum of users, and not solely by those with favorable personal characteristics.	**Societal Culture** A social MaaS-initiative fights social threats to reach a culture of social inclusion. **Scale of Outreach** A social MaaS-initiative addresses social differences and analyzes its geographical impact.	**End-user** A social MaaS-initiative meets the needs of the end-user. But most importantly: A social MaaS-initiative meets the needs of groups experiencing an insufficient level of accessibility.
Social Impacts A social MaaS-initiative may not result in: - an increase in the number of people experiencing an insufficient level of accessibility. - A further reduction in the accessibility levels experienced by these persons.			**Social Benefits** Ultimately, a social MaaS-initiative addresses the accessibility of people who initially experienced a lack of accessibility and raises it above the sufficiency threshold. This gives these people a sufficient level of accessibility.	

MaaS-initiative

- Flexible service (no specific route and time schedule)
- On-demand
- Works with an app
- Consumer pays for the use of transport instead of 'owning' means of transport

Figure 4: The conceptual model of this research (Own creation).

In this research, Transport Justice is selected as an overarching framework to provide a guideline for designing and implementing transport services. Under this framework, the social business model and social business model canvas are then used as an assessment tool to aid the evaluation of MaaS services. The results of the evaluation can help to improve the design of these services as the canvas helps to quantify how the services contribute to the social dimension of the transport system. The more a MaaS-initiative complies to the social business model canvas, the more 'social' it is considered and the more it contributes to an equal transportation system. The latter part of this research focuses on how MaaS-initiatives can be steered to better comply with the social business model canvas. In other words, it focuses on how a more social implementation of MaaS can be ensured, ultimately leading to an equal Dutch transportation system.

3. Methodology

3.1. Research strategy and methods

In the research strategy, the choices that have been made in the first stages of the research are described. The argumentation leading to these decisions and the choice of research methods will be elaborated in the following section.

This research has an inductive approach and is of a qualitative nature. It does not aim to test hypotheses as is customary for deductive research (Gray, 2017). Instead, the acquired empirical data is analyzed in order to determine if any patterns emerge that suggest relationships between variables, thus giving this research its inductive approach. The collection of qualitative data is first done through a literature study, in which the knowledge of other researches is gathered. Later, a case study and interviews are done in order to collect more qualitative data.

The data of the literature review provides the framework for a social business model and gives a definition of a fair transport system. The case study and interviews give more insight into how these theories work out in practice and to what extent they can be recognized in current MaaS-initiatives. This gives more insight into the desired role of the government in achieving the desired social effects of MaaS and a fair transport system. The literature review also forms the framework for the case study and interviews. It provides them with parameters of a social business model and a fair transport system. For all these parameters, data is collected during the interviews in order to answer the research questions.

The analysis of the business models currently being adopted by existing MaaS-initiatives is done through a case study. According to Saunders (2011), a case study can be defined as: *"A method for research which makes use of empirical research of a certain contemporary phenomenon with the actual context, in which different sorts of evidence are used".* During a case study, a phenomenon is researched in its natural context on location (Saunders, 2011; Verschuren & Doorewaard, 2015). A case study focuses on a limited number of research objects and it is an in-depth investigation instead of a wide research (Saunders, 2011; Vennix, 2009).

The case study consists of four cases where a form of MaaS is being implemented. For all these cases, one or two interviews are done with one of the operators to get a better image of the MaaS-initiative, to what extent it absorbs a 'social' business model and how it could contribute to a fairer transportation system. The other interviews will be done with experts in the field of MaaS and with local government or consultants to learn more about the (potential) impact of MaaS and the way

governmental parties can steer and regulate these MaaS-initiatives to realize the desired social effects of MaaS.

The cases considered in this study are all defined as MaaS-initiatives. MaaS-initiatives are on-demand, flexible transport services that do not follow a particular schedule or route. The starting and finishing point can be determined by the user, with some cases providing more freedom than others. All MaaS-initiatives in this study provide an app for their consumers to plan, order and pay for the trip.

There are also differences between the cases included here. They can roughly be divided into two groups. The first group consists of two MaaS-platforms. These MaaS-platforms integrate multiple modes of transport and operate within a larger area. Whim and GoAbout are examples of such MaaS-platforms. The third and fourth case (USP Campusbikes and Brengflex) cannot be considered MaaS-platforms, as they are small scale-services with a small fleet of vehicles, covering a relatively small area and providing a single mode of transport. These smaller MaaS-services do not integrate multiple modes of transport. They are just pieces of the big puzzle that MaaS is. These services are part of a MaaS-platform or are expected to be part of one in the future.

Case	Function
Whim	MaaS-platform
GoAbout	MaaS-platform
USP Campusbikes	MaaS-service
Brengflex	MaaS-service

Table 3: The cases of this research's case study.

It is highly valuable to include a MaaS-platforms, such as Whim and GoAbout, to understand the bigger picture of a fully integrated MaaS-system and its consequences. Although these two platforms are not fully operative yet in the Netherlands, the analysis of these operators can provide speculative insights. Additionally, a lot can be learned about the intentions of these projects and how they may affect people with an insufficient level of accessibility in the Netherlands. On the other hand, it is also highly valuable for this research to analyze the smaller MaaS-initiatives as these are already fully operative, which makes it possible to better analyze what the social effects of these initiatives and MaaS in general are.

MaaS is still a relatively new transport concept with a limited number of practical examples available in the Netherlands. For this reason, the combination of using operative MaaS-service and MaaS-

platforms as cases provides this research with the useful information on the likely social consequences of a MaaS-system.

The goal of this case study is to analyze the MaaS-initiatives to determine whether, and to what extent, the MaaS-initiative adopt a social business model. The information that is gathered in the interviews will be used to fill in the business model canvas presented in the theory section. This will then be analyzed to determine to what extent the case's business model matches the characteristics of the social business model canvas, and thus determining the social contributions of these initiatives.

3.2. Data collection and data analysis

This research utilizes qualitative data collection methods with a case study analysis. As Verschuren & Doorewaard (2015) mention in their definition of a case study, multiple sources of evidence and multiple research methods are used. In other words, this research uses the triangulation of data (Saunders, 2011; Vennix, 2009, Verschuren & Doorewaard, 2015).

Literature study

The literature review is done to learn more about the theories behind social business models and a fair transport system, or 'fairness' in general. For the social business model, the scientific literature is used to identify and extract characteristics of what makes a business model social. The most important authors of social business models are Joyce & Paquin (2016) and Yunus et al. (2010). The scientific literature of Martens (2016) is used to extract characteristics of a fair transport system, and how to achieve such a system. The characteristics of both a social business model and Transport Justice are used to assess and analyze MaaS-initiatives that are being discussed during the case study.

Interviews

I use interview techniques to collect qualitative data from relevant actors. The snowball method is used to reach interesting people to interview. This means that the respondent is asked what other persons are interesting to interview (Verschuren & Doorewaard, 2015). These interviews are semi-structured, which allows the interviewer to maintain focus on the main subject, but it gives room to drift from this focus to a topic of interest that rises during the interview (Barribal & While, 1994).

The interview respondents can be divided into two different groups. The first group is linked to the case study, where the operators of four different MaaS-initiatives are interviewed. The second group consists of experts in the field of MaaS and people from local governments. These interviewees provide different perspectives and interests. The interviews with operators of MaaS-initiatives give a

better understanding of how MaaS-initiatives fit into the current transportation network and how they enhance the current transportation system. Furthermore, they make clear to what extent current MaaS-initiatives follow a social business model. The interviews with experts and local governments are used to determine the potential impacts of MaaS and the desired role of the government in ensuring a social implementation of MaaS.

Reference number	Interviewee	Organization	Case
Int. 1	Jeroen Quee	Sweco	USP Campusbikes
Int. 2	Jacco Lammers	GoAbout	GoAbout/USP Campusbikes
Int. 3	Daan Stevens	Connexxion	Brengflex
Int. 4	Wilco Bos	Municipality Nijmegen	Brengflex
Int. 5	Ralph de Jong	Whim	Whim
Int. 6	Robin Kleine	Mobycon	Expert interview
Int. 7	Wouter Le Fèvre	Municipality Bilthoven	USP Campusbikes
Int. 8	Robin Huizenga	PTV Group	Expert interview
Int. 9	Koenraad Verduyn	PTV Group	Expert interview

Table 4: An overview of the interviews done in this research.

3.3. Validity and reliability of the research

The validity of research can be divided into the internal and external validity. The internal validity concerns the descriptive quality of the model (Pearmain, Swanson, Kroes & Bradley, 1991). The internal validity is considered sufficient when the measuring instrument is actually measuring what it should measure (Vennix, 2011). To assure this, the characteristics of a social business model have been extracted from the literature in order to analyze to what extent the MaaS-initiative follows a social business model. For each characteristic, there will be formed several interview questions to assure that these characteristics can be evaluated adequately for the different MaaS-initiatives.

The external validity is the extent to which the results can be generalized to a larger group (Vennix, 2011). During a case study, it is difficult to have high external validity because the number of research objects is low and they are studied in depth. This makes it difficult to generalize the results and to make statements about MaaS-initiatives with different external factors.

Reliability

The reliability of the research is the extent to which it is possible to do the same research again with the same outcome (Vennix, 2011). To improve reliability, the research will consist of multiple cases instead of only one case. However, reliability is still limited, because innovative projects such as MaaS-initiatives tend to change over time due to constant technological development. Furthermore, some of the MaaS-initiatives are still in a pilot-phase or starting phase. In a few years, these projects can look completely different. They can either be upscaled in case they were a success or they might

not even exist anymore in case of failure. In the case of upscaling and moving further from the pilot-phase, it can be expected that the values captured in the business model have changed. In the initial phase of such a project it is likely that all attention will be on deploying the project and having people to use it. In this phase, one can imagine that economic values and the value of 'brand awareness' will be important, while environmental and social values might become more important during later phases of the project.

