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MOBILITY AS A SUSTAINABLE SERVICE?

An exploration of the sustainable impacts of MaaS
using a Business Model Perspective.

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Preface

Before you lies the disciplinary thesis “Mobility as a Sustainable Service? An exploration of the sustainable impacts of MaaS using a Business Model Perspective”. With this research on Mobility as a Service (MaaS) I will complete the major Science and Innovation Management which is part of my Liberal Arts and Sciences Program at Utrecht University. I was engaged in writing this thesis from April up till and including June 2017.

My interest in this topic has aroused during my internship at PNO Consultants earlier this academic year. During this internship I researched what barriers obstructed the further implementation of MaaS in the Netherlands. A question that has been of interest to me since the internship is whether MaaS is indeed the sustainable solution for a cleaner and nicer mobility regime which several parties claim it is. It is therefore that I chose the sustainability of MaaS as the topic of this thesis.

MaaS is a particular new innovation on which much has been written by experts and scholars, but there is a lack of empirical evidence on impacts and consequences of the service. This made the research sometimes difficult, but in the end I was able to produce an answer to the research question.

I would like to thank my supervisor Anna Nikolaeva for her guidance, feedback and support during these last then weeks. I would also like to thank Jesse Block and Bas Strien, the two other students who were part of the feedback group, for their contributions and feedback during our meetings and feedback rounds. And at last I would like to thank Arjen Rodenburg from PNO Consultants, for making me enthusiast for MaaS and for sharing his knowledge and articles with me.

I hope you enjoy your reading,

Lorena Tol

Summary

Cars are the most dominant and most popular form of transport in the Netherlands. However, car use causes heavy traffic congestion and air pollution in and around big cities. An innovation that is now discussed as a possible sustainable solution for these problems is Mobility as a Service (MaaS). MaaS offers travellers access to several modes of transport without the need to own any vehicle. It also promises travellers seamless and carefree travelling. However, there are concerns about the real sustainable impacts of MaaS. The goal of this thesis is to give more insight into this topic. A business model perspective is used to explore what the MaaS business model elements entail and what their potential contribution to a more sustainable mobility regime can be.

The results show that there is great conformity in the literature around the set-up of the MaaS business model and service: the value proposition entails seamless travelling, access to different modes of transport, an unburdening of travel pains and in some cases a cleaner environment. These values can be offered because collaborations with transport operators are made (the supply chain) and because a customer interface that enables users to plan, book and travel their journeys is developed. The financial model of MaaS is based on MaaS' role as an intermediary, the actual use of the service by users and / or a fee for taking away administrative tasks. With regard to the sustainability impacts, the results show that the MaaS business model elements can have a positive contribution to a more sustainable mobility regime if: 1) the modes that are offered are sustainable 2) the quality of the service is high enough so that users develop positive attitudes towards sustainable transport modes 3) the users shift to sustainable modes and 4) the financial model allows the MaaS companies to earn a profit by offering sustainable transport.

These findings on MaaS can take away some of the ambiguity surrounding the topic. This information can be used to show policy makers or investors how a MaaS project or company can contribute to sustainability and in what way. This knowledge can facilitate them in their investment or policy decisions.

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1. Introduction

More and more people live in cities. This brings citizens a lot of advantages, like economies of scale (Bettencourt & West, 2011), proximity to all kinds of services (hospitals, universities etc.) (Bleijenburg, 2015) and the opportunity to work with creative and smart people (Glaeser, 2011). Besides benefits for the inhabitants, cities themselves also have benefits for the broader economy. (Bettencourt & West, 2011; Florida, 2014; Glaeser, 2011).

However, growing cities also mean more pollution and traffic congestion (Bettencourt & West, 2011). Air pollution is for example a big issue in cities like London and Shanghai and in the Netherlands they have to deal with heavy traffic jams and congestion in and around big cities. This traffic congestion also leads to increased CO₂ emissions. More than 20% of all CO₂ emissions in the Netherlands are emitted by road traffic (CBS, 2015).

It is necessary to come up with creative solutions for these problems. According to Low (2012) the challenge is to avoid the danger of continuing along the fossil-fuelled transport path and to replace private vehicle solutions in time to avoid further climate change. However, it may be difficult to address the previously discussed problems within the existing transport system (Geels, Kemp, Dudley & Lyons, 2012). Following these authors, it is therefore necessary that a transition towards an alternative, more sustainable transport system or mobility regime is going to take place (Geels et al., 2012).

In the literature this possible new socio-technical regime is being discussed. Possible pathways and explorations of sustainable alternatives for (fossil-fuelled) auto mobility are described by several authors (e.g. Schäfer, Heywood, Jacoby & Waitz, 2009; Schiller, Bruun & Kenworthy, 2010; Whitelegg, 1997). One of these alternatives is a shift towards intermodal transportation (Parkhurst, Kemp, Dijk & Sherwin, 2012). According to Parkhurst et al. (2012) intermodal travel can offer prospects for addressing the environmental and congestion problems mentioned earlier. Although there are some different descriptions and definitions of what constitutes intermodal (or sometimes referred to as multimodal) transport, there is also some agreement around basic characteristics: intermodal traveling means that travellers make use of several modes of transport for one journey (Nes, 2002; G. Parkhurst, 2000; Spickermann, Grienitz & Von Der Gracht., 2014), whereby well-informed decisions are made when choosing the modes of transport for a particular journey (this is made possible by mobile-technology support) (Nes, 2002; Spickermann et al., 2014).

When intermodal transport is to become the promised sustainable alternative, travellers need to alter their behaviour and make the switch from car use and ownership to the

use of multiple modes of transport (Dacko & Spalteholz, 2014; Spickermann et al., 2014). Perhaps the biggest challenge in this transition is to convince people that intermodal travelling has greater benefits than unimodal car use, especially since interchange between modes is often perceived as negative (Hine & Scott, 2000).

The idea of Mobility as a Service (MaaS) tries to tackle this problem by offering a service in which the traveller has access to several transport modes, is unburdened of payment and planning issues and in which interchange is no longer a negative feature of intermodal transport (Datson, 2016; Holmberg, Collado, Sarasini & Williander, 2016). However, there are some concerns that an introduction of MaaS does not necessarily lead to sustainable mobility. Parkhurst et al. (2012) point to the risk that introduction of intermodality in the wrong policy framework, may lead to more unsustainable mobility. One can also imagine a service in which car rental or car-sharing will still be the dominant mode of transport, leading perhaps to less CO2 emissions, but not to less congestion. Besides, it seems that MaaS services will be (and already are) performed by business (Spickermann et al., 2014; Catapult Transport Systems, 2016). A possible risk of this is that the need for profits and customer satisfaction, can (unintendedly) lead to a neglect of sustainability issues.

There is thus ambiguity about the possible sustainable impacts of MaaS and its potential contribution to a more sustainable mobility regime. Karlsson, Sochor, Aapaoja, Eckhardt and König (2017) have made an impact assessment of two MaaS trials in Sweden and Austria and have thereby identified promising results. This thesis aims to explore the sustainable impacts of MaaS further by using a different framework: the business model perspective. According to Boons, Montalvo, Quist and Wagner (2013) business models can help firms create sustainable innovations and they can serve as an analytical tool for researchers to “assess the interplay between the different aspects that firms combine to create ecological, economic, and social value”(Boons et al., 2013, p.1). Additionally, business models can give insight into how the firm can connect to or build up a new system. Using the business model as a framework could generate interesting results about how MaaS combines the different elements of the firm to create a sustainable solution and how this combination can help build a more sustainable mobility regime. The following question will be adressed in this thesis:

What do the MaaS Business model elements entail and what can be their potential contribution to a more sustainable mobility regime?

An answer to this question can lead to a better insight in the possible impact that MaaS can have on the development of a more sustainable mobility regime. This knowledge can be useful for policy makers and business investors who seek a sustainable solution for future mobility. E.g. when MaaS seems to have a possible sustainable impact and can contribute to a more sustainable mobility paradigm, this could justify public spending on the development of MaaS ecosystems and trials.

The remainder of this thesis will be as follows. In the theory section sustainable development, sustainable innovation and sustainable business models are discussed. In the method section the research methods and choices are outlined and justified. In the following section the results of the research are presented, followed by a discussion of the findings, the strengths and limitations of this research. Finally a conclusion is given.

