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Declaration concerning the TU/e Code of Scientific Conduct for the Master's thesis

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Summary

Introduction

The current automobility system is a major contributor to CO_2 emissions, which contributes to anthropologic activity that impacts climate change (Lipman & Delucchi, 2006). Climate change has led to rethinking the mobility system based on combustion engines (Kley et al, 2011). Electric vehicles (EVs) and plug-in hybrids are seen by many countries as a way forward to decarbonize the private transport sector (Shepherd, Bonsall & Harrison, 2012). However, the problems that arise through urbanization such as air pollution, traffic congestion and shortage of parking spaces can be addressed more effectively. Carsharing can be a solution to these problems, by reducing private car ownership and reducing single vehicle trips. Several carsharing business models can be identified in the Netherlands, all contributing to the growth of the carsharing business. Although, a lot of research on the topic of carsharing is conducted, it is still unclear how the different electric carsharing initiatives and their business strategies add up to each other and lead to development of the niche. In this explorative study, different business strategies will be identified which influenced the development of the electric carsharing niche in the Netherlands.

Theory

In this research, theory on business models is needed, because we are interested in the development of companies and initiatives that exploit shared EVs. When linking business models to sustainable innovation, Boons and Lüdeke-Freund (2013) proposed four normative requirements that have to be met in order for marketing sustainable innovation: value proposition, supply chain, customer interface and a financial model. Theory on strategic niche management (SNM) is needed in order to describe how successful the emergence of a new niche is, that is; providing the articulation of expectations and visions, providing the building blocks of social networks and learning processes at multiple dimensions. The Multi-level Perspective is used because it provides more contextualization to the niche. MLP distinguishes the niche, regime and socio-technical landscape level. Between these levels, interdependent processes occur that influences the direction and pace of the transition.

Method

In this research, a case study design is chosen. By researching 'Electric Carsharing in the Netherlands' as a single case, processes can be investigated in-depth. Electric carsharing in the Netherlands is the bounded system. Ten electric carsharing initiatives in the Netherlands are used for analysis. Since an understanding of the different business strategies is needed, a qualitative research approach is taken. Content analysis was chosen for structuring the interviews, because

the aim of the study is to explore how the different business models and business strategies add up to niche creation and development. Content analysis was used for finding the context relative to the categories that were found.

Results and conclusion

There are seven important elements of business strategies that impacted the development of the electric carsharing niche so far. First of all, ICT, software development and data analysis is becoming more important for electric carsharing initiatives. Secondly, in the emerging shared EV niche, there is a strong collaboration and involvement of the initiatives with the auto-mobility regime (car rental companies). Thirdly, governmental organizations (municipalities, provincial government and national government) are important customers, partners and facilitators of the electric carsharing initiatives. Fourthly, initiatives are leaning more towards multimodal mobility solutions. Fifthly, electric carsharing initiatives put more emphasis on behavioral change when it comes to establishing customer relationships. The sixth element holds that smaller initiatives make great use of local communities, while bigger initiatives put more emphasis on extensive marketing. The seventh important element of a business strategy is the collaboration between initiatives. Because there is little competition, the incentive is higher to work together and lessons are learned more globally.

The e-carsharing niche consists of a wide range of different types of initiatives, where business strategies are rather divergent. The transformative potential of the niche is not considered to be large, because of the fact that the niche is largely dependent on the automobility (rental) regime, IT regime, municipalities and government. The sustainability potential of the niche is uncertain, because most initiatives are economically driven.

Contents

1   Introduction

The increase in greenhouse gas emissions that is caused by increasing urbanization creates new challenges for urban environments. The World Health Organization (WHO) states that by 2050, the urban population will almost double, increasing from 3.4 billion in 2009 to 6.4 billion in 2050 (World Health Statistics, 2013). Furthermore, in 2050, 67% of the world population will live in urban areas, whereas in 2014 only 54% of the world population was urban (United Nations, 2014). Therefore, many experts are concerned that the increase in urban population will lead to problems in the automobility system concerning air pollution, traffic congestions and increase in vehicle accidents (Shaheen, Chan & Micheaux, 2015). Also shortages of parking spots are essential problems that the automobility system faces (Christie, Koymans, Chanard, Lasgouttes & Kaufmann, 2016).

Moreover, the current automobility system is a major contributor to CO_2 emissions, which contributes to anthropologic activity that impacts climate change (Lipman & Delucchi, 2006). According to the International Panel of Climate Change (IPCC), the transport sector represented 11% of the increase in GHG emissions worldwide between 2000 and 2010, and the transport sector showed the fastest growth of greenhouse gas emissions (Ferrero, Perboli, Vesco, Musso & Pacifici, 2015).

In other words, climate change has led to rethinking the mobility system based on combustion engines (Kley et al, 2011). Electric vehicles (EVs) and plug-in hybrids are seen by many countries as a way forward to decarbonize the private transport sector (Shepherd, Bonsall & Harrison, 2012). EVs reduce the environmental footprint of the automotive sector, provided that the electrical energy is generated from sustainable energy sources (Jacquillat & Zoepf, 2017). Furthermore, an EV is four times as efficient in energy use in comparison to a fossil fueled car (MacKay, 2008). As a consequence of technological improvements, several electric vehicles (EVs) have been introduced and greater market penetration is expected. For example, since 2004, the number of companies producing EVs have substantially increased (Sierzchula et al, 2012). It is expected that the total cost of ownership of an EV will be cost competitive with internal combustion engines in 2024 (ING, 2015).

Thus, electric vehicles have the potential to decrease the carbon footprint of mobility. However, Although these numbers are positive, and the EV niche seems well developed, there is still no domination of EVs (Sierzchula et al, 2012). Moreover, just replacing fossil fueled cars with EVs will not reduce the problems caused by the ongoing urbanization.

The problems that arise through urbanization such as air pollution, traffic congestion and shortage of parking spaces can be addressed more effectively. Car sharing can be a solution to these problems, by reducing private car ownership and reducing single vehicle trips. Car sharing is defined as short-term vehicle access among members who share a car or car fleet that is maintained, managed and insured by a third-party organization (Shaheen et al, 2015). The rates

include maintenance, fuel and insurance. Next to these traditional forms of carsharing, peer-to-peer carsharing is a form where privately owned vehicles are available for use by members in the surrounding area on a daily basis. The promise is, that in this way, cars are used more efficiently. In 2012, there were almost 1.8 million car sharing members distributed over 43500 car sharing vehicles worldwide (Shaheen & Chan, 2015). It is expected that the number of car-sharing members will continue to grow from 2.3 million in 2013 to 12 million members by 2020 (Degirmenci & Breitner, 2014).

Carsharing works best in dense urban neighborhoods, campus or business settings. Here, users can walk, bike and share rides or take public transit to access the shared cars. There has been a proliferation of different carsharing business models, where the most prominent are: neighborhood residential (business to consumer), business (business to business) and personal vehicle sharing (peer to peer). The vehicles are most often deployed from parking spaces in neighborhoods, public transit stations or business parks (Shaheen & Cohen, 2013).