4. Case Study of MaaS and MaaS services in the Netherlands

In this chapter, the data collected is presented. The four cases will each be described in separate sections. In each section, I present the background information of each case and the acquired information from the case study in the social business model canvas.

4.1. Whim

4.1.1 Background information

Whim is the world's first active MaaS-operator that integrates all modes of transport into one app. The app developed by Whim integrates taxi, public transport, shared car and shared bike services. It is possible to 'pay per ride' or to use a monthly subscription. Whim allows the user to plan, order and pay for all these transport modes through an app. Currently, Whim is operative in the regions of Helsinki, Antwerpen and Birmingham. The system was first introduced in Helsinki in November 2017. As of August 2018, the app already had 50.000 users in Helsinki, of which roughly 10% uses a monthly subscription (**Int. 5**).

Whim is the most complete version of MaaS that currently exists. The consumer can give a starting point and their desired destination, and the app will provide them with a number of travel options to reach this destination. These options differ in time, price and comfort level depending on which (combination of) modes of transport is used. For instance, a shared car provides more comfort and is quicker, and will thus be more expensive, while a bus trip will most likely be the cheaper option. Next to paying for a single trip, Whim also has several different monthly subscriptions consumers can use. Essentially, the goal of Whim, and MaaS in general, is to make owning a car unnecessary by offering the same service level but for a lower price. The service of Whim should cover every journey.

	Whim To Go	Whim Urban	Whim Unlimited
Monthly payment	Free	49€	499€
Local public transport	Pay per ride	Unlimited Single Tickets	Unlimited Single Tickets
Taxi (5km radius)	Pay per ride	10€ per ride	Unlimited
Car	Pay per ride	49€ per day	Unlimited
City Bike	Not included	Unlimited (30min)	Unlimited
Cancel anytime	⊘	⊘	⊘
Add-ons incl regional HSL >			
	Read more	Read more	Read more

Figure 5: Three different memberships currently available in Helsinki (Whim, 2018).

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4.1.2. Interview: Whim

Whim is focused on growth to create a market for the platform (**Int. 5**). ; to expand its brand awareness and the number of users. The focus group of Whim is the millennials; the generation that is most familiar with utilizing services through apps. The governance component of Whim's business model tries to tap into the 'low-hanging fruit'; young commuters using multiple modalities living in large cities and using busy transport lines.

For Whim, the social focus is not a priority (**Int. 5**). These social services are expected to come naturally in the future. When this happens, Whim will be able to integrate existing special social transport services into their platform, and they can offer a certain service level to people receiving subsidies (**Int. 5**). Whim expects to offer all groups of people a certain service level, by adjusting the service level to the specific needs of this group. However, the first focus is to expand the market and the number of users.

On the societal impacts, Whim believes there are absolutely no social threats concerning the implementation of MaaS into the Dutch transport system (**Int. 5**). The service can be accessible for everybody, also for people with lower incomes and the elderly. However, the service will always be linked with a smartphone, leading to a culture of smartphone-dependency. Whim does not perceive this as a problem, as smartphone possession is very high in countries in which they are looking to implement their MaaS-platform and smartphone-possession is still growing (**Int. 5**). In the Netherlands for instance, roughly 90% of the population owns a smartphone ([2]CBS, 2017). However, this means that Whim would currently exclude 10% of the Dutch population.

The contribution to the social value of Whim in enhancing people's lives can be examined through the following. Firstly, Whim enhances people's lives when it offers them a more comfortable journey. The most stressful parts about traveling are; switching modalities, being on time for your service and having a lack of information (**Int. 6**). Whim will give more insight in all alternatives and when something changes, for instance, a train that breaks down or the addition of a new shared bicycle system, it will immediately give the user the new best travel option. This will take away worries from the consumer and provides a more comfortable trip.

Secondly, Whim can also help to reduce travel times. This reduced travel time can come in two ways. In some cases, the range of transport service on offer may not change, but the consumers will get a better insight into how to select the best available options. In other cases, the range of transport services available change, for instance, because of a new shared-bicycle system that becomes available for the consumer, which can be used to cover its last-mile more efficiently and reaching its destination quicker.

Finally, the biggest change Whim contributes to the transport system is towards the financial aspect; it changes the way the consumers pay for transport services. With Whim, the consumers pay for mobility services instead of for ownership of the transport modes. Moreover, it also offers an alternative to pay for the service as a monthly subscription, instead of a pay-per-ride system.

Currently, it is still difficult to determine what effect Whim will have on the price levels of transport and the overall expenses of the consumer. The effect on the price levels will also depend on someone's usage of transport modes. Whim enables consumers to have easy access to a wide range of transport modes. If the consumer chooses to use more transport services than it did before Whim than this can increase the transport expenses of this person (**Int. 6**). On the other hand, with Whim it is no longer required to personally own a car, which potentially saves the consumer a lot of expenses (**Int. 6**).

 In general, Whim offers the consumer more flexibility and essentially a higher level of accessibility. It allows the consumer to use all transport modes, where currently most people only have access to either public transport or the car. Having access to all modes of transport gives the opportunity to choose for the most efficient transport mode at that given time, making it easier to reach desired activities and thus improving people's accessibility.

4.2. GoAbout

4.2.1. Background information

GoAbout is one of the most advanced MaaS-platforms in the Netherlands. GoAbout can be used as a travel planner, which combines multiple transport modes to present the user with the most optimal travel option. What makes GoAbout stand out from other travel planners, is that it focuses on the door to door mobility chain. It allows the user to plan trips with all sorts of transport modes, and it is possible for the consumer to indicate with which modality the person would like to start.

For instance, the app can advise the consumer to take its personal bicycle to the train station, because the consumer has indicated that he owns a bicycle and that he would like to start his trip with this modality. When this person arrives at the next train station, the travel planner can then advise taking a shared bicycle to reach its eventual destination, because the consumer has indicated that he also would like to end his trip with a bicycle, for instance, because he has a membership with a shared bicycle system.

The app basically integrates all forms of transport, including walking, (shared) bicycles, (shared) cars, trains, buses and even Park & Ride. GoAbout also offers a map showing the location of all shared

transport services to inform the consumer. These services can be ordered and paid through with the app. Opening the locks of the vehicles is done with Bluetooth.

GoAbout is still in a development phase. The travel planner as explained above is already highly advanced. However, in the future, it should also be possible to also order all the services required to pay through the app. At the moment this is only possible for some shared bicycle services, but eventually, this should be possible for all transport services.
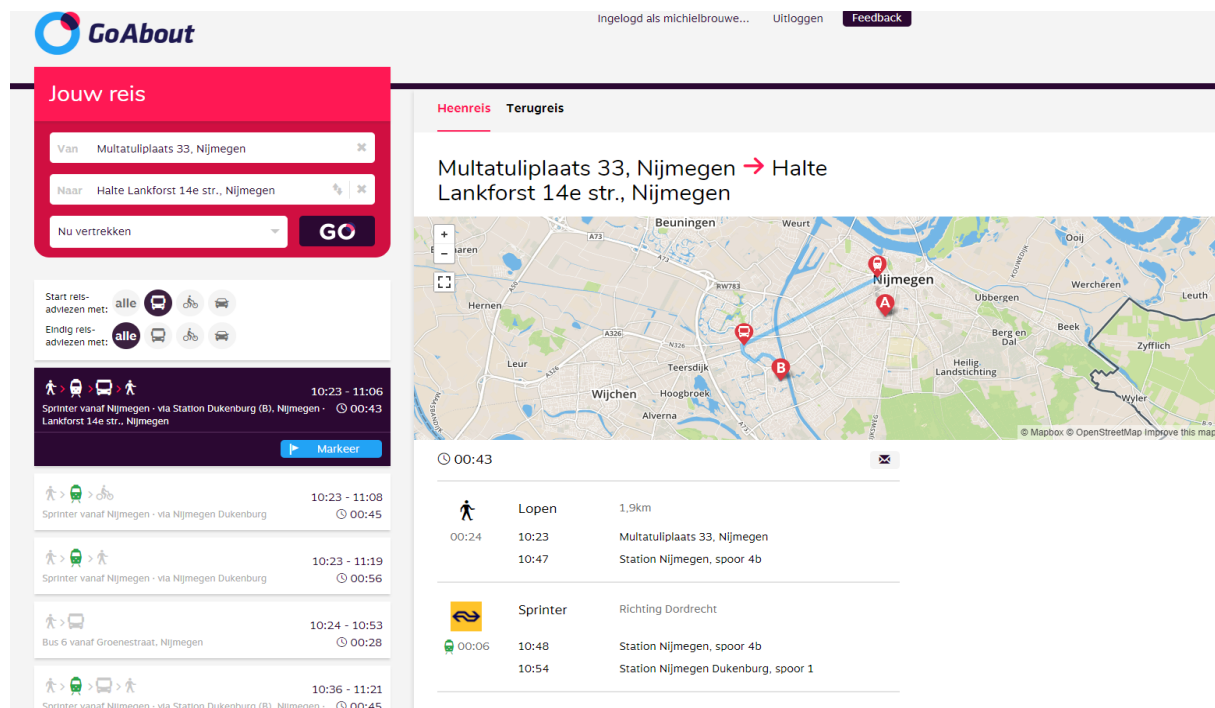

Figure 6: An impression of GoAbout's multimodal travel planner (GoAbout, 2018).

4.2.2. Interview: GoAbout

A lot of similarities in Whim can be seen in the choices GoAbout makes in the governance component. Just like Whim, GoAbout is looking to expand the number of users to strengthen its platform. GoAbout also chooses to target the low-hanging fruit (**Int. 2**). For GoAbout this means targeting people with flexible ways of traveling, occasionally or regularly, and preferably people who use multiple modalities during their trip.