2. Theory

2.1 Sustainable development

The field of sustainable development consists of many contributions and approaches from different disciplines (Geels et al., 2012). An overview of contributions, definitions and contradictions in this field is outside the scope of this thesis. In general it is agreed upon that the Brundtland definition of sustainable development is the most comprehensive: “the ability to make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” (Kates, Parris & Leiserowitz, 2016, p. 2).

2.2 Sustainable transport

Transport or mobility is an important part of sustainable development (Attard & Shiftan, 2015). Low (2012) states that sustainability in transport is an area of conflicted interests and differing ideas and practices. Much has been written on how the transition to such a sustainable mobility regime can be achieved (Banister, 2008; Gaziulusoy & Twomey, 2015; Geels & Kemp, 2012; Low, 2012). Although, analysts seem to agree on three main themes: The global scope of the problem, the deeply rooted reliance on auto-mobility and the need for change (Low, 2012).

2.3 Sustainable innovation and the role of business

In transition theory innovation is seen as a major driver of change (Geels & Kemp, 2012; Hekkert, Suurs, Negro, Kuhlmann & Smits, 2007). Especially sustainable innovations are interesting in light of the sustainable transition that is needed. As with sustainable development, the descriptions and ascribed characteristics of sustainable innovation are broad (Boons & Lüdeke-Freund, 2013; Boons et al., 2013). The term eco-innovation is often used as a substitute for sustainable innovation (Carrillo-Hermosilla, Del Río & Könnölä, 2010; Hellström, 2007), however this term does not capture the whole meaning of sustainable innovation since it only focusses on the environmental side of sustainability. A more comprehensive definition is posed by Charter and Clark (2007):

“Sustainable innovation is a process where sustainability considerations (environmental, social, and financial) are integrated into company systems from idea generation through to research and development (R&D) and commercialization. This applies to products, services and technologies, as well as to new business and organizational models” (Charter & Clark, 2007, p. 9).

This definition includes a focus on the integration of sustainable considerations in the wider company system. This also implies that sustainability is kept in mind during the whole process of idea generation until and beyond commercialization of a new innovation. The business thus plays a role in ensuring that an innovation is sustainable.

2.4 Sustainable business Model

The definition of sustainable innovation also includes the notion that sustainability considerations must be included in the business and organizational models. Boons et al. (2013) argue that a sustainable business model can serve as a potential tool to bridge the gap between firm strategies (which are often linked to financial performance) and the transition to sustainable systems. They have built their argument on (early) business model literature (Ostenwalder & Peigneur, 2011; Doganova & Eyquem-Renault, 2009), sustainable innovation and sustainable business literature (Arimura, Hibiki & Johnstone, 2007; Carrillo-Hermosilla et al., 2010; Smith, Voss & Grin, 2010; Weber & Hemmelskamp, 2005) and (antecedents of) sustainable business model literature (Hart & Milstein, 1999; Lovins, Lovins & Hawken, 1999).

According to Boons & Lüdeke-Freund (2013), the business model can add insight into how a firm can connect to, or build up to a certain system, while delivering a certain value proposition. A business model gives insight into how firms combine several elements of their business. These elements include at least 1) a value proposition, a statement of the measurable and observable benefits a consumer gets when buying the product or service 2) the supply chain, how the firm connects with its suppliers 3) the customer interface, how the firm connects with its customers and 4) the revenue model, how value is captured. The second and third elements combined are also called the value chain. This value chain shows how value is created by the company by both their connections with suppliers and customers (Boons et al., 2013).

To combine the traditional literature on business models and requirements for sustainable innovation into a sustainable business model, Boons and Lüdeke-Freund, (2013) have proposed four normative requirements that business models should have. In short these are:

“1. The value proposition provides measurable ecological and/or social value in concert with economic value2. The supply chain involves suppliers who take responsibility towards their own as well as the focal company’s stakeholders....3. The customer interface motivates customers to take responsibility for their consumption as well as for the focal company’s

stakeholders4. The financial model reflects an appropriate distribution of economic costs and benefits among actors involved in the business model and accounts for the company's ecological and social impacts (Maas & Boons, 2010)" (Boons & Lüdeke-Freund, 2013, p.13).

When a firm has a sustainable business model, it has developed a sustainable innovation from which it captures financial profits and whereby it does not harm the stakeholders or environment. In order to do so, the business itself has become more sustainable and has thereby minimized not only the ecological footprint from the use of their products or services, but also that of their own.

2.5 Conceptual framework

In this thesis MaaS will be viewed as an innovation that is offered by a company. To assess whether this innovation is also a sustainable innovation that has the potential to contribute to a more sustainable mobility regime, the business model perspective will be used. As argued above, the business model can give insight into how the firm connects the different elements of their business and it can give insight into how the firm can connect to or build up a new system. In this thesis the different elements of the business model (the supply chain, the value proposition, the customer interface and the financial model) will be identified for MaaS, following the descriptions of Boons et al. (2013). This will give insight into how the firm connects the different elements. Then, it will be analysed what the (potential) sustainable impacts of these elements are using the normative requirements for a sustainable business model set up by Boons and Lüdeke-Freund (2013). In this way the possible contributions of MaaS to a more sustainable mobility regime (a new system) can be identified.

3. Methods

3.1 Research design

The aim of this thesis is to find out what the elements of the MaaS business model entail and to explore how this business model can contribute to a more sustainable mobility regime. Since MaaS is a new innovation and not yet much is known, an exploratory research design is chosen. This design enables the researcher to look into a topic that has not yet been explored in great detail. This design can help gain a better understanding of the phenomenon and thereby help guide others or further research.

3.2 Research method and data analysis

A two-way research approach was used to collect data. By combining a literature review and content analysis of documents, findings could be cross-checked, this is also called triangulation (Bryman, 2012). Besides, it allowed the researcher to form a more comprehensive account on the MaaS business model elements and the sustainable impacts of these.

First a combination of a narrative and systematic literature review was executed. The purpose of this research was not to identify whether a certain variable has certain effects (seeking a yes or no answer) based on literature (a systemic review), but rather to shed light on a particular area of interest by reviewing literature (a narrative review). However, the narrative review was guided by a research question, exclusion criteria and the use of keywords, which are traditionally elements of a systemic review. The combination of methods made it possible to explore the topic by reviewing the existing literature, but in a systemic way so that a focussed answer could be given on the research question (Bryman, 2012).

The purpose of this study was to shed light on the MaaS business model and the sustainable impacts of this model. Therefore studies related to MaaS have been searched in electronic databases (Google Scholar, Google Books and Scopus), by using the following keywords: *Intermodal transport, MaaS, Multimodality, Mobility as a Service, Intermodality, Transport as a Service, Combined Mobility Services*. Additionally, in-referencing from found literature, was used to find related studies. Criteria for inclusion were: 1) Dutch or English language 2) publicly available via a scholarly database 3) a distinct focus on MaaS.

The studies that were found were read in depth and there was searched for information regarding the business model elements (supply chain, value proposition, customer interface and financial model) of MaaS. Furthermore, there was searched for information regarding the sustainable impacts of the described business model elements. For every element of the MaaS

business model it was analysed how it contributes or can contribute to sustainable development.

Next to a literature review, several MaaS companies in the Netherlands were studied. The purpose of this was to identify what the business model elements are in these MaaS companies and what the possible impacts of these models are. This was done by analysing the content of company documents in a qualitative manner. In the documents was searched for underlying themes. Some predetermined themes of interest were identified based on the theory section and the literature review: the business model elements as described by Boons et al. (2013), the normative requirements for sustainable business models by Boons and Lüdeke-Freund (2013) and the already identified sustainable impacts found in the literature review. However, since this is an exploratory study other themes were allowed to emerge during the study.

The goal of this thematic analysis was to identify both manifest and latent content. When one of the themes from the theoretical framework or literature review was found in one of the documents, the sentence(s) in which the evidence stood were cited (as indicated by quotation marks). When the content was latent, an argument was given why this part of the document was seen as part of a particular theme (as indicated by normal text without quotation marks). To structure the data that has been found around the themes, a framework is used. The framework and the results can be found in appendix I.

Data was collected using the Google database, whereby the following keywords were included: Radiuz, Mobility Mixx, XXImo, NS Business Card, Whim, MaaS Global. The inclusion criteria for the documents were: 1) Authenticity, are the documents authored by the companies themselves? 2) credibility, is the evidence free from error and distortion? 3) representativeness, is the evidence typical for this kind of information? And 4) meaning, is the information clear and comprehensible (Bryman, 2012). This resulted in a dataset of 13 brochures and PowerPoints issued by the company, in addition company website information was used as well.