Recently, new business models have emerged due to e-mobility developments. E-mobility consists of electric vehicles (EVs), hybrid vehicles and also scooters. Furthermore, keyless access to cars and the ability to conduct in one-way trips have been a catalyst to new e-carsharing business models (Shaheen & Chan, 2015). EVs are particularly interesting for carsharing purposes due to the low operational costs in comparison to fossil fueled cars. The high initial costs of the vehicle's electric battery is distributed from one driver to many. Experts expect a greater potential for EVs in carsharing in the future (Shaheen & Camel, 2016). For example, next generation EVs are made at lower costs than before with longer range batteries (Shaheen & Camel, 2016). Moreover, up to 7000 kilometers, using a shared EV is cheaper than using a private car (Ferrero, Perboli, Vesco, Musso and Pacifici, 2015).

The mobility system is changing, and it is influenced by the increased use of information technologies (IT). New IT solutions are gearing the mobility system towards service based technologies like carsharing (Cohen-Blankshtain & Rotem-Mindali, 2016). The increased use of the IT in the mobility field started to evoke a promise of solving the challenges that the current automobility system faces (Manders et al, 2018). There are many contributions of ICT in the mobility sector (Manders et al, 2018). The worldwide trend is that carsharing experts believe that in the next five years a rise of EVs in shared fleets will continue (Shaheen & Camel, 2016).

The combination of EV and IT with the growing need for flexible mobility alongside CO_2 reductions has enabled the development of a range of new mobility initiatives such as carsharing services (Cohen-Blankshtain & Rotem-Mindali, 2016). Particularly the Netherlands has a well-established test environment for experimenting with different business models, according to various policy makers (Manders et al, 2018; Holland, 2016). The Netherlands already consists of established programs that began experimenting with carsharing services (Connecting Mobility,

2016). There is interest in carsharing among policymakers and the government, which is manifested into the 'Energy Agreement for Sustainable Growth' and the 'Green Deal' on carsharing.

In the beginning of the 1990s, carsharing first took hold in the Netherlands, as a result of incentives by the Ministry of Transport, Public Works and Water Management (KiM, 2015). A feasibility study was set up with the goal to help carsharing projects. The carsharing market is mostly visible in high-density urban areas. Amsterdam has the biggest number of shared cars. About 96% of Dutch municipalities (376 of 393 municipalities) have some form of carsharing scheme (KiM, 2015), which implicates a big involvement of public policy in carsharing schemes. A survey showed that about 1% of the Dutch population already made use of one or more types of carsharing schemes (TNS NIPO, 2014), which amounts for 0.02% of all car trips made in the Netherlands (KiM, 2015).

Several carsharing business models can be identified in the Netherlands, all contributing to the growth of the carsharing business. GreenWheels, Car2go, SnappCar, MyWheels and ConnectCar are seen as the biggest carsharing initiatives in the Netherlands (KiM, 2015). A common denominator for carsharing initiatives is the sustainability promise. Especially electric carsharing improves the appeal of carsharing due to its environmental, social and economic performance. The growing carsharing market also opens a new horizon for EV market penetration.

The emergence of electric carsharing in the Netherlands can be seen as a market which is protected from mainstream rental markets, because initiatives are often subsidized by government or municipalities. An important reason for governments to subsidize not yet profitable innovations is the expectation that they will become important for realizing societal or environmental goals in the future. In this way, electric carsharing initiatives can develop their business without the interference of competition that would otherwise outcompete their business. These e-carsharing initiatives are entry points for the creation and development of the shared EV market. Such a protective environment, in which the initiatives can develop their business without the threat of competitors, can be called a niche.

The e-carsharing initiatives are experimenting with new business models in a market that is dominated by incumbent auto-mobility companies, e.g. car-rental companies. There are different initiatives observable in the Netherlands with a variety of business strategies deployed. The business strategies are units of analysis in this research. The variety of e-carsharing initiatives are potentially transformative for the current auto mobility system.

There are many types of e-carsharing initiatives, each with their own barriers and challenges. Although, a lot of research on the topic of carsharing is conducted, it is still unclear how the different e-carsharing initiatives and their business strategies add up to each other and lead to development of the niche. It is also unclear how the different initiatives influence and learn from each other.

Studying this emergent niche requires combining knowledge of business models (for sustainability) and strategic niche development. It is important to research the e-carsharing niche, because these developments are seen as promising solutions for environmental pollution, traffic congestion and expensive parking. However, it is still unclear how this promise is manifested in the business strategies of the initiatives.

Thus, understanding how e-carsharing initiatives in the Netherlands shape the creation and the development of the niche is the goal of this research. This goal is translated into the following research question:

RQ: How do business strategies of electric carsharing initiators impact the development of the electric carsharing niche?

This main research question can be divided into the following sub-questions:

SQ1:   What is electric carsharing?

SQ2:   What e-carsharing business models and strategies can be identified?

SQ3:   How do these BMs and business strategies shape the creation and development of the niche?

2   Theory

In this chapter, the theoretical framework is explained. The theory chapter supports the multiple case-studies which are explored in order to find out in what way all the different electric carsharing initiatives contributed to niche development. Theory of business models, theory of business models for sustainability, strategic niche management, the relation of transition studies to business models and the multi-level perspective will be outlined in a way that it contributes to a better understanding of exploring an emerging electric carsharing niche.

2.1   Business models

A general way of describing a business model is: "a description of an organization and how that organization functions in achieving its goals (Massa, Tucci & Afuah, 2017). Those goals can be growth of the company, social impact or sustainability goals for example.

In the past, business models were seen as strategic theories that were mostly based on competitive advantage. For example, companies with the lowest average costs will make a profit. However, newer businesses showed that creating something as efficient as possible and selling it for the highest price possible is not the only way in which value can be added to a product. For example, Xerox (printer firm) increased its revenues by leasing their printers instead of selling them, and Über and Airbnb are companies that operate in between supply and demand. They rely on house owners and car drivers to generate revenue.

There is not one specific definition for business models. In general, business models can be seen in three different ways. First of all, business models can be seen as an artifact, in which researchers study exactly how the company operates and makes its revenue. Secondly, business models can be seen as a cognitive scheme, on which managers think and try to run a business. Thirdly, business models are seen as a formal representation which is a simplification of the complex environment and is used to articulate the business model (Massa et al., 2017). There is consensus that at the most basic level a business model describes how a firm creates and captures value (Baden-fuller and Haefliger, 2013) The business model describes the complex set-up of transactions within a value network which transcends the focal firm and will be geared towards value creation for all parties involved (Bidmon & Knab, 2014). According to Boons and Lüdeke-Freund (2013), a BM is a plan which specifies how a new venture becomes profitable (Boons & Lüdeke-Freund, 2013). Another definition of BMs state that it is a mediating device that captures the value of a firms' innovative technology by connecting it to customer needs (Teece, 2010). Business models are thus a strategic management tool to improve a company's value chain. BMs are strategy oriented, driven by market competition. The definition of a business model that best fits this thesis is the following:

'The business model describes how a firm creates and captures value in a value network, which transcends the boundaries of the focal firm. It is both, a market device to commercialize innovative technology and subject to innovation' (Bidman & Knab, 2014).

When linking business models to sustainable innovation, Boons and Lüdeke-Freund (2013) proposed four normative requirements that have to be met in order to marketing sustainable innovation.

Sustainable development is a process where ecological, economic and social values are balanced in a continues action (Boons & Lüdeke-Freund, 2013). Four elements of a business model that support the development of sustainable innovations are identified by Boons and Lüdeke-Freund (2013) as: value proposition, supply chain, customer interface and a financial model. Each element of the sustainable business model will be outlined below:

Value proposition: The relationship between a company and customer is built around the exchange of value. The value proposition is a value to be delivered, where the customer has a belief how that value will be experienced. In the field of sustainability, it is a promise of the value proposition that social, ecological and economical values go in harmony with each other. A balance of such values are necessary for both existing and new products or services. For existing products or services, the balance is embedded in existing practices and for new products or services such a balance is actively pursued by participants in evolving networks of producers, consumers and other actors. A measurable ecological, social and economic value is needed, in order to pursue sustainability goals.