However, in looking deeper into GoAbout's business model, a major difference with Whim can be found. GoAbout focuses on people who experience a problem with traveling in regional cities. This is why it chooses to avoid big cities such as Amsterdam or Rotterdam. In these cities, people can already choose between a lot of modalities and the transport network is already highly developed. The demand for transport is high, but the supply is also high, which means that these people do not experience problems regarding traveling (**Int. 2**).

GoAbout focuses on places where people experience problems while traveling, which happens when the overall demand for transport does not match the supply. This focus can be seen in the component of local communities in the business model canvas. GoAbout facilitates local MaaS-initiatives that are focusing on accessibility problems expressed by local communities, which creates a mutually beneficial relationship. On the one hand, it improves the transport system in this region and on the other hand it strengthens GoAbout's MaaS-platform.

However, the overall demand for transport must be high enough for GoAbout to make money. This means that the platform does not focus on people in rural areas. These people also experience a problem when traveling, but according to GoAbout, there is no solution to this problem with which they can earn money (**Int. 2**). The initial focus thus lies on medium-sized Dutch cities such as Nijmegen and Enschede, where the transport network is sub-optimal and the high demand for transport does not match the supply of transport.

GoAbout does not contribute to the transport system on a social level. According to GoAbout, a breakthrough is first needed to expand the service and GoAbout expects to have a positive effect on society in the future. It is not possible to take all groups of people into account from the beginning, especially because the solutions to the transport problems these groups face are not profitable. Focusing on these groups will only increase the risk of early bankruptcy (**Int. 2**).

GoAbout does recognize social threats in their service, but they do not address them. They are aware that they exclude roughly 10% of the Dutch population by linking it with a smartphone and that this will be a problem for certain people. However, GoAbout does not invest in alternative ways to access the service as they do not see any point in doing this from a business perspective (**Int. 2**). The use of hard-copy tickets is seen as user-unfriendly and an office that can be reached by telephone is considered inefficient. Furthermore, using the system without a smartphone is technically impossible, as the consumer needs certain technological features to access the shared vehicles. For instance, opening the lock of a shared bicycle is done by connecting with the smart locks through Bluetooth.

GoAbout expects that the smartphone possession will continue to rise in the coming years, as the elderly will gradually get more used to it and the prices of smartphones drop. GoAbout does not have an answer to the group of people that cannot afford a smartphone, and they have no intent to focus on this group as their main goal is to make a profit (**Int. 2**).

Another increasing problem in the Dutch transportation system is that a lot of infrastructure is reaching its limit. This is the case for some important highways around and between cities, where it

is not possible to simply lay down more asphalt. Bicycle dockings at the train stations are becoming overcrowded, and there is no room to construct more parking spots for bicycles in the dense station areas. Also, the train network is now being intensified to its, for now, maximum capacity, with a train riding every ten minutes between big cities (**Int. 2**).

GoAbout can help the transportation network to be used more efficiently. It will offer the consumer the most optimal trip given the network at that given moment. It tries to manage and utilize the highs and lows of the demand for transport through the whole network, just like a navigation system does for the car. It provides the consumer with the most optimal route, taking into account the current road network. With GoAbout, calculating the most optimal route given the network is taken to another level. The consumer will think about whether it is useful to choose the car in the first place. Maybe it is, given the transport network at that time, a better option to use the train. GoAbout provides the user with the information to choose the best option and with the flexibility to choose all modalities. For example, a consumer may normally take a certain train at a certain time, but there is also a train leaving ten minutes later that is almost empty. GoAbout can than offer the consumer to take this train for a reduced price. The consumer keeps control of his decisions, but the app will encourage him to make a smart choice. And when this user makes a smart choice, the whole network is utilized smarter, while also providing the consumer with more comfort and a reduction in price (**Int. 2**). When this choice is presented to ten consumers and half of them takes the empty train, all ten of them will travel more comfortably. GoAbout encourages people to make a smart travel choice to divide the pressure over the whole network. Essentially, GoAbout is about optimizing the transportation network.

The social value of GoAbout is very dependent on the user. GoAbout is able to enhance the consumers' life, but it depends on the preferences of the consumer. It is possible to have a shorter travel time, it is possible to have a more comfortable trip and, in some cases, it will also be possible to have a cheaper trip (**Int. 2**). GoAbout will improve the options for the last mile, as the consumers will have access to all sorts of shared services. This reduces travel time and improves comfort, but also comes with an extra cost as you have to pay for the usage of a bicycle. In another case, the app will advise you to do an extra switch between modalities because this is quicker, but most people would also consider this as less comfortable.

In the end, GoAbout adds new modalities to the transport network on smart places which gives the consumer more choice and more flexibility. According to the specific situation and the preferences of the consumer, this increased flexibility can make the consumers' trip quicker, cheaper and/or more comfortable (**Int. 2**).

4.3. USP Campusbikes

4.3.1. Background information

The USP Campusbikes are one of the many shared bicycle systems in the Netherlands. Shared bicycle systems are an important part of MaaS, especially as a last-mile solution. The USP Campusbikes can be used in Utrecht Science Park, which is the eastern part of Utrecht, and they cost 1€ per hour. There are multiple docking stations in the cities of Bunnik, De Bilt, Bilthoven and the University of Utrecht. These stations are strategically located, for instance near important bus or train stations and near important destinations such as the university and large companies such as Sweco.

There is one characteristic of the Campusbikes that makes a shared bicycle system like this especially interesting for MaaS. The Campusbikes can be ordered, paid for, and opened with the app on your smartphone. The Campusbikes smartly combine three important functions of a smartphone (internet connection, GPS and Bluetooth) to make the system fully operational with a smartphone, and the app will be easy to integrate into a MaaS-platform (**Int. 1**).

The USP Campusbikes are an answer to the accessibility problem the region experienced. There were a lot of problems regarding traffic jams, and the buses were overloaded with passengers (**Int. 1**). A shared bicycle system did not yet exist in this region. The Campusbikes system is a last mile solution that helps to increase the accessibility of the region, especially when using public transport. It provides an alternative for people using overcrowded buses and for people who were formerly forced to walk the last mile. They also make it more attractive for people to use public transport instead of a car when traveling to this area (**Int. 1**).

Figure 7: The Campusbikes (Own collection).

4.3.2. Interview: USP Campusbikes

The goal of the USP Campusbikes is to improve the accessibility of the Utrecht Science Park. The area used to struggle with overcrowded buses and traffic jams, which limit the accessibility of the area. The Campusbikes provide a solution for both problems. It can be used as an alternative for the bus,

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making these less crowded. At the same time the accessibility of the area by public transport increases, which makes it more attractive to use public transport to reach the Utrecht Science Park instead of the car.

The target audience of the USP Campusbikes is broad. This can be commuters, residents and tourists; practically everybody. However, they are mostly used by the commuters (**Int. 1; Int. 2**). The USP Campusbikes act as a last-mile solution for these people. They target people who use public transport to reach Utrecht Science Park. The goal of the USP Campusbikes is to get these people out of their car and out of the bus, to release the pressure on these modalities during peak hours. The docking stations of the Campusbikes are strategically located; close to public transport services and the most important companies in the area and most commuters get a free membership from their workplace (Int. 1).

The USP Campusbikes are not meant to address social differences (**Int. 2**). The USP Campusbikes or other shared bicycle services cannot be seen as a solution to connect certain vulnerable groups of people to the public transport system. It is mainly an alternative for the bus which gives the consumer a direct and flexible option. Shared bicycle systems are for those who have this need (**Int. 2**).

For the disabled, a shared bicycle system is obviously not a realistic alternative. For the elderly, it could be an option when these bicycles are e-bikes (**Int. 7**). It would dramatically improve the range of action for at least some elderly, depending on the vitality of the individual. For people with a lower income, it is expected that they will always choose walking or using their personal bicycle above a shared bicycle service. Furthermore, the USP Campusbikes can only be accessed when the consumer has a smartphone, which can make it less accessible for people with a lower income or for the elderly.

While it is said that shared bicycle systems such as the USP Campusbikes act as an alternative for the bus, it is important to state that this is only the case in situations where the bus would be the last-mile solution. During the first mile of someone's trip, the person will always prefer to use his or her personal bicycle. This means that shared bicycle systems cannot be seen as an answer to the disappearing bus lines in rural areas. In these cases, the effects of a shared bicycle system are limited because most people living in these areas already own a bicycle that they can use to reach their desired activity. The demand for such a service will therefore be too low (**Int. 2**). Shared bicycle systems are only an alternative for the bus during the last mile of commuters who use multiple modalities. In these cases, commuters do not have access to their own personal bicycle and a shared bicycle is often quicker and more comfortable than walking or taking the bus.

In a large city like Utrecht, public transport in the city is generally very slow (**Int. 7**). This is especially the case in city centers in the Randstad, where buses and cars are often standing in the same traffic jam, which reduces the attractiveness and efficiency of public transport. In situations like this, taking the bus is not necessarily quicker than taking the car, which makes people tentative to choose the car over the bus as they often feel like traveling by car is more comfortable (**Int. 7**).

In these situations, a shared bicycle system can really be an improvement of the current service. It provides people with a quicker alternative than the bus (**Int. 7**). At the same time, it makes it more attractive for people traveling by car to use a combination of public transport and shared bicycle system to reach their destination. In this way, the load on the transport system is divided more equally and the available transport modes are used more efficiently. Fewer people will choose to use the car, which reduces congestion and improves the travel speed of buses (**Int. 7**).

USP Campusbikes can enhance people's lives, but it depends on the person. Shared bicycle systems help to reduce the travel time for people making a chain trip and using multiple modalities. Currently, the last mile for people using multiple modalities is often suboptimal and consists of either a long walking distance or using an inefficient bus line, and sometimes both. With a shared bicycle system this distance from train or bus station to the eventual destination can be covered (**Int. 2; Int. 7**). This also means that the USP Campusbikes provide the user with a more comfortable trip, as most people would find it more comfortable to cycle than to walk. Furthermore, a bicycle can also be considered more comfortable than standing in an overcrowded bus.