3.3 Sampling of cases

In earlier research the researcher has identified several MaaS initiatives (Tol, 2017). Some of the identified initiatives are the cases used in this thesis. Some cases are left out because they are not intermodal or not implemented yet. The following companies were chosen for the content analysis: Mobility Mixx, XXImo, Radiuz, NS Business Card and MaaS Global.¹

¹ Already operating in Helsinki, and soon in the Netherlands.

These cases are chosen because they are all located in the Netherlands, in operation and intermodal of nature.

3.4 Reliability, replicability, validity and ethics

In this method section it is described what cases are used and why, what steps are taken in the literature review and how the thematic analysis is performed. This should make this research replicable.

Reliability refers to the consistency of a measure of a concept. In this thesis internal reliability problems are not present since there are no multiple indicator measures used. Furthermore inter-observer consistency problems are also not apparent since there is only one observer.

With regard to validity there are three types. The first, measurement validity, has to do with the question if an indicator really measures the concept it stands for. In this thesis the concepts used for the thematic analysis and the guidance of the literature review are derived from literature. This limits the risk that the measures (themes) for the sustainability impacts and the business models used in this thesis are not valid, but the chance still exists.

Another issue is the internal validity. This type is not of concern here since the researcher does not wishes to draw causal conclusions from the findings but only to explore a topic. At last there is the issue of external validity. This has to do with the question whether the results of a study can be generalized beyond the specific context. In this thesis insights are searched regarding the sustainable impacts of MaaS business models. The findings from the literature review can also be true for other countries, since most of the literature is not country specific. The findings of the content analysis are not generalizable because insights are drawn from particular cases at one point in time. Initiatives in other countries, or perhaps next year will be different from these examined now. These findings can thus not be generalized.

4. Results

Part I: Literature review

The studies used in this analysis all have presented descriptions of what the business elements of MaaS entail or will entail. In 4.1 the business model elements (value proposition, supply chain, customer interface and financial model) will be described. In 4.2 the (possible) sustainable impacts of these business model elements will be discussed.

4.1 MaaS business model elements

MaaS offers users flexibility in modal choice, access to several modes of transport and convenience in travelling by offering integrated pricing, booking, seamless travel and assistance during the travel (Spickermann et al., 2014; Catapult Transport Systems, 2016). In this way MaaS offers to take away the negative sides of intermodal travel and it promises to reduce the need for users to own modes of transport themselves. These factors constitute the value proposition.

In order to offer users the convenience of travelling, MaaS includes a mobility platform at which customers can plan, book and pay their travel services (Karlsson, Sochor, Aapaoja, Eckhardt & König, 2017; König, Eckhardt, Aapaoja, Sochor & Karlsson, 2016; Spickermann et al., 2014; Catapult Transport Systems, 2016). Additionally this platform can encourage the use of specific (sustainable) modes or can give insight in the impacts of modal choice (Karlsson et al., 2017). This platform can be seen as a customer interface.

Kamargianni, Li, Matyas and Schäfer (2016) argue that this customer interface should bring together three levels of integration. Only those services that include three levels of integration can generate seamless mobility. These levels are: The availability of payment and ticketing integration, mobility package integration and ICT integration. Only MaaS business with these three integrations count as 'real' MaaS offerings according to them.

To make this integration of booking, planning and planning possible, the MaaS operator needs to work together with different actors. Several authors stress the importance of such collaboration and strategic alliances with different actors from different fields (for example the ICT, ITS or transport sector) (e.g. Jonuschat, Stephan & Schelewsky, 2015; König et al., 2016; Spickermann et al., 2014). MaaS also promises flexibility of modal choice and access to different transport modes. In order to ensure this, MaaS business have to collaborate with transport providers. There is no exact description of what modes of transport will be included in MaaS, but it seems that car, bike and ridesharing services will be important modes in the MaaS offering (Jonuschat et al., 2015; Kamargianni, Matyas, Li &

Schäfer, 2015; Spickermann et al., 2014). Other modes that are mentioned are taxi and private and public modes (Jonuschat et al., 2015; Spickermann et al., 2014). The MaaS operator should collaborate with all these parties in order to be able to offer the total service and full value proposition. All collaborations the MaaS business has are part of the supply chain.

The financial model of MaaS is based on MaaS' role as an intermediary between transport operators and users (Kamargianni & Matyas, 2017). Transport operators share data about for example prices, routes, vacancy of vehicles etc. with the MaaS company. The MaaS company then combines the information from the different transport operators and integrates it into a service. Via their customer interface they inform users on the available transport modes and offer the service to them (Kamargianni & Matyas, 2017). Their financial model will likely will be based on a payment for the integration of these information streams and services. Different options for the financial model are visible in the literature. Examples are a monthly fee, a prepaid or flat rate or a pay-as-you-go structure.

4.2 Effects and impacts of this business model

When looking at the value proposition of MaaS described above, it can be observed that the value proposition in itself does not directly mention any sustainable values or improvements. The values that are mentioned in the literature are not concerned with reducing CO2 emissions or traffic congestion. However, some of the MaaS business elements have the potential to add social and environmental value to the value proposition. It seems that the sustainable impacts of MaaS are dependent on the choices MaaS business make in developing and designing the service and on the choices consumers make when using MaaS. In the following paragraphs this will become more clear.

The collaborations in the supply chain can be of influence on the sustainability of MaaS. A sustainable supply chain “involves suppliers who take responsibility towards their own as well as the focal company's stakeholders” (Boons & Lüdeke-Freund, 2013 p. 13). In literature the sustainable contribution of MaaS is often based on the premise that the service will only offer sustainable modes. These modes are supplied by transport operators. The argument is that when sustainable modes (e.g. a shared fleet of vehicles or public transport) are used, resource efficiency can be improved leading to less CO2 emissions. Less private cars and more shared cars or public modes of transport can lead to less cars parked in streets and less cars on the road (Karlsson et al., 2017).

However, the exact modes that are or will be offered by MaaS business are not described in literature. Furthermore, it is not always clear what constitutes sustainable

transport. In the case of sharing services for example, there are different opinions. Several authors see an important role for sharing initiatives (Jonuschat et al., 2015; Kamargianni et al., 2015; Karlsson et al., 2017; Spickermann et al., 2014) and argue for an integration of these into MaaS. According to Jonuschat et al. (2015) shared mobility services have the opportunity to link the private and public transport infrastructures. Non-car owners can for example reach stations further from home, by using shared vehicles or bikes. Access to public transport is then increased, while the need for car ownership is decreased (Jonuschat et al., 2015). However, at the same time Jonuschat et al. (2015) question if shared mobility services are indeed sustainable. They conclude that this is only the case when: “Individuals reduce their number of local car trips in favour of intermodal or multimodal trips” and when “Individuals find that they no longer need a private car due to their modified inter- and multimodal mobility behaviour” (Jonuschat et al., 2015 p.164). So following Jonuschat et al. (2015), including sharing services in MaaS has the potential to reduce the need for cars and increase the access to public transport, which can in turn lead to less cars on the road and less congestion. However, this is only possible if people behave in a certain way.

By Karlsson et al. (2017) a same observation was made: not having access to a private car could reduce the number of short trips made by cars, but on the other hand access to car-sharing services could also increase the number of trips made. From an environmental point of view this can be seen as a negative development, however from a social point of view, increased access to transport (e.g. car-sharing services) can also lead to social inclusion of those who were not able to own a private car or those living far remote from public transport.

In theory, a sustainable supply chain is possible if sustainable modes are offered by the MaaS companies. These sustainable modes must then also be offered by suppliers who take responsibility for their potential effect on stakeholders. Thus, MaaS can have a positive impact on sustainable transport, but this premise is thus very dependent on what collaborations are made in the supply chain and with whom.

Even when a sustainable supply chain is not (totally) present, MaaS can still contribute to sustainability via its customer interface. A sustainable customer interface “motivates customers to take responsibility for their consumption as well as for the focal company’s stakeholders” (Boons & Lüdeke-Freund, 2013, p.13).