Supply chain: The supply chain is a network between a producer (company) and suppliers to produce a product or service. In the field of sustainability, this means that the suppliers have to take responsibility towards their own company as well as to the company's stakeholders. The sociological and ecological burdens are not shifted to suppliers. This means that suppliers are actively engaged into a supply chain management which is sustainable (Boons & Lüdeke-Freund, 2013).

Customer interface: Each type of interaction between a customer and an organization is known as the customer interface. For sustainability, this means that it's essential that the focal company does not shift ecological and social burdens to its customers, whereas customers are motivated to take responsibility for their consumption (Boons & Lüdeke-Freund, 2013). The customer relationships are set up in recognition of the company specific challenges resulting from an individual supply chain configuration (Hart and Milstein, 1999).

Financial model: The financial model represents the costs structure of the company as well as the revenue streams. For sustainability this means an appropriate distribution of economic costs and benefits among all the actors involved is necessary in the business model, as well as accounting for the social impact and ecological impact, which is also appropriately distributed among actors. In this way, sustainable business models can be maintained.

In this research, the focus lies on exploring the development of electric carsharing in the Netherlands. While an innovation is often distinguished from an invention by the additional condition of a successful market introduction, the way through which firms succeed in bringing innovations or inventions to the market is still underexplored in the field of sustainable innovation (Boons & Lüdeke-Freund, 2013).

These four normative requirements are needed to ensure that sustainable business models contribute to successful marketing of the sustainable innovation (Boons & Lüdeke-Freund, 2013). Given the fact that there is no precise or established definition of sustainable innovation, Arthur D. Little (2004) defined 'sustainability-driven' innovation as 'the creation of new market space, products and services or processes driven by social, environmental or sustainability issues' (Katerva, 2017).

The diffusion and development of innovations is often challenging, because economic barriers and acceptance among users have to be overcome. For radical innovations sometimes the whole socio-technical system needs to change. Thus, sustainable business models which commercializes the sustainable innovation have to fit from a technical point of view, from an organizational point of view and has to solve sustainability problems.

It is not clear in what way a transition towards more sustainable modes of development can be achieved. Sustainable innovations that fulfil user requirements in terms of performance and price are often not on the market (Kemp, Schot & Hoogsma, 1998). Long development times and the need of change for different levels in an organization, technology, infrastructure and the wider social and institutional context provide uncertainty and provide barriers. Institutionalized organizational memory like business rules can be a barrier for development, if a business model is fully developed. Another obstacle is the external business environment. For example, in the auto-mobility industry, high capital intensity and resilience to new technologies can lead to locked-in business models (Boons & Lüdeke-Freund, 2013). Moreover, uncertainty of market demand and social gains provide barriers for diffusion. The question of how the potential of sustainable innovations may be exploited was addressed by Kemp et al (1998). They developed the theory of strategic niche management (SNM).

2.2   Strategic Niche Management (SNM)

The strategic niche management (SNM) approach can facilitate sustainable innovation journeys by creating technological niches (i.e. protective spaces). Protective spaces can bring new sustainable technologies on to the market (Kemp et al, 1998). Kemp et al (1998) provide SNM with the following definition: "strategic niche management is the creation, development and controlled phase-out of protected spaces for the development and use of promising technologies by means of experimentation, with the aim of (1) learning about the desirability of the new technology and (2) enhancing the further development and the rate of application of the new technology" (Kemp et al, 1998).

In transition studies, strategic niche management (SNM) has emerged primarily from science and technology studies, and has links with evolutionary economics (Budde, Alkemade & Weber, 2012). In SNM, sustainable innovation journeys like electric carsharing can be facilitated by

creating niches (Schot & Geels, 2008). Niches can be defined as a protective space for radical and path breaking alternatives (Kemp, Schot & Hoogsma, 1998). Niches are necessary because socio-technical regimes are stable and resistant to change due to lock-in mechanisms. Therefore, sustainable innovations are crucially dependent upon the activity of niches. Protective spaces allow the experimentation of the niche with the co-evolution of technology, user practices and regulations (Schot & Geels, 2008). In SNM, there are three internal niche processes that determine how successful the emergence of a new niche is, that is; the articulation of expectations and visions, the building blocks of social networks and learning processes at multiple dimensions. The three internal niche processes are described in more detail:

Expectations: Expectations can contribute to the development of a niche if expectations are made robust (shared by many actors), if they are made specific and have high quality (the content of expectations is substantiated by projects) (Schot & Geels, 2008).

Social networks: The social networks have a positive impact on the development of a niche if the network is broad (multiple kinds of stakeholders that are included who articulate many views and voices). Here, also the involvement of relative outsiders is important for facilitating second-order learning (i.e. broaden cognitive frames). Next to broad networks, deep networks are necessary, where organizations are able to commit valuable resources within their network (Schot and Geels, 2008). Thus, the network needs to be broad and deep in order to create constituency behind the carsharing platforms, create interactions between the relevant stakeholders and provide the necessary resources (Schot & Geels, 2008).

Learning processes: The learning processes would contribute to niche development if the learning processes are not only directed at facts and data, but also enable changes in cognitive frames and assumptions (second order learning) (Schot and Geels, 2008). First order learning occurs through the accumulation of facts and data, whereas second-order learning is about changing assumptions and cognitive frames (Schot & Geels, 2008). These learning processes work at seven dimensions: 1: technical aspects and design specifications, 2: market, user preferences, 3: cultural and symbolic meaning, 4: infrastructure and maintenance networks, 5: industry and production networks, 6: regulations and government policy, and 7: societal and environmental effects.

Niche development can be processed at two levels: at the level of local projects and the global niche level. Many local projects have the potential to add up to an emerging niche at the global level (Schot and Geels, 2008). Local projects are the test beds and ideas in local projects are carried out by local networks and actors. The cognitive rules that shape these projects are still diffuse and unstable. However, if learning processes in these local projects are aggregated and compared, the rules may become more global and the niche level can become more global,

articulated and stable (Schot and Geels, 2008). The movement to a market niche only occurs when more stable rules are formed (Schot and Geels, 2008).
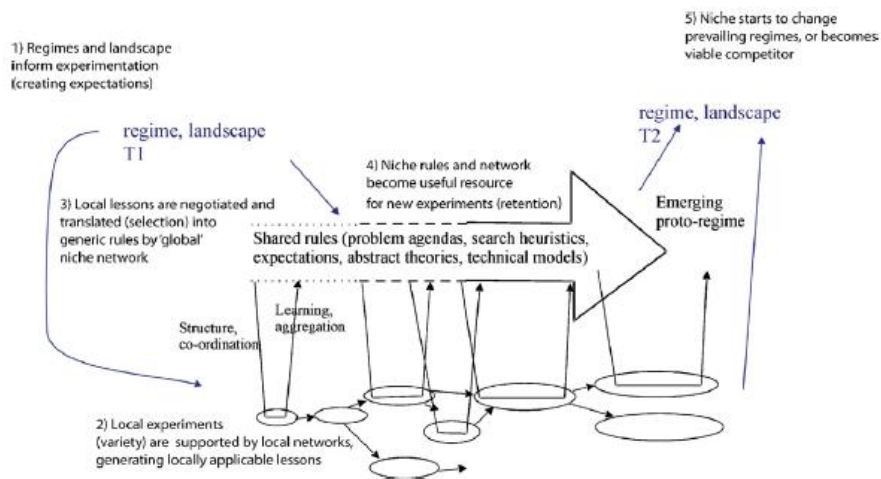
Figure 1: Local- and global-level niche development. Retrieved from (Geels & Raven, 2006)

Thus, in this conceptualization the attention shifts from single projects to sequence of projects where learning curves converge. Failure can also contribute to the success of the development of the projects. Cyclical patterns of learning and networking stimulates more global rules. Furthermore, organizing sequences are important to take into account changes that are necessary to change a production chain (Schot and Geels, 2008).