The USP Campusbike can be returned at any docking station, which is much more flexible and comfortable compared to the 'OV-fiets' (**Int. 7**). The OV-fiets is currently the most used shared bicycle system and it obliges the user to return the bicycle at the same place he took it. The USP Campusbikes can also help the consumer to save money compared to other alternatives. Using a Campusbike is cheaper than using an OV-fiets or taking the bus (**Int. 1**).

4.4. Brengflex

4.4.1. Background information

Brengflex can be described as a flexible, demand-responsive bus system. It is a project of Transdev, which is the transport operator. Currently, Brengflex is operative in three separate areas. There is a middle area surrounding Nijmegen, that also connects the closely located towns of Wijchen, Berg en Dal, Lent, Beek and Oosterhout. Furthermore, there is a northern area around Arnhem, that also consists of Rozendaal, Velp and Rheden. Lastly, Brengflex just added a southern area that connects the towns of Mook, Middelaar, Molenhoek and Malden. With Brengflex, the user can order a mini-

bus or car, by using the app or by phone, and this bus can drive a flexible route at the time you desire. The user can choose every existing bus stop in the region as its starting or finishing point, which means that the bus does not follow a certain, predetermined route or time schedule. It is not possible to travel between the areas; a person can only make a trip inside these separate areas (**Int. 3**).

The project started with a pilot-phase back in December 2016 and from April 2017 a full version was implemented (**Int. 3**). The goal of Brengflex was to exploit the market between taxies and public transport. Apart from this, it was also considered as an experiment to see how demand responsive transport would work in a city (**Int. 3**). The project has come forward out of a challenge that is embedded in the public transport vision of the Province of Gelderland, which consists of two parts; first, the Province states that there should come a new, modernized transport system and there should be room to try these systems out in the form of pilots. And second; there should be more attention given to the so-called shrinking regions, which are the rural areas, and to other vulnerable people, to make sure that these people are connected to the public transport system (**Int. 3**).

Figure 8: A Brengflex mini-bus (OV Magazine, 2018).

4.4.2. Interview: Brengflex

There is a great contrast with the first three cases when it comes to the initial goal of this MaaS-initiative. GoAbout and Whim mostly aimed for making as much money as possible, but for Brengflex earning money is not an important focus (**Int. 3**). Brengflex can afford to have a lack of focus on making a profit because they are receiving subsidies from the province. This gives Brengflex a social function, which means that they are obliged to offer bus lines that are used less intensively to ensure accessibility for everyone.

This social function shows in the governance strategy of Brengflex. The service basically looks at places where a regular bus line is not an option anymore and where a flexible line would be a better option. This can be the case when the demand for transport is too low or when the demand fluctuates too much. However, it is important not to forget the financial advantage this brings for Brengflex. Operating a flexible bus line is much cheaper than operating a regular bus line (**Int. 4**).

Brengflex stands out in recognizing and addressing social threats. One of the goals of Brengflex is to make public transport accessible for people who currently have no or limited access to public transport (**Int. 3**). This focus shows in a number of measures. For instance, while the service is fully operational with an app on your phone, it is also possible to call the service and make a reservation, making it accessible for people who don't have access to a smartphone (**Int. 3**).

Furthermore, Brengflex has realized additional flexible bus stops in order to reach people that experience problems when using the public transport network. For example, a bus stop is now implemented in front of the biggest nursing home in Nijmegen, which enables the elderly living here to go out and participate in activities. This flexible bus stop is used very intensively. Some elderly would normally stay in the canteen the whole week, but with Brengflex they are able to leave the nursing home as often as they want to visit the city center or friends and family (**Int. 3**). Mr. Stevens sees a lot of potential here, especially when you take into account that the group of elderly that are no longer capable of driving a car will increase dramatically in the coming years because of the aging population (**Int. 3**).

Brengflex can be a good alternative for disabled people. When planning a trip the consumer can choose to have a vehicle that is accessible by wheelchair. The drivers will also be trained in the future to assist these people (**Int. 3**). Furthermore, the Brengflex buses can also be a replacement of the regular bus lines in rural areas. Some of these lines are disappearing, while other buses are mostly empty. A flexible and demand-responsive service like Brengflex can increase the accessibility of people living in rural areas.

Brengflex is not yet operative in rural areas, but it could be in the future. Brengflex has chosen to start in the city area because this generates more users, which gives more experiences and feedback that can be used to further improve the system (**Int. 3**). Brengflex sees potential to be operative in the rural areas and address accessibility problems, but these solutions will always be loss-making, and thus these lines should be subsidized (**Int. 3**).

Brengflex can make traveling more comfortable for the consumer. It keeps track of the experiences of the users by asking them to rate their trip in the app and by doing surveys. Based on the results of

these surveys it can be said that the users feel like the service is of high quality (**Int. 3**). With Brengflex the user is guaranteed to have a seating place, the driver and the user can keep in touch in case of delays and the time and route can be adjusted to match the consumer's wishes. These characteristics all make Brengflex a high-quality service that improves comfort.

In most cases, it is quicker to use Brengflex than using an alternative mode of transport. For instance, people traveling from Wijchen to Nijmegen, who earlier had to do a chain trip of bus-train-bus, can reduce their travel time by 30 to 45 minutes when using Brengflex (**Int. 3**). Brengflex makes it possible to have a direct trip, instead of using multiple modalities. Travel time is also reduced during shorter trips (Int. 3).

However, the price of Brengflex can be an issue. A trip costs €3,50, regardless of the distance. This is almost always more expensive than using regular public transport and this is also an important reason why the municipality of Nijmegen still sees Brengflex as an addition to the public transport network, instead of a replacement (**Int. 4**). Removing bus lines and replacing them with Brengflex would negatively affect a lot of residents of Nijmegen on a financial scale.

5. Analysis of results and discussion

In the following chapter, the results of the interviews are analyzed and used to fill in the business model canvas for each case. The case's business models will be compared with the characteristics of the social business model canvas as presented in the theoretical framework session. Afterward, the results of this analysis are discussed.

5.1. Analyzing the socialness of Whim

Whim shows a lack of focus on the social dimension of their service. Certain choices that Whim made in the governance component lead to this lack of focus. Whim identifies with young commuters using multiple modalities and who live in large cities. This initial focus on low-hanging fruit means that Whim does not try to identify with groups that experience an insufficient level of accessibility, as would be necessary according to the social business model canvas. This is a very logical choice from a business standpoint, as will be discussed later, but it results in negative social impacts on the transport system.

Whim does not address any social differences and it does not recognize social threats, even though the smartphone-dependency can certainly be seen as a threat for the elderly or people with a lower income; groups that already run the risk of experiencing an insufficient level of accessibility without a smartphone-dependent transport system. In its current form, Whim excludes these groups, which can lead to social exclusion. Furthermore, the lack of service in rural areas can lead to the possible isolation of people living in these areas. The isolation of these groups can in its turn be seen as a negative social impact on its own.

Whim can certainly be seen as an improvement of the current service and it enhances people's lives. Whim will provide the end-user with more comfort, more flexibility, shorter travel times and essentially an improved level of accessibility. However, these improvements and enhancements will only be enjoyed by people that are already experiencing a sufficient level of accessibility; young mobile commuters, living in the city and using thick transport lines.

The Social Business Model Canvas for Whim				
Local Communities Works with the local shared car- and bike-initiatives to increase its network and fleet of vehicles. Interacts with the local communities of Birmingham, Helsinki and Antwerpen. Although these relationships are mutually beneficial, it does not benefit the local communities on a social scale.	**Governance** Focus on low-hanging fruit: - Multi-modal commuters - Millennials Focuses on big markets: - Large cities - Busy transport lines	**Social Value** Whim enhances the quality of consumer's lives by - Improving the efficiency of the transport system - Enabling consumers to access all different modes of transport	**Societal Culture** - Culture of smartphone-dependency with the service only being accessible through an app - Culture of buying mobility, instead of owning means of transport	**End-user** The needs of the end-user are met by offering: - More comfortability - More flexibility - Travel time reduction - Demand-responsiveness - Door-to-door travel advice - More information
	Employees There is currently no information available about the component of employees for Whim.		**Scale of Outreach** - Young and mobile commuters living in big cities and using busy transport lines	
Social Impacts - Potentially increases the gap between groups with sufficient accessibility and groups with insufficient accessibility - Social exclusion and possible isolation of people that do not have access to a smartphone - Possible isolation of rural areas			**Social Benefits** - Increased level of accessibility for the user	

Table 5: The Social Business Model Canvas filled in for the case of Whim (Own creation).

It can be concluded that the social benefits of Whim will be very limited and that Whim does not adopt a social business model in its current form. Whim only increases the social differences regarding accessibility and potentially excludes and isolates people living in rural areas and people that do not have access to a smartphone. Whim does not contribute to a more equal Dutch transportation system.

5.2. Analyzing the socialness of GoAbout

When looking at the business model canvas of GoAbout, a lot of similarities with Whim's canvas can be found. The governance component of GoAbout is focused on medium-sized cities such as Enschede and Nijmegen, which differentiates its business model slightly from Whim's business model. However, a focus on medium-sized cities does not address social differences, as the people living in such medium-sized cities generally have a sufficient level of accessibility. GoAbout's business model can only be considered social when it would also focus on people who currently have an insufficient level of accessibility. GoAbout addresses problems expressed by the local community, but the people benefiting from these interventions already had a sufficient level of accessibility, despite their problems.

GoAbout aims to improve the current service in two ways. First, it tries to help the current transportation network to be used more efficiently. Second, GoAbout adds new modalities at smart places to provide the consumer with new transport options. According to the specific situation and the preferences of the consumer, this increased flexibility can make the consumers' trip quicker, cheaper and/or more comfortable. Either way, this will always contribute to the user's accessibility, and thus enhances its life.