The MaaS customer interface, as described in 4.1 has several possibilities to motivate customers. Kamargianni et al. (2016) and Kamargianni and Matyas (2017) argue that the level of integration of MaaS has an influence on the impacts the service can make. Higher levels of integration can thereby lead to greater levels of customer demand for the travel service

(Kamargianni et al., 2016). The better the customer interface has integrated ticketing, booking, travelling and ICT, the more customers will be motivated to use MaaS. However, this does not directly mean more sustainability. The argument of Kamargianni et al. (2016) and Kamargianni and Matyas (2017) is therefore indirect: developments in information and communication technologies (ICTs) can contribute to an increase in resource efficiency (more efficient use of vehicles), better infrastructure utilisation and optimisation of the transport network.

Another argument is provided by Karlsson et al. (2017). They have done an impact assessment of a MaaS trial in Sweden (The UbiGo project). They found that the users of UbiGo developed positive attitudes towards sustainable modes of transport. This in turn led to more people choosing sustainable modes over unsustainable modes.

The observed modal shift was researched in depth by Sochor, Strömberg and Karlsson (2015). Four groups were identified based on their access to car-sharing services and car ownership before the field trial. It was observed that in all groups changes occurred in the modes of travel that were used. Most of these changes were towards more sustainable modes. Interesting too was that users who did not have access to cars or car-sharing services before the trial, didn't use car-sharing services as much as they had expected. The overall service and integration were rated positively by all user groups, which indicates that the use of the service was perceived as positive. These results indicate that the customer interface of MaaS, the place where the whole integration of the service takes place, motivated customers to change their travel behaviour in a sustainable direction. The interface thus made users take responsibility for their travel consumption.

The customer interface can thus motivate users to take responsibility for their travel consumption by providing a service that is rated positive (note that this also includes the other elements of the business model) and the technical organization of the customer interface (the degree of integration) also has the potential to contribute to sustainability.

The financial model gives insight into how economic costs and benefits are distributed among actors in the business model. Besides, it must account for the company's ecological and social impacts (Boons and Lüdeke-Freund, 2013). From 4.1 it becomes clear that MaaS' financial model will probably be dependent on its position as an intermediary. There is however still a lot unclear about this topic. It is thus difficult to find direct impacts of this business model element.

Though, one interesting result of a financial model comes from the UbiGo project (Sochor, Stromberg & Karlsson, 2015). In their research they identified the matches and

mismatches between the expectations and experiences of users, commercial actors and society after the UbiGo trial in Gothenburg. They found that it is in the interest of society and some users that the number of cars used goes down. However, the financial model of UbiGo is based on the number of trips made with shared cars. No revenue can be made by reselling public transport tickets, since they are subsidized. So the profits were dependent on the use of car-sharing services. A dependence on car services may lead to an incentive for MaaS operators to promote car services in their service offering. As a result this can lead to more trips made with car services. This can lead to traffic congestion and also to extra CO₂ emissions. This is a threat for the sustainable impacts of MaaS.

The results from this literature review indicate that scholars broadly agree on what the business model of MaaS looks like and what elements it entails. Analysis of the possible impacts revealed that MaaS can contribute to a more sustainable mobility regime, but that this is highly dependent on how the details of the service are designed. It can be concluded that the sustainability of the system is dependent on the collaborations that are formed between actors in the supply chain, the quality that the service offers to customers and on how well MaaS providers can make profit without stimulating unsustainable modes. It is however not yet known in detail what the exact business model elements will look like, so it is not clear whether MaaS will indeed contribute to a more sustainable mobility regime.

Part II: Content analysis

4.3 Analysis of texts produced by MaaS companies

The MaaS companies that were studied had some similar elements in their business models when compared to the descriptions from Part I. The customer interface and supply chain descriptions from the MaaS companies are very similar to these in the literature. All companies offer access to and use of different modes of transport. Public transport, car and bike sharing services, car rental and taxi are part of all companies' offerings. Some offer additional services like parking (Radiuz, XXImo, NS, Whim), a car pool service (Mobility Mixx and Radiuz) and payment of fuel/ electric charging (Radiuz and XXImo). The modes can be accessed or booked by using a customer interface. In some cases this interface is an app (Radiuz, XXImo, Whim), in others there is a website (NS Business Card, Mobility Mixx, XXImo) or rides can be booked by telephone (NS Business Card). All companies except Whim provide a mobility card, which serves as ticket while travelling and can be used for payment of services by using a Visa Chip in the case of XXImo. In general these elements resemble the descriptions from 4.1.

However, there are also interesting differences in the business models. A first difference is that all companies except Whim are targeting the business market instead of a consumer market. The companies targeting the business market therefore also have a different value proposition. The value proposition of Whim contains time saving, freedom of movement, no hassle and cleaner transport, which is similar to what is described in the literature. The other companies provide their services to companies. What they offer can be summarized as: a reduction in mobility costs and travel time of employees, more sustainable transport (reducing CO₂ emissions) and as a result more corporate social responsibility and an unburdening of administration tasks.

This difference in their value proposition has consequences for the financial model. The companies that focus on a business market let companies pay not only for transport use and integration of services (like Whim does), but also for the determination of mobility budgets for employees, analysis of travel behaviour and the taking away of administrative burdens. There was also variation within the companies focussing on a business market. XXIimo and Radiuz for example based their financial model on a flat rate per new user. The companies also charged a small monthly fee for providing access to the different services for every new user (fuelling, parking, public transport etc). The actual use of travel modes was paid per use or kilometre. In this way the company ensures a steady monthly income based on the flat rates, independent of the actual kilometres travelled.

What is striking is that in the MaaS companies targeting the business market there is an environmental value offered as well. All companies claim that using their services contributes to corporate social responsibility, a more sustainable environment and less CO₂ emissions. From the documents it becomes clear that this value can be offered because the companies offer cleaner modes of transport (part of the supply chain) and insight into the sustainability of these mode (a sustainable customer interface). Radius and XXIimo offer for example insight into CO₂ emissions for every possible travel mode at a particular route. The companies offer this insight but let customers choose for themselves. Since they promise cleaner transportation and less CO₂ it seems that they assume that these features are enough to persuade users to choose an environmentally friendly mode of transport. Mobility Mixx for example, states that its service offers users freedom of choice and clean transport options, while XXIimo and Whim state that more flexibility and better accessibility of other (more sustainable) transport modes will automatically lead to better choices.

The companies already operating thus have slightly different business models than

those described in the literature review. Some elements like the insight into CO₂ emissions and the availability of clean modes of transport can have a positive effect on the sustainable impacts of MaaS. The different financial model also opens up possibilities to ensure a steady income stream that is not based on car sharing services. This will be discussed in the next chapter.

5. Conclusion and discussion

The goal of this thesis was to identify what the MaaS business model elements entail and to explore what the possible contribution of these business model elements to a more sustainable mobility regime can be. The literature on sustainable innovation and (sustainable) business models was hereby used as a framework to guide the research. This framework proved fruitful for the identification of the different business model elements and the ways in which they connect to each other. Furthermore, the sustainable business model requirements helped guide the analysis of sustainable impacts of the business model elements. In order to answer the research question, a literature review (both narrative and systemic) combined with a content analysis of MaaS company documents was performed.

This thesis identified great conformity in the literature around the set-up of the MaaS business model and service. All articles described more or less the same elements of the service. The value proposition entailed seamless travelling, access to different modes of transport and an unburdening of travel pains. These values can be offered because the MaaS company has several collaborations with transport operators (the supply chain) and because it has developed a customer interface that enables users to plan, book and travel their journeys. The financial model of MaaS is based on MaaS' role as an intermediary (the integration of services) and on the actual use of the service by users.

However, it was found that the business models found in the existing MaaS companies differed somewhat from the models in the literature. Four out of five companies were only offering their services on a business market. This had implications for their value proposition and their financial model. These companies promised an additional environmental value and they had different financial models when compared to the descriptions found in literature.

With regard to the sustainable impacts it can be concluded that MaaS can contribute to a more sustainable mobility regime. However, the premise of MaaS as a sustainable service is based on a couple conditions. The first is that the transport modes offered by MaaS providers need to be sustainable modes of transport offered by responsibility taking suppliers. In MaaS, users are free to choose their modes of transport and currently the only encouragement for the making of sustainable choices are CO₂ emission calculations. There is no evidence found that indicates that this CO₂ information is enough to ensure sustainable choices. This means that the collaborations a MaaS provider has with its transport suppliers (the supply chain) are important for the sustainability impacts of the service.