There are three ways in which a niche can be protected. First of all, shielding is a process that holds off selection pressures from selection environments (Smith & Raven, 2012). When shields are established, and the niche is protected is provides an opportunity to nurture the sustainable innovation. Nurturing is the second process, and is defined as a process that supports the development of an innovation (Smith & Raven, 2012). Key nurturing processes in SNM are: assisting learning processes, helping networking processes and articulate expectations (Smith & Raven, 2012). The third process is empowerment. Empowerment can refer to niche-innovations that become competitive in an unchanged selection environment or to changes in a niche that is a consequence of changes in regime selection environments, favorable to niche-innovation (Smith & Raven, 2012).

Internal niche processes (expectations, learning and forming networks) are important for describing the development of a niche, however, internal niche processes need to be complemented with external niche processes in order to describe more precisely what affects the development of a niche.

2.3 Multi-Level Perspective (MLP)

The multilevel perspective provides more contextualization to the niche. MLP distinguishes the niche, regime and socio-technical landscape level. Between these levels, interdependent processes occur that influences the direction and pace of the transition. The interactions between the socio-technical landscape, niche and regime are enacted by social groups (customers, firms, policy makers, engineers, social movements). These groups can put pressure against a socio-technical regime, which is described below. The MLP holds that transitions come about through processes at the niche level which builds up internal momentum, the changes at the landscape level that creates pressure on the regime, and at last the destabilization of the regime creates opportunities for niche innovations (Schot & Geels, 2008).

Socio-technical regime: A socio-technical regime is described by Rip and Kemp (1998) as follows: '*A technological regime is the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling relevant artefacts and persons, ways of defining problems; all of them embedded in institutions and infrastructures"* (Rip and Kemp, 1998).

A regime is stable and is very resistant to change due to lock-in mechanisms. The multi-level perspective (MLP) is a popular framework to understand sociotechnical shifts, and how to influence them (Geels, 2012). A socio technical regime is related to social relations, e.g. users, policy makers and social groups (Geels & Schot, 2008). The regime level constitutes the socio-technical processes of selection operating beyond firms, in an attempt to get a grip on the emergence and decline of technological developments (Rip and Kemp, 1998; Geels, 2002; Smith, 2007). Market, users and culture form a selection environment through stabilized market institutions, supply and demand, user preferences and the culture of people, which is represented by symbolic meaning. Industrial networks articulate technical standards which are imposed on new innovations. These standards are sometimes pressured to companies trough policy and politics. Technology and scientific knowledge are at the forefront of new innovations, but incumbent technologies that proved themselves in the past will compete with new innovations. Path breaking innovations require different standards and infrastructures in order to perform optimally, where incumbent infrastructure is often seen as problematic.

The niche already was defined as a protective space for radical and path breaking alternatives (Kemp, Schot & Hoogsma, 1998). Niches are necessary because socio-technical regimes are stable and resistant to change due to lock-in mechanisms. Therefore, sustainable innovations are crucially dependent upon the activity of niches.

The context of the regime and the niches is what is called the socio-technical landscape. At the landscape level, demographic change, environmental change, the restructuring of the economy, cultural shifts, shifts in the political arena and social movements are included, that shape the landscape (Smith, Voss & Grin, 2010). Thus, the landscape level consists of an exogenous environment which can change because of the before-mentioned factors.

2.4 Niche-Regime interactions

In transition literature, the role of niches is defined as protective space for path-breaking innovations (Smith & Raven, 2012). The concept of protection consists of shielding, nurturing and empowerment. According to Smith and Raven (2012) is empowerment considered to be least developed in niche literature. Empowerment can refer to two different notions of niche-regime interactions. Empowerment can refer to niche-innovations that become competitive in an unchanged selection environment or to changes in a niche that is a consequence of changes in regime selection environments, favorable to niche-innovation (Smith & Raven, 2012).

Analyzing niche development can be done through analyzing these protective spaces. Shielding processes, nurturing processes and empowerment processes are reflected in the business strategies of the initiatives. Smith & Raven (2012) provide a systematical way in analyzing the dynamics of protection of sustainable innovations.

2.5 Role of business models in transition studies

Where transition studies like MLP and SNM analyze socio-technical change and ways in which a niche can be protected from selection pressures, business model innovation (BMI) is also seen as a way of gearing sustainable innovations towards more sustainability.

Integrating business model perspectives with transition theories is an emerging field of research, where sustainable innovations are the object of study. When delivering customer value, the business model itself can also become a source of competitive advantage, by means of business model innovation (BMI) (Chesbrough, 2010). The boundary spanning of transition studies is much broader than that of a business model. The business model boundary is often centered on to the individual firm level, while for transition studies, the boundary level is drawn at the societal level.

Bidmon and Knab (2014) focus on the role of BMs for socio-technical transitions. They argue that BMs can impact transitions in their role as a device to commercialize technical innovation, as well as a dominant business model logic that is part of the socio-technical regime and as a niche innovation competing with the dominant BM logic (Bidman & Knab, 2014). Bolton and Hannon (2016) combine the BM logic with transition studies in an approach that describes BMs as activity

systems. They use the multi-level perspective to illustrate that regime and landscape forces can hinder BMI (Bolton and Hannon, 2016).

Relevant literature that comprised the theoretical building blocks of this research were taken into account. Especially, Bidmon and Knab (2014), Boons and Lüdeke-Freund (2013), Sarasini (2017), Smith and Raven (2012), Bolton and Hannon (2016) and general SNM and MLP literature (Schot and Geels, 2008) contributed towards an understanding that business models on the one side and transition literature on the other side complement each other in an understanding in what way the development of niches (i.e. electric carsharing) are influenced by different forces that work on different scales.

In SNM, it is normally the case that 'experiments' are the unit of analysis to understand niche emergence. In this research, business strategies will be the unit of analysis, and are derived from business models. Business strategies BSs are chosen as unit of analysis because the objective of this research is to study different electric carsharing initiatives in the Netherlands that each have their own business model. An 'experiment' refers to a broader notion, and could be comprised by different companies. By taking business strategies as a unit of analysis, the immature niche can be studied in more detail, because the emerging electric carsharing niche is characterized by a limited number of initiatives. A business strategy will provide valuable information about how a company creates and captures value. A business strategy (BS) operates within in a wider context than a business model, and is therefore useful for analyzing sustainability transitions like electric carsharing.

The business strategy is also influenced by niche level processes (learning, networking and expectations), as well as regime characteristics and the landscape level. Three nurturing processes will be described for the shared EV niche in the Netherlands. Furthermore, value propositions will influence the different business strategies that the initiators deploy. The different value propositions will in this way underline the boundary spanning behavior of the business strategy, and therefore, influence niche development. The dominant logic from the mobility regime can raise barriers that may hamper or disturb the development of electric carsharing business models.