However, it can again be argued that these improvements to the users' lives and their accessibility are done for (groups of) people that already experience a sufficient level of accessibility. GoAbout does not improve the accessibility levels of the elderly, disabled people, people living in rural areas or people with a lower income.

The Social Business Model Canvas for GoAbout				
Local Communities - Creates mutually beneficial relationships with local MaaS-initiatives - Facilitates local MaaS-initiatives to react to accessibility problems expressed by the local community	**Governance** Focuses on low-hanging fruit inside medium-sized Dutch cities: - People experiencing a problem when traveling due to a mismatch between the supply of transport and demand for transport.	**Social Value** GoAbout enhances the quality of the consumer's lives by improving the transport system However, improvements are only made for a small group of people who already experience a sufficient level of accessibility	**Societal Culture** - Culture of smartphone-dependency with the service only being accessible through an app - Culture of buying mobility, instead of owning means of transport	**End-user** The needs of the end-user are met by offering: - More comfortability - More flexibility - Travel time reduction - Adding travel options in smart places - Demand-responsiveness - Door-to-door travel advice - More information
	Employees There is currently no information available about the component of employees		**Scale of Outreach** - Young and mobile commuters traveling in medium-sized Dutch cities	
Social Impacts - Potentially increases the gap between groups with sufficient accessibility and groups with insufficient accessibility - Social exclusion and possible isolation of people that do not have access to a smartphone - Possible isolation of rural areas		**Social Benefits** - Increased level of accessibility for the user		

Table 6: The Social Business Model Canvas filled in for the case of GoAbout (Own creation).

It can be concluded that GoAbout's business model does not adopt a social business model. Similarities can be drawn here with the business model of Whim, as the initial focus is on low-hanging fruit and earning money, which potentially increases the gap between groups with sufficient

accessibility and groups with insufficient accessibility. Furthermore, this can potentially lead to the social exclusion and isolation of people living in rural areas and people that do not have access to a smartphone. In its current form, the business model of GoAbout cannot be considered social and it does not contribute to a more equal transportation system. Either way, this will always contribute to the user's accessibility. However, just like with Whim this increased accessibility is only experienced by people who currently have a sufficient level of accessibility.

5.3. Analyzing the socialness of the USP Campusbikes

The governance of the USP Campusbikes, and shared bicycle systems in general is mostly focused on commuters. This means that they do not focus on addressing social differences. Shared bicycles are simply not accessible for the disabled and most elderly, while people with a lower income will always prefer the use of their own bicycle. A shared bicycle system also has little effect on the accessibility of people living in rural areas, as these people will also prefer the use of their own bicycle.

The service does not yet recognize or address current or future social threats. However, the municipality of De Bilt is already looking at improving the service to make it more accessible for other groups than commuters (**Int. 7**). By replacing the normal bicycles with e-bikes, the range of motion and the comfort level of the service will increase. This could increase the target audience, as it would make it more interesting for some elderly or provide a realistic alternative for the bus for people living in rural areas. Shared bicycle systems are currently only an alternative for the bus when the user cannot use its own bicycle, which is the case in the last-mile of a person's multi-modal trip. In these cases, shared bicycle services can be an improvement of the public transport system, as they add a transport option to the network that fills a gap. Shared bicycle systems can thus help to make the last mile of a multi-modal trip more efficient.

Apart from adding new modes of transportation in areas that need this, the USP Campusbikes are also an improvement of the current service. The currently most-used shared bicycle system is the OV-fiets. However, USP Campusbikes are much more user-friendly and cheaper to use. The social value of the USP Campusbikes is thus very specific. The service, or any shared bicycle service, can enhance the lives of the consumer, but only for a very small group. It is mostly the commuters that will benefit from these improvements.

The Social Business Model Canvas for the USP Campusbikes				
Local Communities - Creates mutual beneficial relationships with its 'launching customers'	**Governance** - Addresses the accessibility issues of Utrecht Science Park - Pulls commuters out of buses and cars, and stimulating the use of a shared bicycle	**Social Value** The USP Campusbikes enhance the quality of consumer's lives and the accessibility of the Utrecht Science Park However, improvements are	**Societal Culture** - Culture of smartphone-dependency with the service only being accessible through an app - Culture of buying mobility, instead of owning means of transport	**End-user** The needs of the end-user are met by offering: - A more efficient last-mile solution - More comfortability - A reduction in travel time
	Employees There is currently no information available about the component of employees	only made for a small group of people who already experience a sufficient level of accessibility	**Scale of Outreach** - Commuters visiting the region of Utrecht Science Park	
Social Impacts - Not accessible for the disabled and most elderly - Too expensive for people with a lower income - Potentially increases the gap between groups with sufficient accessibility and groups with insufficient accessibility		**Social Benefits** - Increased accessibility for commuters heading for the Utrecht Science Park - A more efficient last-mile solution		

Table 7: The Social Business Model Canvas filled in for the case of the USP Campusbikes (Own creation).

It can be concluded that the USP Campusbikes do not follow a social business model, as the improvements that are made to the transport system and the enhancements to people's lives that follow from these improvements are not done for the people that currently experience an insufficient level of accessibility. The service fails to provide a travel option for the groups of people currently experiencing an insufficient level of accessibility. This means that a shared bicycle system such as the USP Campusbikes does not contribute to the equality of the Dutch transportation system.

5.4. Analyzing the socialness of Brengflex

Brengflex' service comes from the conception that it has a social function to provide good public transport for everyone. This means that the service strives for a culture of social inclusion in which it addresses social differences and threats. Brengflex focuses on areas and people that are experiencing problems when trying to use the public transport system. This focus can be seen in the governance component of the business model and it matches the characteristics of the social business model canvas as presented in the theory.

Currently, Brengflex implements measures for two of the four groups of people that this research focuses on; the elderly and the disabled. Brengflex' vehicles and services are adjusted to make sure that these groups can easily access their transport service which prevents social exclusion and the drivers are being trained to assist these people. Brengflex is not yet operative in rural areas, but it is expected to be in the future. Brengflex is already active on other low-demand transport lines, for instance towards the outskirts of urban areas, so expanding the service towards the rural areas is just a small step.

When being implemented on a larger scale, Brengflex could have great social benefits. The service enhances the lives of a very broad spectrum of end-users, including groups of people that are currently experiencing an insufficient level of accessibility, matching the characteristics of the social business model canvas presented in the theory. This contributes to the social inclusion of the elderly and disabled people, and possibly also the social inclusion of people living in rural areas in the future.

The most important social characteristic of Brengflex shows in the service it provided for the elderly in the nursing home in Nijmegen. Because of Brengflex, these elderly can now participate in desired activities they could not reach before the service was implemented. In other words, it could be argued that the accessibility level of these elderly has now been raised above the sufficiency threshold, giving these elderly a sufficient level of accessibility. As determined in the theory section of this research, raising a person's accessibility level above the sufficiency threshold is one of the most important social characteristics of a social business model.

The Social Business Model Canvas for Brengflex				
Local Communities - Communicates with local communities to determine the placing of flexible bus stops in smart locations to address accessibility issues. This led to the construction of a flexible bus stop in front of a retirement home in Nijmegen.	**Governance** - Focuses on lines where a regular bus is inefficient - Focuses on groups of people that have problems accessing the conventional transport system	**Social Value** - Enhances the quality of a wide array of users by making transport more accessible for some troubled groups	**Societal Culture** - Strives for a culture of social inclusion	**End-user** The needs of the end-user are met by offering: - A flexible service - A demand-responsive service - Personal attention to people experiencing an insufficient level of accessibility
	Employees - Drivers are trained to fulfill a caring role and to assist disabled or elder users		**Scale of Outreach** - A broad spectrum of users in and around the region of Arnhem and Nijmegen	
Social Impacts - The financial costs exclude people with a low income - Possible isolation of people with a lower income when Brengflex replaces current, cheaper alternatives		**Social Benefits** - Contributes to social inclusion of the elderly, the disabled and people living in rural areas - Raises the accessibility levels of (groups of) people who currently experience an insufficient level of accessibility		

Table 8: The Social Business Model Canvas filled in for the case of Brengflex (Own creation).

In the end, it can be concluded that the business model of Brengflex is highly social and that it contributes to a more equal Dutch transportation system. The only concern is that the service is significantly more expensive than the existing alternatives, which can be a huge threat for people with a lower income when this service is implemented and is used as a replacement of the current service. This could potentially lead to the social exclusion of people with a lower income.

5.5. Discussing MaaS business models

The result of the analysis in the previous chapter indicates that 3 out of 4 MaaS-services do not adopt a social business model and thus do not contribute to a more equal Dutch transportation system. In this chapter, a deeper look is taken into this lack of social focus. First, the lack of a social business model will be explained. Afterward, the desired role of the government in ensuring a social implementation of MaaS and providing accessibility for all will be discussed

5.5.1. Explaining the lack of social focus

There are a few logical explanations for the lack of social focus of MaaS-initiatives. First of all, MaaS is still a relatively new concept. This means that the first MaaS-initiatives are currently popping up and trying to survive on the mobility market. This initial phase is the hardest part of any new business. In order to be self-sufficient and to ensure that enough profit is being generated to survive as a company, the initial focus of most starting MaaS-initiatives is on the low-hanging fruit (**Int. 2**).

With MaaS, the low-hanging fruit represents the people that have a problem which can be easily fixed by MaaS, but most importantly, it should be possible to 'bundle' these people. Bundling means that the MaaS-initiative can offer a service that a large group of people is immediately interested in (**Int. 2**). This is often possible for the 'thick lines', the transport lines that are most intensively used. The demand for transport along these lines is very high and there are large groups of people that are experiencing the same problem which can be fixed by MaaS. The solutions MaaS provides can thus be profitable due to the high demand.