The second condition entails that the quality of the total service must be of such a

degree that users will develop positive attitudes towards the sustainable modes of transport. These attitudes must then develop into sustainable actions. When the use of the service offers advantages (financial, social or environmental improvements) when compared with earlier ways of travelling and when the offered modes are also sustainable, then positive attitudes will be developed and users will shift to more sustainable modes of transport or they will decide to reduce their number of trips made.

A third condition is that the financial model of MaaS must not be dependent on the use of one particular mode. This can bring the risk of stimulating the use of one mode over another, which can have negative effects on the sustainability of MaaS. The financial models found in MaaS companies have shown a way to ensure a steady monthly income which can help the financial sustainability of the company without the dependence on unsustainable modes.

This findings on MaaS business models and their possible contribution to a more sustainable mobility regime can take away some of the ambiguity surrounding the topic. This information can be used to show policy makers how a MaaS project or company can contribute to sustainability and in what way. Policy can be shaped to help the further development of MaaS in a sustainable direction. For investors interested in a sustainable investment the information can be of use for comparing or assessing a MaaS business model and its impacts.

Although this research has given some more insight into the possible contributions of MaaS to create a sustainable mobility regime, the research was limited by the use of selection criteria for MaaS literature and company documents. These criteria limited the available material that could be used for the research. Some articles could not be used by the author because they were written in another language and from some documents the authenticity could not be guaranteed.

Furthermore, there is a lack of empirical evidence on the impacts of MaaS. In the literature review only one case providing empirical evidence was found, namely the UbiGo project (Karlsson et al., 2017; Sochor et al., 2015). Other impacts were deducted from expert and scholarly opinions and the researcher's own reasoning. To really grasp the impacts MaaS business models have, more empirical evidence is needed. Different trials with differences in the business model can reveal the true impacts of a particular service design. Only then it can be analysed what the real impacts of a particular service are.

One element of the MaaS business model that is for example not yet understood in detail is the financial model. The difficulties with the business model of UbiGo, as described

in 4.2 threatened the financial sustainability of MaaS in the project (Sochor et al., 2015).

By looking at the financial models of the MaaS companies in the Netherlands, the researcher observed a possible solutions for this problem. By using the elements of the financial models that the MaaS companies use, the problem can perhaps be overcome. Charging a fee for the integration of services, while simultaneously charging for access, ensures a steady monthly income for the MaaS company. The financial model is than not solely dependent on car-sharing services. This could mean generating profit in other ways for the business. A shift away from a dependence on sharing services can also lead to less trips made with this mode.

To explore this combination of financial models in more detail some more information is needed. The information on financial models of Radiuz and XXIImo is now deducted from company documents. It could have been of value to explore these models more deeply by holding interviews with company leaders. This was unfortunately not possible, since none of the business leaders responded to a request.

6. References

- Arimura, T., Hibiki, A. & Johnstone, N. (2007). An empirical study of environmental R&D: what encourages facilities to be environmentally innovative. *Environmental Policy and Corporate Behaviour*, 142–173.
- Attard, M. & Shiftan, Y. (2015). Sustainable Urban Transport – An Introduction, xv–xxvi. <https://doi.org/10.1108/S2044-994120150000007026>
- Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73–80. <https://doi.org/10.1016/j.tranpol.2007.10.005>
- Bettencourt, L. & West, G. (2011). A unified theory of urban living. *Phys.Lett.*, D83, 25023. Retrieved from <http://arxiv.org/abs/1011.3641%5Cnpapers3://publication/doi/10.1103/PhysRevD.83.025023>
- Bleijenburg, A. (2015). *Nieuwe Mobiliteit*. Eburon.
- Boons, F. & Lüdeke-Freund, F. (2013). Business models for sustainable innovation: State-of-the-art and steps towards a research agenda. *Journal of Cleaner Production*, 45, 9–19. <https://doi.org/10.1016/j.jclepro.2012.07.007>
- Boons, F., Montalvo, C., Quist, J. & Wagner, M. (2013). Sustainable innovation, business models and economic performance: An overview. *Journal of Cleaner Production*, 45, 1–8. <https://doi.org/10.1016/j.jclepro.2012.08.013>
- Bryman, A. (2012). *Social Research Methods* (4th editio). Oxford University Press.
- Osterwalder, A. & Pigneur, Y. (2011). Business Model Generation. Retrieved from <http://www.businessmodelgeneration.com/>
- Carrillo-Hermosilla, J., Del Río, P. & Könnölä, T. (2010). Diversity of eco-innovations: Reflections from selected case studies. *Journal of Cleaner Production*, 18(10–11), 1073–1083. <https://doi.org/10.1016/j.jclepro.2010.02.014>
- CBS. (2015). No Title. Retrieved April 28, 2017, from <https://www.cbs.nl/nl-nl/nieuws/2015/37/uitstoot-verkeer-en-vervoer-daalt>
- Charter, M. & Clark, T. (2007). Sustainable Innovation: Key conclusions from sustainable innovation conferences 2003-2006 organised by The Centre for Sustainable Design. *The*

- Centre for Sustainable Design*, ..., (May), 48. Retrieved from http://bic-innovation.com/static/bic/knowledge_base/documents/T160433.pdf
- Dacko, S. G. & Spalteholz, C. (2014). Upgrading the city: Enabling intermodal travel behaviour. *Technological Forecasting and Social Change*, 89, 222–235. <https://doi.org/10.1016/j.techfore.2013.08.039>
- Datson, J. (Transport S. C. (2016). Mobility As a Service, 1–54.
- Doganova, L. & Eyquem-Renault, M. (2009). What do business models do?. Innovation devices in technology entrepreneurship. *Research Policy*, 38(10), 1559–1570. <https://doi.org/10.1016/j.respol.2009.08.002>
- Florida, R. (2014). *The Rise of the Creative Class*. (B. Books, Ed.).
- Gaziulusoy, A. I. & Twomey, P. (2015). Emerging Approaches in Business Model Innovation Relevant to Sustainability and Low-carbon Transitions. *State of Australian Cities Conference*, 23. Retrieved from http://www.visionsandpathways.com/wp-content/uploads/2014/10/Gaziulusoy_Twomey_NewBusinessModels.pdf
- Geels, F., Dudley, G. & Kemp, R. (2012). Findings, Conclusions and Assessments of Sustainability Transitions in Automobility. In *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp. 335–376).
- Geels, F. & Kemp, R. (2012). The Multi-Level Perspective as a New Perspective for Studying Socio-Technical Transitions. In *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*.
- Geels, F., Kemp, R., Dudley, G. & Lyons, G. (2012). *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport*. New York: Routledge.
- Glaeser, E. (2011). *The Triumph of the City: How our greatest inventions make us richer, smarter, greener, healthier and happier*. Penguin.
- Hart, S. & Milstein, M. (1999). Global sustainability and the creative destruction of industries. *Sloan Management Review*, 41, 23–33.
- Hekkert, M. P., Suurs, R. A. A., Negro, S. O., Kuhlmann, S. & Smits, R. E. H. M. (2007). Functions of innovation systems: A new approach for analysing technological change. *Technological Forecasting and Social Change*, 74(4), 413–432.

<https://doi.org/10.1016/j.techfore.2006.03.002>

Hellström, T. (2007). Dimensions of environmentally sustainable Innovation: The structure of eco-innovation concepts. *Sustainable Development*, 15(3), 148–159.

<https://doi.org/10.1002/sd.309>

Hietanen, S. (2016a). Mobility as a Service. MaaS Global.

Hietanen, S. (2016b). Mobility as a Service Can it be even better than owning a car? Helsinki: MaaS Global.

Hine, J. & Scott, J. (2000). Seamless, accessible travel: Users' views of the public transport journey and interchange. *Transport Policy*, 7(3), 217–226.

[https://doi.org/10.1016/S0967-070X\(00\)00022-6](https://doi.org/10.1016/S0967-070X(00)00022-6)

Holmberg, P.-E., Collado, M., Sarasini, S. & Williander, M. (2016). MOBILITY AS A SERVICE- MAAS describing the framework. Viktoria Swedisch ICT.

Jonuschat, H., Stephan, K. & Schelewsky, M. (2015). Understanding Multimodal and Intermodal Mobility, 149–176. <https://doi.org/10.1108/S2044-994120150000007018>

Kadouch, A. (2016). De toekomst van duurzame mobiliteit. Radiuz Total Mobility.