Thus, by studying business models of electric carsharing initiatives business strategies can be identified. Business strategies are more general then business models and are needed to explain niche creation and development, because of their wider context which is relevant for transitions. Figure 3 illustrates how strategies of electric carsharing initiatives and their business models and strategies evolve. In the beginning, business models are supported by local networks, generating local lessons. Over time, local lessons are negotiated and translated into more generic rules. The learned lessons, converging expectations and growing network becomes a useful resource for new entrants.

Shared rules (problem agendas, search heuristics expectations, abstract theories)
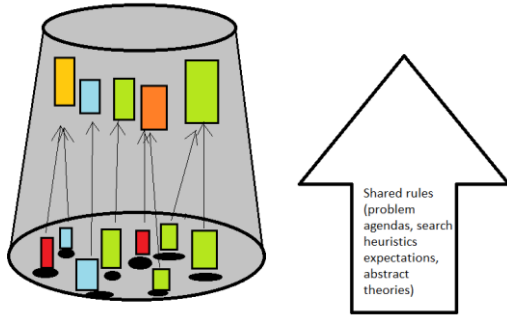
Figure 2: Evolving strategies of local project

3 Methods

In this chapter, the way the research is conducted will be outlined. The chapter will clarify the research approach, how data is collected, in what way it is analyzed and how the data is validated.

3.1 Research approach

In this research, the goal is to understand and explore the contribution of how business strategies of electric carsharing initiatives impact the development of the electric carsharing niche in the Netherlands. Thus, business strategies and business models of electric carsharing initiatives are unit of analysis. Various business models and strategies of different initiatives are studied in order to find an answer to the research question. In the theory section, it was already elucidated that this kind of explorative research lies at the intersection of business model theory and transition theory literature.

The goal is to understand how different business strategies of electric carsharing initiators contributed towards the creation and development of the niche. I am interested in how the different initiators contributed towards the development of the shared EV niche. Questions about development and in-depth understanding about different electric carsharing initiatives will provide insight into the creation and development of that niche. Since an understanding of the different business strategies is needed, a qualitative research approach is taken. According to Creswell (2003), this qualitative research approach is suitable when a researcher aims at more insight. In this research, the aim is to gain insight into the development of the e-carsharing niche by analyzing multiple data sources. Since the diffusion of e-carsharing technology into society is also influenced by the social context, a qualitative constructivist approach is chosen. The constructivist approach provides insight into the social and environmental concerns of the different e-carsharing initiators. Thus, a constructivist approach is used, because the main interests are business strategies of the e-carsharing initiators. These niche actors construct their knowledge based on the meaning from their experiences, which is suitable for this research.

3.2 Research strategy

In this research, a case study design is chosen. According to Creswell (2009): "*The case study method explores a real-life contemporary bounded system (a case) over time, through detailed, in-depth data collection involving multiple sources of information…and reports a case description and case themes (Creswell, 2013, p. 97)".* By researching 'Electric Carsharing in the Netherlands' as a single case, processes can be investigated in-depth. Electric carsharing in the Netherlands is the bounded system. A case study can be defined as a research strategy, that researches a bounded system within a real life context. The issue is defined as follows: How do different business strategies contributed to the creation and development of the e-carsharing niche. In order to answer this question multiple sources of data are used.

I believe a single case study design suits this research the best way. A single case study enables a deeper understanding of the exploring subject (Gustafsson, 2017). Furthermore, single case studies enable a high-quality theory (Gustafsson, 2017). However, benefits of a multiple case study design are that the data within each situation and across different situations can be analyzed the best way. In this research, however, it is not the goal to compare different e-carsharing initiatives with each other, or to find themes of potential conflicts cut across different case studies. It is also not the goal to understand the similarities and differences between cases. Therefore, a single case study design fits this research the best way.

A case study research uses multiple data sources (Baxter & Jack2008). These multiple data sources will enhance the credibility of the data. Case study research provides an opportunity to compare qualitative data, obtained from various channels. For example, interviews and relevant papers and website information is used. The unit of analysis are the business strategies and business models of the different carsharing initiatives in the Netherlands. These initiatives are very different, and thus provide a wide range of useful information.

3.3   Case study selection

The objective is to select electric carsharing initiatives in the Netherlands. Since electric carsharing consists of P2P, B2C and B2B business models, all three types of BMs should be included to characterize the case (electric carsharing in the Netherlands). Search engine Google was used to identify the different electric carsharing initiatives in the Netherlands. A criteria was that an initiative exploited at least ten EVs and the initiative was at least a couple of years old. This led to the identification of 16 electric carsharing initiatives. An email was send out to each initiative, requesting for an interview with an expert and preferably the CEO, CMO or COO of the company/initiative. In-depth interviews with experts will provide useful information about business models as well as insight into the electric carsharing niche, and its transformative properties. The research question can best be answered by focusing on a qualitative research approach.

As a consequence of the second interview with LochemEnergie, new contacts were made with initiatives that initially turned down the request to be interviewed. Thus, through snowballing more interviews could be held. Furthermore, through attending meetings for energy-cooperatives in the Netherlands, more interesting initiatives and contacts where identified. Thus, the selection of the electric carsharing initiatives was not linear and straightforward. It was a messy process. Numerous reminder mails were send out, and attending public meetings were several electric carsharing initiatives were present was helpful in persuading the initiatives to interview them. In this way, interviews were held with 9 different electric carsharing initiatives. After having held 9 interviews I decided to stop, because the most relevant and important e-

carsharing initiatives had been interviewed, and the data that was gathered through these interviews fulfilled all the necessary initially set criteria. There were also some e-carsharing initiatives who did not want to be interviewed.

Interviews were held with a CEO, CMO, COO or expert employee of the interviewed company or initiative. These experts were interviewed for the purpose of providing a perception of their view on E-carsharing in general, as well as their view on their business model, the barriers they experience, the expectations they have, the lessons they have learned so far and the network they utilize.

The goal of each interview is twofold. Firstly, by interviewing each party a clear vision of the value proposition, customers and supply chain can be made explicit. In this way, a clear image of the business model can be established. Secondly, experts are also asked for their views on the mainstream market, and how different regime characteristics influence the development of their own business model. Next to that, questions were asked about the internal niche processes (learning, expectations and network). Furthermore, they were asked about the strategies they deploy for upscaling their business.

All the experts were found after email contact. The process of snowballing occurred because one contact of an initiative led to two other contacts of other companies. Two types of companies were interviewed: profit and non-profit organizations. Several companies that were interviewed worked together with other companies that were also interviewed. In this way, something useful can be said about the niche dynamics. Furthermore, it was chosen to conduct a semi-structured interview approach, because this is an effective way conducting interviews in qualitative research. The freedom that comes with a semi-structured interview helped to tailor the questions to the interviewee. In this way, rich data is produced.

3.4   Data collection

A qualitative research approach is taken. This study consists of a single case study design in the Netherlands where ten different electric carsharing initiatives are researched. The most important condition is that all the cases are exploiting shared EVs one way or another.

An iterative process was carried out. First of all, insight into the topic of electric carsharing was needed. Therefore, the context chapter explore the topic of electric carsharing. In the context chapter, relevant research papers were needed. First of all, a broad search of the topic 'electric carsharing' was carried out on Scopus in order to find relevant topics concerning e-carsharing.