The vulnerable groups of people that this research is focused on all have their own problems regarding mobility and accessibility. People living in rural areas are highly dependent of the car because of disappearing bus lines, people with a lower income rely heavily on walking and cycling and have a limited range of motion and the disabled people and elderly experience (physical) barriers when accessing public transport and getting out of their homes. These problems could also be fixed easily by a MaaS-initiative of some sort. However, the problems these people face cannot be bundled as they are experienced by a relatively small and widely distributed group of people. This makes bundling the problem into a profitable service impossible and thus uninteresting for MaaS-initiatives.

Several interviewees have also pointed out the competitiveness of the mobility market. The profit margins of transport operators are very slim and the market experiences a lot of pressure (**Int. 2; Int. 3**; **Int. 4**). MaaS-initiatives are now infiltrating the already tense mobility market, making profit margins even slimmer. In order to survive, MaaS-initiatives simply cannot afford to have a social focus. Not because they do not intend to, but because the state of the transport market just makes it impossible to have a social focus while also realizing a profit and surviving as a startup (**Int. 2**). The only MaaS-initiative that adopts a social business model is Brengflex. However, Brengflex is also the only MaaS-initiatives that relies heavily on subsidies, which is why they can afford to apply this social focus. Such a focus can simply not be expected from private MaaS-initiatives under the current circumstances.

5.5.2. Desired role of government

The difference between traditional transportation planning policies and social transportation planning policies has been explained in the theoretical framework of this research. Just like traditional transportation planning policies, MaaS-initiatives focus primarily on ensuring effective and efficient movement of people and goods. The decisions these MaaS-initiatives make to ensure this efficiency affect people's accessibility, and it unfortunately affects the same people in the same way, increasing the social inequalities in the Dutch transportation system.

According to Martens, transportation planning should not be based on principles of efficiency. Instead, the sufficiency principle should be an important factor in transportation planning, meaning that the focus of the government's transportation planning should lie on investing in measures that improve the accessibility of the (groups of) people currently experiencing an insufficient level of accessibility.

The impact of using the sufficiency principle in transportation planning can be seen clearly in the case of Brengflex. As explained in the previous chapter, Brengflex set up flexible bus stops in front of retirement homes. According to Martens' Transport Justice (2016), the people living here initially experienced an insufficient level of accessibility; they could not participate in desired activities and were unable to visit friends and/or family. Brengflex' flexible bus stop enabled these elderly to visit the city center or family and friends, raising their accessibility level above the sufficiency threshold and providing these people with a sufficient level of accessibility.

MaaS-initiatives like Brengflex have the characteristics to potentially address social differences in the current transportation system, but only when they are regulated correctly. It is up to the government to implement principles of justice in its transportation planning policy to ensure a more social implementation of MaaS. It cannot be expected that MaaS-initiatives will adopt a more social focus themselves to limit this gap, because of the financial disadvantages this brings.

Furthermore, there are clear principles of justice implemented in other important policy areas in the Netherlands to make sure that all people can have access to basic needs such as housing, health care and education. These principles of justice are not currently implemented in the mobility policy. It could be argued however that a sufficient level of accessibility can also be considered a basic need, as it enables people to reach health care, jobs, social contacts or educational institutions. In other words, a lack of accessibility can make it impossible to access other basic needs. It would thus be very logical to implement principles of justice in the transportation planning policy to ensure a sufficient level of accessibility for (virtually) all people, leading to a fair transportation system.

Public transport is currently heavily subsidized by the government (**Int. 9**). There are simply very few lines that are profitable on its own. These subsidies can and should also be used when setting the rules for MaaS. MaaS-initiatives will never provide the non-profitable lines on its own. When the government does not intervene, unprofitable services such as transport in the evening, at night and towards rural areas will disappear and MaaS-initiatives will only focus on groups of people and areas where they can make a profit. (**Int. 8**). This would result in a further reduction of the accessibility levels experienced by people who already have an insufficient level of accessibility. According to Martens' (2016) Transport Justice, such interventions cannot be justified.

Basically, it is important that the government does two things. First, it has to be clear what the goals of the government are when it comes to MaaS. The government has to determine what they want to achieve with MaaS and what effects they desire (Int. 8). Considering that the government has a social obligation towards their own citizens to provide everyone with a good transport system and thus providing them with a sufficient level of accessibility, it can be expected that they will incorporate principles of justice in these goals. Second, they should come up with a set of rules for the market and the MaaS-initiatives. This set of rules should be set up in such a way that, when followed by market-initiatives, they will automatically fulfill the goals of the government (Int. 9).

Governments can for instance force MaaS-initiatives to include certain (rural) areas, to provide certain services for the elderly or to offer a reduced price to people with a low income to ensure an acceptable level of accessibility for these groups of people (**Int. 9**).

Lastly, it is important to point out that, no matter how much effort is put into limiting inequalities in the Dutch transportation system, there will always be differences between the level of accessibility people have. According to Martens (2016), this is acceptable as long as all people experience a sufficient level of accessibility. Furthermore, there will always be a person in a remote area that cannot be connected to the transportation network. It is important that the government acknowledges this and draws a line for themselves. There is only so much the government can do. This is what Martens (2016) means when talking about 'virtually all cases'. In this case, it would be too expensive for society to take away these inequalities, which means that no further measures are needed to connect these people to the transportation system.

6. Conclusion

This chapter describes the most important conclusions of this research. The first paragraph will answer the different research questions of this research. First, the sub-questions will be answered, followed by an answer to the main question. The second paragraph will critically reflect on the research. This chapter is finished with a paragraph about recommendations and possible follow-up studies.

6.1. Research questions

The main research question of this research was as follows:

"What kind of business model should Mobility as a Service adopt in order to have the desired social effects that lead to a more 'equal' or 'just' transport system in the Netherlands and how can this be achieved?"

The main research question raises some questions on its own. For instance, the terms 'equal' and 'just' can be considered very subjective, which makes it very important to reach an objective view on the matter. Thus, the first sub-question was as follows; what are the characteristics of a just and inclusive transport system and how can this be achieved using a social business model?

The most important theory that is used to determine when a transport system is considered fair or just is the concept of Transport Justice (Martens, 2016). This concept develops a new paradigm for transportation planning and it looks to set up a fair transportation system. A transportation system is considered fair when it provides sufficient accessibility for all people in virtually all cases. This definition of a fair transportation system raises two more questions. First of all, what is meant with virtually all cases? According to Martens (2016), virtually all cases refers to situations where only a few persons experience an insufficient level of accessibility, and improving this to a sufficient level would be inhibitively expensive to society.

Furthermore, a sufficient level of accessibility is still very subjective and needs to be further operationalized. However, this is not possible according to Martens (2016). Instead, an approach or agreement about what is considered a sufficient or insufficient level of accessibility needs to be developed in order to come up with a sufficiency threshold. This sufficiency threshold should be based on the possibility of a person to access education, jobs, social contacts and health care and it should be set up by independent real-life agents, such as politicians or policymakers. These real-life agents will still have different opinions about whether someone's accessibility level can be considered as 'sufficient'.

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When placing all people in a spectrum, the real-life agents will all agree that the people on the absolute bottom of the accessibility spectrum have an insufficient level of accessibility. The people in this group experience a lack of accessibility and are below the threshold. For these people, measures are required to improve their accessibility levels. Thus, a transportation system is considered fair or equal when there are no people in the insufficiency range or only people for who it would be inhibitively expensive to society to raise their accessibility above the sufficiency threshold. A fair transportation system provides all people with a high enough level of accessibility to be able to access education, jobs, social contacts and health care.
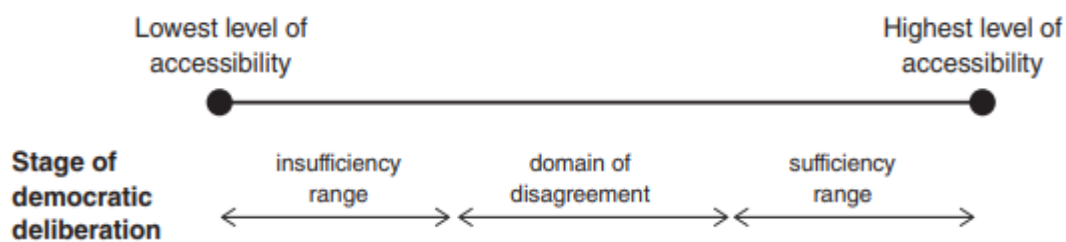
Figure 9: Graphic representation of setting the boundaries of sufficiency and insufficiency range. The domain of disagreement contains the people on which the real-life agents cannot reach an agreement (Martens, 2016).

In order for MaaS-initiatives to have a focus on improving the equality of the transport system, their business model should be centered around concepts such as fairness and equality. The concept of Joyce & Paquin (2016) has been used to learn more about business models and the transition in business models. Conventional business models usually had a strong focus on profit-making, but the last years sustainable business models have been introduced. These business models have an environmental or social focus that addresses sustainability and sociality issues (Joyce & Paquin, 2016).

Adopting a purely social business model cannot be expected from private MaaS-initiatives, as profit-making will always be one of the core business values of such an initiative. However, Joyce & Paquin (2016) have constructed a Triple Layered Business Model Canvas (TLBMC), which consist of an economical layer, an environmental layer and a social layer. The social layer of the TLBMC can be used to analyze what a social business model for MaaS should look like while still respecting the value of profit-making.

The social layer of Joyce & Paquin's (2016) TLBMC presents a canvas that tries to capture the social value of a business. In this research, the concept of Transport Justice has been applied to the social business model canvas, which formed a social business model canvas for a MaaS-initiative striving for

a more equal transportation system. This canvas is used as a tool in the case study to analyze the business model of a MaaS-initiative and its contribution to a more equal Dutch transportation system.