Kamargianni, M., Li, W., Matyas, M. & Schäfer, A. (2016). A Critical Review of New Mobility Services for Urban Transport. *Transportation Research Procedia*, 14(0), 3294–3303. <https://doi.org/10.1016/j.trpro.2016.05.277>

Kamargianni, M. & Matyas, M. (2017). The Business Ecosystem of Mobility-as-a-Service. *96th Transportation Research Board (TRB) Annual Meeting*, (January).

Kamargianni, M., Matyas, M., Li, W. & Schäfer, A. (2015). Feasibility Study for “Mobility as a Service” concept in London. *UCL Energy Institute; Department for Transportation*. <https://doi.org/10.13140/RG.2.1.3808.1124>

Karlsson, M., Sochor, J., Aapaoja, A., Eckhardt, J. & König, D. (2017). Deliverable 4: Impact Assessment. *Communities*. MAASiFiE project funded by CEDR.

Kates, R. W., Parris, T. M. & Leiserowitz, A. A. (2016). Editorial-What Is Sustainable Development? Goals, Indicators, Values, and Practice, 1–13.

König, D., Eckhardt, J., Aapaoja, A., Sochor, J. & Karlsson, M. (2016). Business and operator models for MaaS, (3).

- Lovins, A., Lovins, L. & Hawken, B. (1999). A roadmap for natural capitalism. *Harvard Business Review*, (1–14).
- Low, N. (2012). Transforming Urban Transport. *Transforming Urban Transport: The Ethics, Politics and Practices of Sustainable Mobility*, 1–268.
<https://doi.org/10.4324/9780203083864>
- MaaS Global. (2017). Whim - Better than owning a car. Retrieved June 3, 2017, from <http://maas.global/whim/>
- Mobility, R. T. (2013). Radiuz – Total Mobility. Utrecht.
- mobility mixx. (2013). Persbericht Mobility Mixx lanceert nieuwe zakelijke OV-chipkaart.
- Mobility Mixx. (n.d.). Met Mobility Mixx in de driver ' s seat.
- Mobility Mixx. (2015). Handleiding voor budgethouders.
- Mobility Mixx. (2017). Een nieuwe kijk op zakelijke mobiliteit. Retrieved June 3, 2017, from <https://mobilitymixx.nl/home.html>
- Nes, R. Van. (2002). *Design of multimodal transport networks: A hierarchical approach. Proefschrift*. <https://doi.org/90-407-2314-1>
- Newmann, P. & Kenworthy, J. (1989). *Cities and Automobile Dependence: A sourcebook*. Aldarshot, UK: Gower Technical.
- NS.nl. (n.d.). Flexibiliteit en gemak met de NS-Business Card. Retrieved June 1, 2017, from <http://www.ns.nl/zakelijk/ns-business-card?gclid=CJrlptW5sNQCFQIG0wod4R4NGQ>
- NS Business Card. (2007). NS-Business Card . Ontspannen reizen is ontspannen zakendoen . NSbusinesscard.nl.
- Parkhurst, G. (2000). Influence of bus-based park and ride facilities on users' car traffic. *Transport Policy*, 7(2), 159–172. [https://doi.org/10.1016/S0967-070X\(00\)00006-8](https://doi.org/10.1016/S0967-070X(00)00006-8)
- Parkhurst, G., Kemp, R., Dijk, M. & Sherwin, H. (2012). Intermodal Personal Mobility. In *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport* (pp. 308–334).
- Radiuz, M., App, R. R., App, D. R., App, R., Reisplanner, R., Mobiliteitskaart, D. R. & App, R. R. (2012). Radiuz veelzijdig vervoermiddel, (April).

- Radiuz Total Mobility. (2013). Radiuz maakt mobiliteit beheersbaar.
- Radiuz Total Mobility. (2017). Retrieved June 2, 2017, from <https://www.radiuz.nl/>
- Schäfer, A., Heywood, J., Jacoby, H. & Waitz, I. (2009). *Transport in a Climate-Constrained World*. Cambridge and London: MIT Press.
- Schiller, L., Bruun, E. & Kenworthy, J. (2010). *An Introduction to Sustainable Transportation, Policy, planning and implementation*. London and Washington DC: Earthscan.
- Smith, A., Vo??, J. P. & Grin, J. (2010). Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy*, 39(4), 435–448. <https://doi.org/10.1016/j.respol.2010.01.023>
- Sochor, J., Stromberg, H. & Karlsson, I. C. M. (2015). Implementing Mobility as a Service Challenges in Integrating User, Commercial, and Societal Perspectives. *Transportation Research Record*, (2536), 1–9. <https://doi.org/10.3141/2536-01>
- Spickermann, A., Grienitz, V. & Von Der Gracht, H. A. (2014). Heading towards a multimodal city of the future: Multi-stakeholder scenarios for urban mobility. *Technological Forecasting and Social Change*, 89(April), 201–221. <https://doi.org/10.1016/j.techfore.2013.08.036>
- Systems, C. T. (2016). MOBILITY AS A SERVICE The Transport Systems Catapult is the, (July).
- Timmermans, B. (2016). Presentatie Fleetacademy. XXiMO.
- Tol, L. (2017). *Mobility as a Service, Ecosysteem en Belemmeringen MaaS in Nederland*. Rotterdam, Nederland.
- Weber, K. M. & Hemmelskamp, J. (2005). *Towards an Environmental Innovation System*. Berlin: Springer.
- Wessels, P. (n.d.). MAASIFEST! Uitdagingen op weg naar MaaS. Mobility Mixx.
- Whitelegg, J. (1997). *Critical Mass: Transport, environment and society in the 21st Century*. London: Pluto Press.
- XXiMO. (2017). De meest complete mobiliteitskaart. Retrieved June 3, 2017, from <https://www.xximo.nl/>

Appendix I

Content analysis coding schemes.

Theme I: Business Model

	Value proposition for employers	Value proposition for employees	Supply Chain	Customer Interface	Financial Model
Radiuz Total Mobility (Kadouch, 2016; Mobility, 2013; Radiuz et al., 2012; “Radiuz Total Mobility,” 2017; Radiuz Total Mobility, 2013)	<p>“interne afwegingen, Wat drijft de klant: 1. Kosten 2. Flexibiliteit 3. Milieu.”</p> <p>“MaaS, de dienstverlening van Radiuz”</p> <p>“integrator, informatie, betalen naar gebruik, One-stop-shop.”</p> <p>“integrator, informatie, betalen naar gebruik, One-stop-shop.”</p> <p>“Reis efficiënter, duurzamer en voordeliger van deur tot deur”</p> <p>Business cases:</p>	<p>“MaaS, de dienstverlening van Radiuz”</p> <p>“integrator, informatie, betalen naar gebruik, One-stop-shop.”</p> <p>“Reis efficiënter, duurzamer en voordeliger van deur tot deur”</p> <p>“met keuzevrijheid maak je bewustere afwegingen”</p>	<p>“samenwerken met Lease Maatschappijen... Oplaadtransacties elektrisch vervoer... integratie tijdelijke auto voorziening (pool)”</p> <p>Diensten rondom auto zijn ook inbegrepen bij de service: bijvoorbeeld Tankkaart, Parkeren.</p>	<p>“App” bevat een multimodale reisplanner. Elke vervoersoptie wordt getoond met inzicht in de CO2 bijdrage, de prijs en de reistijd. Inzicht in de CO2 bijdrage levert volgens het bedrijf vanzelf tot bewuste keuzes.</p> <p>“Full Service Mobiliteitsplatform met inzicht in</p>	<p>Het financiële model van Radiuz is gebaseerd op een aantal onderdelen: “tarief per aansluiting werknemer 1 x €30,-.”</p> <p>Bestaande uit: “Kosten voor registratie, aanmaak pas, inregelen gewenste voorzieningen, instructiepakket, communicatie uitgifte pas.”</p>