Hereafter followed an iterative process. It was carried out to find relevant papers on the topic of electric carsharing. Scopus was used as search engine, mainly because of snowballing effect after

reading relevant papers. The keyword 'electric carsharing' consisted of 64 results. Only the results that mentioned electric carsharing in a socio-technical context were chosen for further analysis. Other keywords: 'shared electric car', 'shared EV' and 'electric car' within results of 'carsharing' were used to verify the same articles. Also the keyword 'business models' within the results of electric carsharing were used for further analysis.

Technical journals were excluded because of lack of socio-technical context. Cross referencing provided a useful tool for illustrating the coherence of the data-set. From 64 results, 30 articles were chosen for further in-depth research, because they consisted of the socio-technical context that was required. As a result, the environmental, social, technological forecast, automotive technology and management, and transportation journals were the only relevant journals for this literature review. Results from 2011 until 2017 are used for analysis. Initially a period of publications in a time frame of five years was chosen, in order to find out the new developments and barriers. However, a few important papers were not published in that time frame. They were included into the set of articles, which led to a time frame of six years. In figure 1 it can be seen that in academic literature, this topic is gaining more attention.
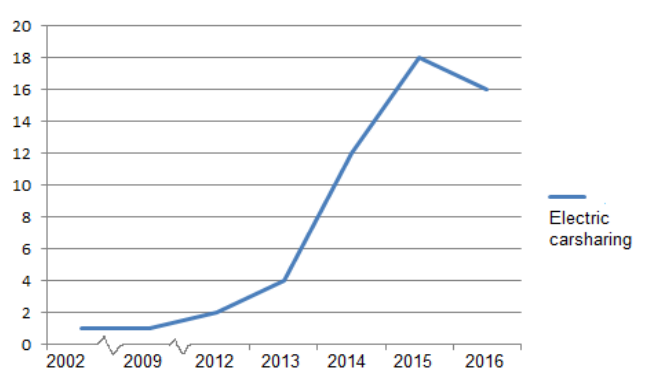
Figure 4: Scopus output: The number of 'Electric carsharing' papers

In order to analyze the e-carsharing niche in the Netherlands, nine interviews were held in order to find answers to the research question and the sub-questions. Amber mobility, LochemEnergie, SnappCar, Claut, MyWheels, Ecarshare, Car2Use, Buurauto and StappIn were interviewed. The identification of these initiatives in the Netherlands that exploit the electric carsharing service was done via the work of Manders, Wieczorek and Verbong (2018). In the article, *"Understanding smart mobility experiments in the Dutch automobility system: Who is involved and what do they promise",* Manders et al (2018) aimed to understand what ICT-related automobility experiments are initiated in the Netherlands, in order to get a better understanding of the direction of change. Several of the 118 'experiments' in the Netherlands that were identified, represented a mobility service niche. In this research, the objective for the interviews is finding initiatives that represent e-carsharing initiatives, which matches the identified experiments by Manders et al (2018) that

are characterized by shared- and service-based 'experiments'. This was a starting point for identifying interesting e-carsharing initiatives.

3.5   Data analysis

In the context chapter, the topic of electric carsharing is elucidated. Through snowballing, an important author of electric carsharing was identified (Susan Shaheen). Susan Shaheen conducted research on the topic of electric carsharing (mainly roundtrip carsharing), and explained into great detail the history of the emergence of EVs into carsharing fleets. For the first research sub-question, four different codes for the regime characteristics were established (regime level codes). These different codes are: 1) market, users and culture, 2) industrial networks, policy and politics, 3) technology, scientific knowledge, and 4) infrastructure. These regime codes can be found back in table 2. This explorative context chapter was carried out in order to find out more about the electric carsharing business in general, as well as identifying the regime barriers that influence the development of the electric carsharing niche globally. In the context chapter, several barriers were identified that had an influence on the development of electric carsharing initiatives in the past. The most important journals are strategic management, journal of management and Technological forecasting.

Interviews were transcribed for data analysis. The interviews were coded in Excel, where the coding was structured according to content analysis. Content analysis was chosen for structuring the interviews, because the aim of the study is to explore how the different business models and business strategies add up to niche creation and development. Content analysis was used for finding the context relative to the categories that were found. This is very important, because only if the link between the context relative to the data that is analyzed is understood, then inferences can be drawn. The data in the form of interviews, reports and research papers, will be transcribed through content analysis in Excel. Content analysis adds to the structuration of the reports, interviews and research articles. It is a systematic way of finding these trends, patterns and categories of information (Creswell, 2009). According to the theory section, the coding was divided into three categories. The first category are the business model codes, which provides information that can answer SQ2. The second category are the niche level codes, which provides information about how the protective space is nurtured. The third category consist of regime level codes, which provide insight in how the socio-technical regime influences the business model that is studied.

For the second research sub-question, four different codes were established that constituted the value propositions, the supply chain, the customer interface and the financial model. In this way, all the relevant information that is needed to make a description of a business model are present.

The theory of business models is already explained in chapter 3. Business models for sustainability are business models that emphasizes on the overlap between sustainable innovations and BMs (Boons and Lüdeke-Freund, 2013). Business models of each company needs to be understood before inferences about niche dynamics can be drawn.

For the third research sub-question, the niche level codes are established. Next to the three codes that make up the internal niche processes (learning, expectations and network), a fourth 'strategy' code helps in understanding in how the initiative want to expand their business. Since a business model is seen as a strategy in itself, asking explicit questions about a 'strategy' ensures data triangulation.

The niche codes are put forward in order to understand the nurturing processes, which are constituted by the internal niche processes of SNM: learning processes, articulation of expectations and visions, and the formation of networks. The nurturing of a niche can lead to more active shielding measures and/or more empowerment. This process between shielding, nurturing and empowerment is iterative (Smith & Raven, 2012)

Table 1 provides an overview of how the coding procedure of the data will look like.

BM codes	Niche codes	Regime level codes
Value proposition	Learning processes	Market, users and culture
Customer relationships	Expectations and future	Industrial networks, policy and politics
Supply chain	The network	Technology, scientific knowledge
Social relevance	Strategies	Infrastructure

Table 2: Coding for the data

The coding process was done in a way that each time the script of the interview was read, one type of coding was applied. The first time the coding was read, the BM codes were applied. The second time, the niche level codes were applied and the third time the regime codes were applied.

All the data that is analyzed (interviews, website information or research papers) are presented in a qualitative way. Creswell (2009) emphasizes on the qualitative data analysis. All the scripted interviews and other documents that is used in this research is analyzed on the content. In the

research approach, the theoretical building blocks was changed a few times. The research approach could be characterized as an iterative process.

Elements of the RQ	Theoretical insight	Data collection	Data analysis
SQ1 Context	Regime dimensions	research papers	Content analysis
SQ2 BMs and BSs	BMs and BMfS	Interviews, websites, research papers	Content analysis
SQ3 Niche creation and development	Strategic Niche Management (SNM)	Interviews, websites, research papers	Content analysis

Table 1: Overview of the structure of the research

3.6   Data validation

Data validation is important in research because in this way rich data is provided, and bias is avoided. In order to provide rich data the interviews that were held were held with people very high in the organization. Several CEO's were interviewed for example. Furthermore, answers from interviewees regarding questions concerning barriers could be compared to barriers found in the context chapter (barriers that were found in research papers). In this way, data triangulation is ensures rich data, which is an important guideline according to Creswell (1994). This internal validity is necessary amongst all e-carsharing initiatives that were interviewed. In order for the different case study's to be comparable, the questions that were asked were similar to each other.