The second sub-question was as follows; how do existing MaaS-initiatives address or influence the social dimensions of the transport system and what are possible enhancements? The cases of GoAbout, Whim, USP Campusbikes and Brengflex have been analyzed to determine whether the business models of these initiatives can be considered social and to what extent they contribute to an equal Dutch transportation system.

The case study has shown that current MaaS-initiatives very rarely follow a social business model. Potential MaaS-platforms GoAbout and Whim are both focusing on the low-hanging fruit, in order to earn as much money as possible. Shared bicycle systems such as the USP Campusbikes are mainly focused on commuters. Neither one of these cases address any social differences or threats. Vulnerable groups such as the elderly, disabled people, lower-income people and people living in rural areas are not helped by these initiatives. In other words, they do not contribute to a more equal Dutch transportation system. In general, these initiatives improve the current service and they enhance the lives of people using them. They manage to improve the user's accessibility, improve the level of comfort, potentially limit the cost of travel and/or reduce the travel time. However, these improvements are mostly experienced by people who currently already have a sufficient level of accessibility.

The only case that follows a social business model is Brengflex. It provides a better transport option for the elderly, disabled people and people living in rural areas. It improves the accessibility of these groups, while also improving comfort and reducing travel time. The only concern is the costs of the service, which is a problem for people with a lower income. The socialness of the business model of Brengflex is a consequence of the subsidies it receives from the province, which obliges Brengflex to offer the service for everyone.

The other three MaaS-initiatives simply cannot afford to have a social focus. The problems of the vulnerable groups described in this research cannot be bundled into large groups, making it uninteresting for MaaS-initiatives to address them. The competitiveness of the market is very high, making the profit margins very slim. In order to survive, MaaS-initiatives have to focus on profit-making in order to survive as a company.

This is where the government should step in. It is important that the government implements principles of justice in their transportation planning policy, just like they do in other important policy areas such as housing, health care and education. A sufficient level of accessibility should be considered as a basic need, as it enables people to reach other basic needs such as health care, social contacts, jobs and educational institutions. An insufficient level of accessibility can prohibit someone from participating in society. Implementing principles of justice in the Dutch transportation planning policy helps fighting social exclusion.

MaaS has a huge potential for addressing the social differences in the Dutch transportation system. It can provide smart solutions for the special needs certain groups have. People in rural areas will benefit a lot from a high-quality demand-responsive transport system. The elderly will use the public transport system a lot more when it offers the flexibility of being picked up at their front door. Most disabled people are perfectly capable of using the public transport system when it is possible to be picked up at their front and when some extra attention is given to their special needs, such as audio support or wheelchair-accessible vehicles.

The solutions as described above will never be profitable on their own, meaning that they will never be offered by the market if they are not forced to. It is important that the government regulates MaaS-initiatives in order to prevent the loss-making services to disappear.

First, the government has to determine what its goal is regarding MaaS. As described in this research, limiting social differences in the transport system should be one of the main goals as it can be considered as a basic precondition for participating in society. Then, the government should set up rules for MaaS-initiatives. These rules should be set up in such a way that MaaS-initiatives will automatically fulfill the goals of the government when following this set of rules. This requires subsidizing the loss-making services in order to offer a sufficient level of accessibility for everyone.

To conclude, MaaS can potentially have great social benefits when governed right. MaaS should adopt a social business model to realize a more fair and just transport system. A social business model focuses on people who are currently experiencing an insufficient level of accessibility, which means that these people are not capable of participating in desired activities and they do not have access to education, jobs, social contacts and/or health care. Because of the state of the transport market and a company's inevitable focus on profit-making, it cannot be expected that MaaS-initiatives will adopt such a social business model themselves. It is up to the government to regulate MaaS-initiatives by setting up rules that force these initiatives to fulfill the accessibility goals of the government.

6.2. Critical reflection

The aim of this research was to increase the knowledge about the potential social impact of MaaS and to provide recommendations on the possible business model MaaS should adopt in order to limit inequalities in the Dutch transportation system. Furthermore, the desired role of the government in ensuring a social implementation of MaaS has been looked into. Now it is important to critically reflect on the end result and this research as a whole. Are there questions being left unanswered? Did this research raise new questions? Are there any shortcomings and are improvements possible? These questions will be addressed in the following paragraph.

6.2.1. Research design

Some critical remarks can be made regarding the case study. One of the problems with such a case study is that the number of research objects is small, which makes it difficult to generalize results as the cases differ. In this research, the cases were very different. The first two cases (Whim and GoAbout) are both very large cases that are looking to set up a MaaS-platform in which all different MaaS-initiatives are being integrated. The other two cases (USP Campusbikes and Brengflex) can be seen as smaller pieces of the puzzle of a MaaS-platform such as Whim or GoAbout. The USP Campusbikes are already integrated into the GoAbout-platform, while Brengflex will eventually also just be a small piece of MaaS. The big differences between the cases make the external validity of this research very low.

However, the choice for analyzing such different cases can be explained. There are very few MaaS-cases available that are also within reach for a master thesis research. This made it impossible to analyze four comparable MaaS-platforms. GoAbout is the only MaaS-platform in the Netherlands that complies to the MaaS-characteristics extracted from the literature. Most importantly; it is the only platform that integrates different modes of transport into an app. There are MaaS-platforms in other countries that comply with these characteristics, but using these MaaS-platforms in the case study was not an option for other reasons.

First, it is difficult to reach out to these foreign organization for an interview. Second, this research focuses on the Netherlands exclusively, which automatically excludes the use of foreign cases. The case of Whim forms an exception to this, as Whim is currently working on setting up their service in the Netherlands and the person responsible for this was easy to reach for an interview. In the end, it was impossible to find more than two MaaS-platforms to use as a case.

Furthermore, it should be mentioned that it was of great value for this research to analyze MaaS-initiatives that are already operative to be able to better estimate and understand the effects and

intentions of these MaaS-initiatives, which is why Brengflex and the USP Campusbikes were chosen as the other two cases. These MaaS-initiatives are already been in the operation for some time with high levels of users. While using such a variety of cases obviously is not ideal as it might hurt the external validity, it highly contributed to the internal validity.

On June 25th, 2018, the Ministry of Infrastructure and Water started with a national MaaS pilot, consisting of seven regional pilots (Ministerie van Infrastructuur en Waterstaat, 2018). These pilots would have been the perfect cases for this research, as they are all comparable MaaS-platforms of roughly the same size. Unfortunately, these pilots started too late to be of any value for this research. Future research should focus on these pilots and their findings.

Additionally, another limitation lies in the definition of MaaS-initiative. For instance, Not all interviewees agreed in calling Brengflex a MaaS-initiative; some interviewees did not agree with this term (**Int. 3**; **Int. 4**). They pointed out that Brengflex is not very different from a regular taxi service or bus line. However, there are some key differences that make Brengflex a MaaS-initiative. Brengflex is demand-responsive, flexible and every part of the journey (planning, ordering and paying) can be taken care of with an app. Especially the last characteristic is important for considering Brengflex as a MaaS-initiative, as it makes the service of Brengflex available to be integrated by a MaaS-platform, and that is where it differs from a regular taxi service or bus line.

The last limitation of this research lies in the chosen focus on the social layer of Joyce & Paquin's (2016) TLBMC. In this research, the social layer was isolated from the other two layers. However, Joyce & Paquin explicitly state that there is an interaction between the three different layers, and these interactions have been neglected during this research. When examining the interaction between the different layers, more complex relations could emerge.

Finally, I found it highly challenge in achieving and maintaining the depth of focus this research. As someone who is broadly interested in various within the field of mobility, I tend to set up a broad research. This was especially a struggle at the beginning of the research when I had to form a research question. I noticed that the same problem occurred during interviews. I sometimes drift away from the subject and ask about other things I find interesting, but which are not of any importance for this research. I could have captured more valuable information during these interviews if I was able to maintain a better focus on the subject. I expect that improving this focus on depth can only be done by getting more experienced in doing research. When setting up my next research, I will automatically think about the problem I encountered during this master thesis, which will force me to better focus on maintaining depth.

6.2.2. Contribution to existing theories

It is important to analyze how the results of this research connect and contribute to existing theories regarding MaaS, business models and Transport Justice. The results of this research could either fill in gaps in the existing knowledge about these subjects, or they could contribute to existing theories.

Firstly, this research further builds on and provide an application of the Transport Justice concept. The theory of Transport Justice has been used to identify the groups of people that experience an insufficient level of accessibility in the current Dutch transportation system. This research thus extends Martens' theory and applies it to the Dutch context to reveal equality problems the Dutch transportation system faces. This research then also describes how these equality issues in the transport sector should be handled by MaaS. This knowledge is not only useful in the Dutch context but can also be used in other countries that experience inequalities in their transport system and who are looking to implement MaaS.

Secondly, this research fills a gap in the existing knowledge about MaaS-initiatives in the Netherlands. This is the first research that analyzes Dutch MaaS-initiatives and the impact they can have on the accessibility of Dutch citizens. Currently, there is not a lot of practical knowledge when it comes to the impact MaaS can have, but this research fills the knowledge-gap that is experienced. The findings of this research can be used for decision-making when implementing MaaS into the Dutch transportation system. The focus on social inequalities that this research applies will hopefully lead to the realization that adopting a social business model for MaaS is important, leading to a more equal Dutch transportation system.

Thirdly, this research further builds on Joyce & Paquin's (2016) social business model. In this research, the social layer of the TLBMC is combined with the Transport Justice concept, which resulted in a social business model canvas for MaaS-initiatives that strive for a more equal Dutch transportation system. This social business model canvas can be used to assess the business model of any transport initiative in order to analyze its socialness. The social business model canvas could also be used in other fields where injustices are experienced by certain groups, under the precondition that this field also concerns a basic need that is crucial for participating in society. The extracted characteristics can be used to determine if certain market-driven initiatives have embedded social values in their business model to limit these inequalities, and to what extent they have done so. If this is not the case, this research can help to make the argument that more effort has to be done by other parties, for instance, governmental parties, to further regulate this field and to strive for more equality.