	<p>I: “Kostenbesparingen ov”</p> <p>“Radiuz verlaagt de ov-kosten van personeel”</p> <p>II: “inzicht in hybride”</p> <p>Radiuz geeft inzicht in en beperkt brandstofgebruik in gebruik van hybride auto’s.</p> <p>III: “Realiseren CO2 reductie”</p> <p>IV: “Radiuz als one-stop-shop”</p> <p>“korting op regionale (bus) vervoerders”</p> <p>“20% korting op NS na 09:00”</p> <p>diensten rondom de auto</p>	<p>“gemak werknemer:</p> <ul style="list-style-type: none"> • ‘Pay as you Go!’ • Altijd Saldo, direct toegang • Keuzevrijheid rondom mobiliteit en werken • Slim werken, slim reizen • Administratie georganiseerd • Geen declaraties • Bewust met bijdrage aan een betere wereld” <p>“Radiuz en duurzaamheid: Meten is weten CO2 rapportage</p>	<p>Uit een van de dia’s is af te leiden dat de supply chain van Radiuz mobility bestaat uit: Ov, fiets, scooter, (deel/huur) auto, taxi, tanken, parkeren en administratie.</p>	<p>complete mobiliteit per medewerker”</p> <p>“Gebruiker krijgt eigen multi modale reisplanner. De app is beschikbaar via iPhone, Android en via m.radiuz.nl. De complete reis van deur tot deur kan via diverse combinaties worden berekend. Naast gewonnen effectieve werktijd en kostenverlaging, wordt hier steeds de CO₂ reductie aangegeven. Alle betrokken medewerkers krijgen</p>	<p>Daarnaast wordt een maandelijkse bijdrage gevraagd voor toevoeging van extra diensten:</p> <p>“administratie en support, toegang tot multi-channel service desk, persoonlijke rapportages per 24 uur, aanleveren data t.b.v. bduget analyse. P.m €1,50.”</p> <p>“ov en trein zijn gratis”</p> <p>“radiuz mobiliteitspas extra diensten” bv ov-</p>
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	<p>inbegrepen: tanken, opladen, parkeren etc.</p> <p>“samenwerken met lease maatschappijen .. opaadtransacties elektrisch vervoer.. integratie met tijdelijke auto voorziening (pool)”</p> <p>“facturering”</p> <p>“gemak werkgever: • Efficiency en productiviteit</p> <ul style="list-style-type: none"> • Verlaging Administratieve druk • Partner met vast systeem • Lagere kosten door gericht reizen • Verlichting parkeerdruk op eigen parkeerplaatsen 	<p>Keuzevrijheid terug bij de werknemer</p> <p>Het aanbieden van faciliteiten zorgt voor gebruik</p> <p>Gemakspropositie stimuleert meerverbruik</p> <p>Radiuz is een officiële Lean & Green Solution”</p>		<p>toegang tot de Radiuz app.”</p>	<p>fiets en fietsenstalling: €1,00 p.m.</p> <p>“mobiliteitsplatform, niet uitcheckservice €0,25 p.m., incasseren bij medewerkers €2,50 p.m., registratie km gebruik eigen auto €1,00 p.m.”</p>
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	<ul style="list-style-type: none"> • Duurzamer ondernemen” <p>“Radiuz en duurzaamheid: Meten is weten CO2 rapportage Keuzevrijheid terug bij de werknemer Het aanbieden van faciliteiten zorgt voor gebruik Gemakspropositie stimuleert meerverbruik Radiuz is een officiële Lean & Green Solution”</p>				
<p>Mobility Mixx (Mobility Mixx, 2013; Mobility</p>	<p>“Mobility Mixx, de service provider die voor alle medewerkers die zakelijke reizen maken</p>	<p>“uw werknemers kunnen zelf kiezen en combineren”</p>	<p>“uw medewerkers kunnen een treinreis, taxitrit, huurauto of poolauto boeken”</p>	<p>“de Mobility Card. Met die kaart kunnen zij reizen op de</p>	

<p>Mixx, n.d., 2015, 2017; Wessels, n.d.)</p>	<p>een integrale oplossing heeft.”</p> <p>“minder tijd verloren aan zakelijk reizen, betekent een verhoging van de arbeidsproductiviteit”</p> <p>“met het Mobility Mixx systeem biedt u uw medewerkers een veilig en schoon alternatief”</p> <p>“geen overvolle parkeerplaatsen en reisdeclaraties meer”</p> <p>“beheersbare mobiliteit binnen het bedrijf”</p>	<p>“met het Mobility Mixx systeem biedt u uw medewerkers een veilig en schoon alternatief”</p> <p>Voordelen voor de werknemer:</p> <p>• Keuzevrijheid: werknemers kunnen de vervoersoplossing kiezen, die het beste past bij hun wensen en mogelijkheden.</p> <p>• Gemak: werknemers hebben een volwaardig alternatief voor de</p>	<p>Mobility Mixx biedt bedrijven de mogelijkheid gebruik te maken van een eigen poolauto’s die ter beschikking worden gesteld aan een bedrijf: SamSam autodelen.</p>	<p>manier die hun het beste uitkomt”</p> <p>“Uw medewerkers kunnen een treinreis, taxirit, huurauto of poolauto boeken via de website van Mobility Mixx of het callcenter. Ook kunnen zij een OV-fiets huren en parkeren op P+R terreinen.</p> <p>Bij het boeken van de reis krijgen zij een helder reisadvies. Is de reis geboekt, dan is de Mobility Card het vervoersbewijs.</p> <p>Kortom,</p>	
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	<p>Mobility Mixx levert ook mobiliteitsbudgetten en de administratie daarvan: “Met een mobiliteitsbudget van Mobility Mixx biedt u uw medewerkers een fiscaal aantrekkelijke mobiliteitsoplossing én uw mobiliteitskosten worden beter budgetteerbaar”</p> <p>Voordelen voor de werkgever: “• Goed werkgeverschap: u biedt uw medewerkers keuzevrijheid én een vervoersoplossing</p>	<p>eigen auto en hoeven geen geld voor te schieten.</p> <ul style="list-style-type: none"> • Efficiënt reizen: met een compleet reisadvies van deur tot deur kunnen werknemers hun reis optimaal plannen.” <p>“Voordelen voor de maatschappij</p> <ul style="list-style-type: none"> • Filereductie: als u uw medewerkers reisfaciliteiten biedt, komen zij minder vaak met de auto naar kantoor. Dit leidt tot minder auto's op de weg. 		<p>uw medewerkers zijn altijd reisklaar.</p> <p>Zonder gedoe met kaartjes en zonder declaraties.”</p>	
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	<p>op maat. En door het aanbieden van schone en veilige alternatieven voldoet u aan uw zorgplicht.</p> <ul style="list-style-type: none"> • Vermindering van de parkeerproblematiek: het aanbieden van zakelijke reismogelijkheden leidt tot wel 20% minder auto's op uw parkeerplaats. • Heldere facturen: u krijgt hiermee zicht op kosten en kilometers en mobiliteitskosten worden budgetteerbaar. • Kostenvermindering: Mobility Mixx biedt korting op de vervoerstarieven. 	<ul style="list-style-type: none"> • Minder CO2-uitstoot: met de trein reizen of met een schone poolauto in plaats van met de privé-auto levert milieuwinst op en draagt bij aan de verkeersveiligheid.” 			
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	<ul style="list-style-type: none"> • Geen declaraties: met de Mobility Card hoeven uw medewerkers geen geld voor te schieten.” <p>Kortom Mobility Mixx biedt:</p> <p>Kostenreducering + Efficiency + Inzicht + Keuzevrijheid + Medewerkerstevredenheid + MVO-doelstellingen.</p> <p>Op de website is daar ook uurzaam reizen aan toegevoegd.</p>				
<p>NS Business Card</p> <p>(NS.nl, n.d.; NS-Business Card, 2007)</p>	<p>“NS-Business Card. Ontspannen reizen is ontspannen zakendoen”</p> <p>“eenvoudig en snel uw reis boeken” telefonisch</p>	<p>“NS-Business Card. Ontspannen reizen is ontspannen zakendoen”</p>	<p>Ov fiets, parkeren op p+R, trein, taxi, Greenwheels auto, treintaxi en KPN hotspots.</p>		