The external validity has to do with to what extent the results can be made generalizable. In order to provide results that are trustworthy, ten e-carsharing initiatives are studied, which accounts for a significant percentage of Dutch e-carsharing initiatives. Next to that, the semi-structured interview where the themes of questions that were asked were similar amongst each interview indicates a structured research process. Furthermore, if the results of the multiple case study resembles the results found in literature, it adds to the external validity. Furthermore, all the different business models that constitute the e-carsharing market are interviewed.

4 Context

Emergence of e-carsharing

As a reaction to urbanization concerning environmental pollution, expensive parking and high energy costs, new mobility alternatives are developed. Carsharing is considered one of those alternatives, and is considered a short term car rental, where cars can be used without the costs and responsibilities of ownership (Degirmenci & Breitner, 2014). The number of worldwide carsharing members is expected to grow from 2.3 million in 2013 to more than 12 million by 2020 (Degirmenci & Breitner, 2014).

In the 1970s, One-way carsharing began developing in Montpellier (France) and in Amsterdam (Shaheen & Chan, 2015). Due to limited governmental support and lack of technology these experiments failed. However, they resurfaced in the late 1990s. An improvement was that the EV was not allowed to be used until charging was finished (Shaheen & Chan, 2015). This improvement undid problems caused by the limited EV range. In October 2008, Car2go began implementing an one-way carsharing system in Ulm, Germany. This success enabled expansion to other cities in Western-Europe. Both Car2go and DriveNow work together with municipalities to prepay for parking spaces which enables further growth.

Also roundtrip and hybrid carsharing models were developed and implemented during the 1990s, especially in France and Japan. However, most programs lost users after fees were implemented (Shaheen & Chan, 2015). An important company in Tokyo (OrixCarsharing) stopped implementing only EVs in their system (400 vehicles), and also employs hybrid and gasoline vehicles (Shaheen & Chan, 2015).

In the 1990s, a lot of pilot programs failed because of 1st EV models. The initiatives proved feasible in terms of user satisfaction and range, but EVs gradually faded out of hybrid, roundtrip and station car programs (Shaheen & Chan, 2015). There were a lot of reasons for failure. For example, low reliability of first generation EVs, high insurance rates, decreased user demand, logistical challenges, not being viable economically and low public support. Now there is re-emergence, because of technological advancements, lower costs and longer range (Shaheen & Camel, 2016). The most important catalyst for re-implementation of EVs into carsharing programs was the role of public policy (e.g. supporting parking policies). Amsterdam for example invested a lot of capital in establishing an electric charging infrastructure, which is a necessity for a shared EV program like Car2go to succeed (Suiker & Elshout, 2013).

However, in this digital century a well-functioning electric fleet requires high-end ICT solutions. Advanced communication systems are needed for forecasting. New technologies are needed to ensure electricity reliability if e-cars and e-carsharing becomes dominant in the future.

Market, users and culture

This regime category researches the market potential of electric carsharing, as well as the influence of culture and different user perspectives. Some documents mainly focus on user's attitudes, where other documents focus on the market potential of a specific carsharing program. Taken together, the following conclusions can be made: OEMs have the biggest market potential for projected electric carsharing growth . This holds because OEMs can make the highest margins on cars and have a lot of capital to invest. New entrants do not have that kind of power, and their competitive position is marginal. Market trends are that automakers are taking a lead in launching e-mobility systems. Daimler's car2go and BMW-Sixt's Drive-now have worked together with governments for infrastructure, and are considered the biggest carsharing initiators in Europe (Shaheen & Chan, 2015). The prediction is that there will be continued expansion. When considering users, it can be seen that immediate flexibility and last mile coverage complemented by public transit is of great importance for the success of carsharing. Range anxiety works on different modes of carsharing programs. Even for free-floating programs, range anxiety is apparent if somebody cannot find a parking space. The notion that someone sells its own car because of participating in a carsharing program, is very marginal. This indicates that the car 'culture' is still very powerful and resistant to change. Owning a car, and the cultural values of a car as private property will remain very strong, The central motives to use electric cars as carsharing device is because of enjoyment. It is also found that using carsharing as substitution for public transit, this is too costly. However, multimodal transport systems, i.e. carsharing in combination with public transit is a powerful strategy of developing and diffusing carsharing programs into current infrastructures.

Industrial networks, policy and politics

All the different actors (OEMs, research institutes, government, lease-companies, municipalities) form a network that together determines the success of electric carsharing programs. From all the research documents analyzed, it can be concluded that the involvement of all governmental bodies is indispensable. Electric carsharing programs are not yet economically feasible without governmental support. Many operators work together with municipal governments to gain access to more EV charging infrastructure (Shaheen & Chan, 2015). EU support is necessary for top down consensus between governmental bodies. Financial support in the form of subsidized parking, tax incentives, starting investments and emergency risk funds are important to enhance the social and environmental benefits brought by carsharing. Parking subsidies are significant in congested areas, which is an important policy tool to advocate carsharing usage. Moreover, increased cooperation between industry partners are necessary to facilitate technological standards, agreements between operators and for a public policy development (Shaheen & Cohen, 2013). No variant of any car sharing system can be implemented on a large scale by simply

giving a company a license without public policy support. For example, in Ireland a carsharing program stopped because of the loss of insurance coverage. The resurgence of electric carsharing, which is also due to technological advancements, is being sustained with government support. In the metropole region of Amsterdam for example, more than 200 companies collaborate in the field of electric transport (Suiker & Elshout, . E-carsharing only works when market players, knowledge institutes and governmental organizations collaborate efficiently. As e-carsharing becomes a mainstream transportation mode, then it will further integrate into mainstream transportation modes, and will like result into increased competition, more multi-modal transportation and greater customer choice (Shaheen & Cohen, 2013).

Technology and scientific knowledge

The biggest problem for optimizing free floating carsharing relocation algorithms has to do with when to respond if somebody makes a reservation. Further research in the field of predictive algorithms is needed here.

EVs can store energy while charging batteries and return their energy to the system through bidirectional loading. Also, the addition of autonomous carsharing vehicles could solve relocation problems and reduce maintenance costs. Nowadays, there is no carsharing program that uses autonomous driving. Furthermore,.

Infrastructure

The ability to park wherever without additional cost is a main determinant in the success of electric carsharing (Suiker & Elshout, 2013). Therefore, cities should consider investing in electric charging infrastructure to encourage the proliferation of EV in carsharing. The success of electric carsharing programs are highly dependent upon the urban public transport system. When public transport is well arranged, than success-rate of carsharing initiatives is higher. Supportive parking policies also play a role in supporting e-mobility.

5 Business Strategies

In this chapter, the business models of the ten identified carsharing initiatives will be outlined. The BM concept is used to get an idea of what business strategies are used by the initiatives. The goal is to get a better understanding of the orientation and the variety of business strategies of the electric carsharing initiatives. There is a broad overview of different types of business models which all take part in electric carsharing one way or another. The elements of the BM described in Lüdeke-Freund (2014) will be outlined. This chapter starts with introducing the e-carsharing initiatives that were chosen for analysis. After introducing the initiatives, ten factsheets will provide information about the strategy, barriers and the business model of the electric carsharing initiative.