6.3. Recommendations

Several recommendations can be made to improve future research on the topic. For further research, it can be very interesting to take a deeper look into the seven regional MaaS-pilots mentioned before. These pilots started too late to be analyzed during this research. However, it provides a very interesting research opportunity for future research. The seven regional MaaS-pilots provide the opportunity to analyze comparable MaaS-platforms and they can be used to better determine the effects of MaaS on the Dutch transport system. Having seven comparable cases will maximize the external validity of the research, making it possible to generalize results and providing the government with even better advice regarding the desired implementation of MaaS.

Other future research could also focus on the environmental layer of Joyce & Paquin's (2016) TLBMC. This research exclusively focused on the desired social effects of MaaS-initiatives in order to take away inequalities in the Dutch transportation system. A comparable argument can be made in an environmental context. In the coming years, the Dutch government faces some ambitious challenges in the reduction of CO_2-emissions. The transport sector is one of the biggest polluters regarding the emission of CO_2, meaning that a lot of gains can be made here. The TLBMC could thus be used to set up an environmental business model canvas that transport initiatives like MaaS should adopt in order to fulfill the environmental goals of the government.

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Appendix 1. Accessibility vs Mobility

An important concept in this research is accessibility. An equal or just transport system is about providing sufficient accessibility to all people. To better understand this concept, it is important to form a definition for accessibility. Furthermore, it is important to make clear that there is a difference between accessibility and mobility. These two concepts are often mixed up in existing literature, as if they mean the same thing. There is a clear difference between these concepts however, and for this research, it is very crucial to elaborate this difference.

To better understand the difference between these two, it is wise to compare both definitions as stated in the existing literature. Mobility is a fairly simple concept. According to Meurs (2017), mobility is the ability to move around, or the potential for movement. So when talking about a person´s mobility, it basically relates to the ease of movement or travel speed.

Where mobility is the ability to move around, accessibility can be seen as "the ability to get what you need" (Meurs, 2017). Accessibility is about the ease of reaching your desired destination. This ease or ability to reach your destination is influenced by a number of factors that can be divided into four components (Geurs & van Wee, 2004).

The quality of the transport system is the first component of accessibility. The quality of the transport system is dependent of the travel time and speed, reliability and comfort. The second component of accessibility is the land use system. Proximity is a key concept here. Simply put, when a destination is closer located towards your starting point, it is easier accessible. Thirdly, individual characteristics such as income and physical constraints can influence the amount of accessibility that is experienced. The last component is the temporal component, which relates for instance to the opening times of shops, schedules of buses or times on which specific activities take place.

The relation between mobility and accessibility mostly shows in the first component of accessibility. A high quality, reliable and fast transport system makes it easier to move around. In other words, it provides someone with good mobility. It gives a person a high potential for movement, which means that good mobility can contribute to good accessibility. However, good mobility does not necessarily lead to good accessibility. When the other three components of accessibility are less beneficial, a person can still experience a low level of accessibility even though this person has a high mobility.

Towards a definition for accessibility
In the past decades, several definitions of accessibility have been given in other literature on which Geurs & van Wee (2004) based the four components of accessibility. The first known definition of

accessibility is "the potential of opportunities for interaction" (Hansen, 1959). This definition first introduced the importance of reaching your desired destination, instead of focusing on ease of movement.

Dalvi & Martin (1976) first came up with two of the components of accessibility as given by Geurs & van Wee (2004). According to Dalvi & Martin (1976), accessibility is "the ease with any land-use activity can be reached from a location using a particular transport system". The components of land-use and transport system were first introduced with this definition. A few years later Ben Akiva & Lerman (1979) first described the link between the transportation- and land-use system, describing accessibility as "the benefits provided by a transportation/land-use system".

In the same year Burns (1979) added to the existing knowledge about accessibility. According to Burns (1979), accessibility is "the freedom of individuals to decide whether or not to participate in different activities". With this definition, the importance of attention to individual characteristics and differences was first being introduced.

These definitions in existing literature formed the foundation of the earlier explained components of accessibility. Geurs & van Wee (2004) combine these definitions to come up with a definition for accessibility that includes all four components:

"Accessibility is the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations, by means of a (combination of) (transport) mode(s)" (Geurs & van Wee, 2004).

In more recent definitions, a virtual or digital component is added to the concept of accessibility, which will be added in this research as well. The virtual component is important to include in this research because MaaS will consist of a digital platform on which trips can be planned and booked. Having access to this digital platform will be a crucial pre-condition for the user to be able to use MaaS-services. The definition of accessibility used in this research will thus be:

"The extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations, physically or virtually, at times they desire by means of a (combination of) (transport) mode(s)" (Meurs & Sharmeen, 2017).

Appendix 2. Interview guides

<u>Interview guide case</u>

<u>Introduction</u>
- Brief explanation of my research and how/why I chose to reach out to the respondent.
- Ask if the respondent wants to stay anonymous and assuring that this anonymity will be guaranteed.
- Ask if the respondent agrees that the outcome of the interview will be used in my thesis.
- Ask if the respondent can start with a brief introduction of him/herself.

<u>The case</u>
In this part, question are asked to learn more about the project and to determine if the case or project follows a social business model.

Characteristics of a social business model:	Questions:	Outcome
Has a consumer perspective	What triggered the start of this project?	
	What is the goal of the project?	
	What is the target audience of the project?	
	What is the project trying to achieve?	
	Who can use the MaaS-initiative?	
	How can an individual use the MaaS-initiative?	
	What does an individual need to have/possess in order to use the MaaS-initiative?	
Recognizes social threats and addresses social differences	Is it accessible in the same way for all (groups of) people? (for instance; same prices for everyone? Accessible in cities/rural areas etc.?)	
	Do you think that this MaaS-initiative is accessible for everyone? For: - people with low(er) income? - people living in remote areas? - elderly? - people with physical disabilities?	
	Do you think it is important to contribute on a social scale?	
	Compared to the current Dutch transportation system, do you think that this MaaS-initiative can help to improve	

	the quality of transport experienced by the challenged groups?	
Recognizes points of improvement in current product or service	What do you think of the current Dutch transportation system?	
	Do you see any points of improvement in the Dutch transportation system?	
	Do you think that this project/case can help to improve the Dutch transportation system as a whole?	
Enhances people's lives	Can the project help to improve the overall quality of transport experienced by the consumer?	
	Does the project help to give the consumer a more comfortable trip? How?	
	Does the project help to reduce travel time? How?	
	Does the project provide the consumer with a cheaper alternative to reach its desired destination?	
	Does the project help to make it easier for the user to reach its destination? How?	

Collaboration with different parties
- Which parties have helped to realize the project?
- What did the collaboration with these parties look like?
- Where there governmental parties concerned when realizing the project?
- What was the role of these governmental parties?
- Would you have liked to see the governmental party take a different role?

Financial aspect
- Which parties have invested in the project?
- Were there any subsidies in play to help to realize the project?
- Was the project realized with the goal to achieve financial profit?

Future of the project
- What does the future hold for the project?
- Are there any plans for expanding or upscaling the project?

Closing
- Are there things left unspoken that you think are important for my research?
- Would you like to make some other remarks before we close this interview?
- Thank the respondent for his/her time and effort.

Interview guide experts

Introduction
- Brief explanation of my research and how/why I chose to reach out to the respondent.
- Ask if the respondent wants to stay anonymous and assuring that this anonymity will be guaranteed.
- Ask if the respondent agrees that the outcome of the interview will be used in my thesis.
- Ask if the respondent can start with a brief introduction of him/herself.

General
- How are you involved in MaaS?
- Can you tell more about the MaaS-projects you are working with?
- What do you think of the current Dutch transportation system?
- Do you see any problems and/or points of improvement in the current transportation system?
- Does the current transportation system provide accessibility for all people?
  Elderly?
  Disabled people?
  People with lower income?
  People living in rural areas?

MaaS in general
- What do you think is the biggest opportunity for MaaS?
- Can you think of any threats concerning MaaS?
- Do you think MaaS can improve the Dutch transportation system (referring to the earlier mentioned problems)?
- What do you think are the effects of MaaS? On a social scale?
- What problems could MaaS give to society? Are there certain groups of people that could be affected by these problems?
- How can MaaS be an addition to the current Dutch transportation network?
- Do you think that MaaS will be accessible for all people?

Role of the government
- What can a government do to steer and/or control MaaS-initiatives?
- Is it desirable that the government steers MaaS-initiatives?
- What would happen to our transport system when governments won't steer MaaS-initiatives?
- What do you think the role of the government should be concerning MaaS?

Concluding
- What does the ideal implementation of MaaS look like? And what should be the role of the government in this?

Closing
- Are there things left unspoken that you think are important for my research?
- Would you like to make some other remarks before we close this interview?
- Thank the respondent for his/her time and effort.

Appendix 3. Interview reports

9 interviews have been done during this research:

Interviewee	Organization	Case	Date of interview
Jeroen Quee	Sweco	USP Campusbikes	12th of July, 2018
Jacco Lammers	GoAbout	GoAbout/USP Campusbikes	24th of July, 2018
Daan Stevens	Connexxion	Brengflex	26th of July, 2018
Wilco Bos	Municipality Nijmegen	Brengflex	8th of August, 2018
Ralph de Jong	Whim	Whim	9th of August, 2018
Robin Kleine	Mobycon	Expert interview	14th of August, 2018
Wouter Le Fèvre	Municipality Bilthoven	USP Campusbikes	28th of August, 2018
Robin Huizenga	PTV Group	Expert interview	5th of September, 2018
Koenraad Verduyn	PTV Group	Expert interview	5th of September, 2018

All transcripts and audio files are available upon request. For contact, mail to: michielbrouwer@live.nl.