	<p>of online via pincode en kaartnummer.</p> <p>“Eén kaart voor trein, (Trein)taxi, OV-fi ets en Q-Park parkeerterreinen</p> <ul style="list-style-type: none"> • Online of telefonisch boeken • Gespecificeerde factuur rechtstreeks naar de werkgever • 20% korting op alle treinreizen in de daluren • 10% korting op alle taxiriten • KPN HotSpots <p>abonnement betalen via de NS-Business Card</p> <ul style="list-style-type: none"> • Extra services zoals een gratis Greenwheels abonnement 	<p>“eenvoudig en snel uw reis boeken”</p> <p>telefonisch of online via pincode en kaartnummer.</p>			
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	en toegang tot de NS Lounge”				
XXImo (Timmermans, 2016; XXImo, 2017)	<p>“seamless tools 1 kaart, 1 app een webbased mobility management system”</p> <p>Dit maakt het mogelijk om vier belangrijke services in een oplossing te integreren: Transacties, onkostenmanagement, reismanagement en kostenbesparing</p> <p>“XXImo steunt en stimuleert energiezuinig, milieuvriendelijk en duurzaam vervoer. Het principe van de XXImo</p>		<p>“samenwerking met ClimaCount. ClimaCount heeft in samenwerking met CE Delft een methodiek ontwikkeld om de CO2 uitstoot te berekenen. Voor elke soort transactie die met de XXImo Mobility Card wordt gedaan, is een CO2-belastingsfactor door CE Delft vastgesteld. Deze factoren worden periodiek door TNO gecontroleerd”</p>		<p>“XXImo werkt met vaste, concurrerende tarieven per XXImo Mobility Card en per mobiliteitsoptie. Afhankelijk van de mobiliteitsopties die u kiest, wordt de kaartbijdrage maandelijks bepaald. De maandelijks basiskosten (ad. € 2,95 per maand per kaarthouder) worden zes maanden vooruit in rekening gebracht. Eventuele aanvullende mobiliteitsopties en/of mutaties worden direct</p>

	<p>Mobility Card biedt meer flexibiliteit en maakt reizen met het openbaar vervoer, car sharing en elektrisch rijden aantrekkelijker. Door vaker voor dit soort opties te kiezen, kunnen we een CO2 reductie realiseren. CO2 reductie is cruciaal bij het leefbaar houden van de aarde. XXImo heeft voor haar kaarthouders tevens inzichtelijk gemaakt hoeveel CO2 zij uitstoten per reis, om zo duurzaam reizen te stimuleren.”</p>		<p>XXImo werkt via een visa kaart. Naast de opties die Radiuz, NS business card en Mobility Mixx bieden, biedt XXImo ook de mogelijkheid vliegtickets, hotelovernachtingen, zakelijke diners etc bij de maandelijkse factuur in te sluiten, doordat dit mogelijk wordt gemaakt door de visa betalingsmogelijkheid.</p> <p>De reismogelijkheden en aanverwante diensten van XXImo zijn: Tanken, parkeren</p>	<p>per maand in rekening gebracht en gespecificeerd op de verzamelfactuur. Op deze manier helpt XXImo u om uw administratie makkelijk en overzichtelijk te houden. Terwijl u flexibel bent om de XXImo-dienstverlening direct op maat in te richten en te muteren door simpel diensten per kaarthouder (per maand) aan en uit te zetten in de beveiligde online XXImo-selfservice module.</p>
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	<p>“Milieuvriendelijk reizen met XXImo – de voordelen</p> <ul style="list-style-type: none"> • XXImo biedt u meer flexibiliteit en milieuvriendelijke oplossingen • XXImo geeft u duidelijk inzicht in de CO2 uitstoot van uw bedrijf • Per type dienst inzichtelijk hoe milieuvriendelijk deze optie is • Er wordt meer bewustzijn gecreëerd 		<p>en tol, ov, taxi, internationaal reizen, autodelen/flexcar, auto wassen , btw terugvragen, visa en elektrisch laden.</p>		<p>Uiteraard betaalt u alleen voor de opties die u per maand aanzet. Wilt u met de XXImo Mobility Card bijvoorbeeld alleen tanken in Nederland en parkeren in garages? Dan betaalt u slechts € 2,95 per maand. Kiest u daarnaast voor internationaal reizen en betalen in horeca en vergaderlocatie? Dan kost de XXImo Mobility Card € 5,20 per maand. Maak hieronder de keuze uit de verschillende</p>
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	<ul style="list-style-type: none"> • Mogelijk positief effect op de kosten en gezondheid van werknemers” 				producten en services naar uw behoefte en zie direct wat de XXImo Mobility Card zal kosten.”
Whim, MaaS Global (Hietanen, 2016a, 2016b; MaaS Global, 2017)	<p>Since MaaS Global is not aimed at the Business segment, there is no distinction between value proposition for employees and employers.</p> <p>“Decrease need to own a car by ensuring plethora of alternatives and making it as easy as possible to use them”</p> <p>“Market opportunity: Savings in car expenditure”</p> <p>“We want to:</p> <ul style="list-style-type: none"> • Give you back 90 minutes to your day • Make sure you have freedom of movement • Take away the pain of ‘how do I get there’ 	<p>Integration of several transportation services: bike and car sharing, car rental, public transport.</p> <p>But also real-time travel management, journey planning, incentives, smart parking etc. all kinds of connected services are part of mobility as a service according to MaaS Global</p>	<p>“Variety of operators and transport providers, in one platform, one single solution (app).”</p> <p>“Much More than a Trip Planner DOOR-TO-DOOR JOURNEYS, ALL YOUR TRIPS, FROM A TO B TO Z – WITH AN ENJOYABLE EXPERIENCE”</p>	<p>Converged transportation tailored to your needs in different mobility packages. Or monthly subscriptions</p> <p>Different payment methods:</p> <p>Single journey customers,</p> <p>Mobility package customers,</p> <p>Hybrid customers.</p>	

	<ul style="list-style-type: none"> • Make sure you're not a polluter” <p>MaaS Global states that its service has value for different stakeholders:</p> <p>“CONSUMER Tailored, situation-specific mobility for the user’s needs</p> <p>TRAFFIC OPERATORS Increased profit through volume, efficiency and demand response</p> <p>OTHER OPERATORS Profit share and new business, ecosystem benefits</p> <p>CITIES AND THE STATE Better service-level for the citizen, budget savings, decrease of congestion, air quality, etc...</p> <p>OTHER COMPANIES Platform to integrate services, platform to innovate new services”</p>		<p>“Monthly Subscription for All Transportation PAYMENT AND TICKETING HANDLED IN THE BACKGROUND, ALL YOUR TICKETS IN ON PLACE”</p> <p>“Everything’s Set at a Press of a Button SIMPLE AND EASY CUSTOMER EXPERIENCE AT THE CORE”</p>	
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	MaaS can lead to new business (Economic), traffic emissions target (environmental) and reduce the need to own a car leading to traffic fluency and parking space (transport).			
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Theme II target audience

Radiuz Total mobility	“De zakelijke reiziger” zowel degenen die al met het ov reizen als reizigers die nu een lease auto bezitten.
Mobility Mixx	Bedrijven: “Heeft uw bedrijf een overvolle parkeerplaats? Verwerkt u nog jaarlijks honderden declaraties voor het gebruik van de trein of privé-auto? Wilt u uw medewerkers eigenlijk meer flexibiliteit bieden? En neemt u de verantwoordelijkheid voor uw medewerkers én voor het milieu serieus?”
NS business Card	Bedrijven: “ Voor ZZP'ers biedt de NS-Business Card veel vrijheid en voordelen. Het is een gratis kaart waarmee u elke dag kunt kiezen hoe u reist; Voor ondernemers in het MKB en voor uw collega's die elke dag kunnen kiezen hoe ze willen reizen. U heeft altijd inzicht in de reiskosten en betaalt alleen voor de gemaakte reizen met 1 overzichtelijke rekening achteraf; Voor Grootzakelijke bedrijven. U regelt het zakelijk reizen met NS Zakelijk tegen de laagste kosten en op de meest eenvoudige en duurzame wijze. Wij adviseren en bieden u maatwerk met de NS-Business Card”.
XXImo	Bedrijven: “De XXImo mobiliteitskaart is er voor elke ondernemingsvorm: ZZP, Geen gedoe meer met bonnetjes en declareren - dat wilt u toch ook? MKB, Ontdek hoe uw organisatie kan besparen op reiskosten. Grootzakelijke markt, Meer overzicht op de reiskosten binnen uw organisatie? Reseller, ontdek hier de voordelen voor u”

Whim, MaaS Global	Users are segmented: “The tourist, The urban Single, The sub-urban Family and the long distance commuter... Determinants of travel needs are the basis for pricing, and service level agreements”
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