5.1   Characteristics of the electric carsharing initiatives

In this research, ten carsharing initiatives are taken into account for analyzing in what way their business strategies contributed to niche creation and development. Before the findings of the strategies will be outlined, a few relevant characteristics of the initiatives are summarized in the table below. These characteristics have a big influence on the business strategy that the initiative pursues.

The first column shows what market segment the initiative targets. Business strategies are dependent on what type of market segment they target. In this research, the three market segments are: peer-to-peer, business-to-consumer and business-to-business market segment. There is overlap between these different business models. The second column shows whether the initiative is commercial or not. The third column indicates on what geographical scale the initiative works. The fourth column shows whether or not IT is produced in house.

	P2P, B2C or B2B	commercial or non-commercial	Local or non-local	in-house IT or no in-house IT
SnappCar	P2P	commercial	non-local	yes
MyWheels	P2P, B2C	non-commercial	non-local	yes
Buurauto	B2C	commercial	non-local	no
LochemEnergie	B2C	non-commercial	local	no
Car2go	B2C	commercial	local	yes
Ecarshare	B2B	non-commercial	non-local	yes
Car2use	B2B	commercial	non-local	no
Claut	B2B	non-commercial	local	no
StappIn	B2B	commercial	non-local	yes
Amber mobility	B2B	commercial	local	yes

Table 3: Characteristics of the electric carsharing initiatives. Information retrieved from conducted interviews (interview1, interview2, interview3, interview4, interview5, interview6, interview7, interview8, interview 9 and (Suiker & Elshout, 2013).

Figure 5 shows three main values that electric carsharing instill in their business models. Most initiatives put emphasis on promoting beneficial economical gains when customers start using shared EVs, in combination with promoting sustainability. Few electric carsharing initiatives frame their business explicitly as a social initiative. It is important to classify initiatives onto these three different orientations, because they influence the business strategy. The picture below indicates the orientation is of the carsharing company that was interviewed.
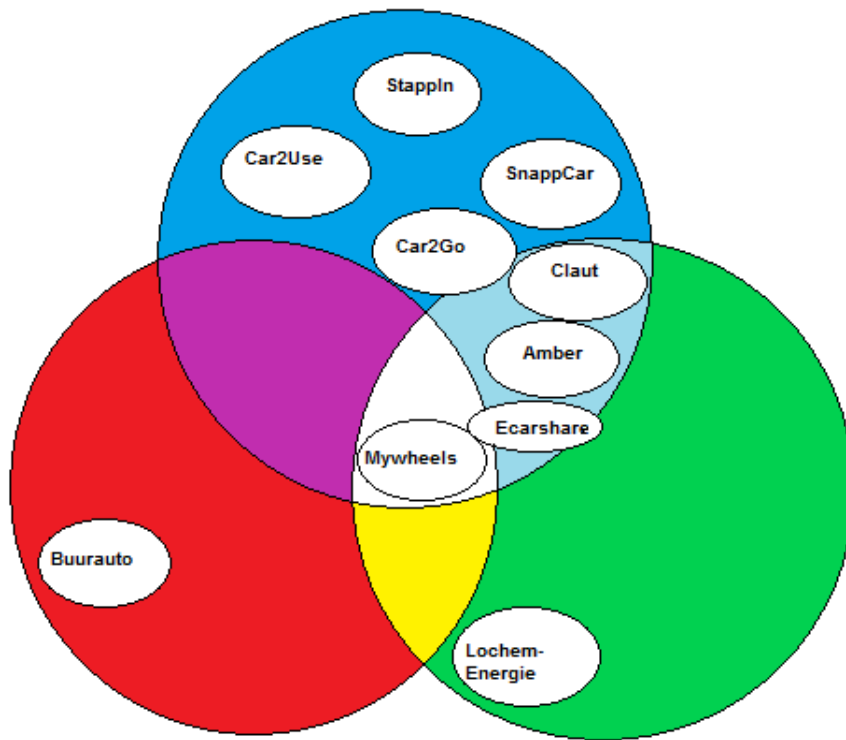
Figure 5: Orientation of the indicated carsharing initiative. Red is social, green is environmental and blue is economical oriented.

5.2   Introduction to the electric carsharing initiatives

What is SnappCar?
SnappCar is a peer-to-peer car sharing company, with more than 30000 cars to be shared available on their website. SnappCar uses their website as platform in order for car users to rent out their cars. It is thus an enterprise website that mediates in the sharing of cars between private individuals. Car users rent out their own car via the website to others at a self-determined financial compensation. In order to make this possible technically, the car insurance of the lessor is replaced by a temporary insurance from SnappCar for the fixed rental period.

What is MyWheels?

MyWheels is a non-profit car sharing foundation located in Amsterdam, founded by Jules Brouwer in the 1990s. In 1993 the first car was shared The ultimate goal is to reduce the amount of cars in the Netherlands from eight million to one million. MyWheels started with their own cars, which had a fixed location. In 2011, MyWheels also started with including private offerings. They operate in the P2P and B2C market. In that way a lot of shared cars are available in Amsterdam. MyWheels owns twenty shared cars, using the B2C model. In the future, more emphasis will go towards the B2C model.

What is Buurauto?

Buurauto is an electric car sharing company who has the objective to share EVs amongst neighbors and friends. They started in march 2016 and in November 2016 the. Buurauto targets customers who are willing to share their car with friends or neighbors. Consumers decide how and when to utilize the car, which means they communicate with each other and make arrangements. The only function of Buurauto is to facilitate and administrate the process. Buurauto uses both the B2C and P2P concept.

What is LochemEnergie?

Elektrip, an electric carsharing initiative originated from LochemEnergie (energy cooperative) works on a project basis, and participates in the IPEM project ('smart grid Lochem' project). The cooperative took part in this project with the goal: How can the behavior of citizens be influenced, and what is the effect of electric vehicles on the grid? Lochem began implementing 12 shared electric vehicles. After introduction of these shared EVs, LochemEnergie participated in the EFRO (European funding for regional development) project. In order for other municipalities to join the electric car sharing scheme of LochemEnergie, 'Elektrip' was set up, who facilitates the car sharing business.

What is Car2go?

Car2go is a German car rental company and it is a subsidiary of Daimler AG. Several car sharing services are provided in urban areas in Europe. Car2go offers one-way free floating rentals. Smart Fortwo are mostly used as shared EVs. Daimler introduced Car2go in Ulm, October 2008. In this experiment the cars were developed as internal business innovation units and tested by employees of Daimler. In November 2011, Car2go was introduced in Amsterdam. The electric car sharing project was initiated by Car2go and was facilitated by the municipality of Amsterdam, because they provided parking permits. These permits are valid throughout the city, and Car2go makes use of the already existing charging pole structure (Suiker & Elshout, 2013). There are currently 350 Fortwo's located in Amsterdam.

What is Ecarshare?

Ecarshare is an electric car sharing service, initiated by the foundation 'Stichting Limburg Elektrisch'. In 2013 the foundation did a feasibility study for shared EVs in the southern part of Limburg. The municipality of Sittard-Geleen wanted to start with 10 shared EVs. That was the direct reason for bringing Ecarshare within the foundation. After the Ecarshare project started growing in Limburg, there was an interest from the province of Noord-Brabant for the Ecarshare project. Ecarshare mainly focusses mainly on the B2B and B2C platform. Ecarshare grew substantially, now exploiting 100 shared EVs. They want to expand further to 1000 cars

What is Car2use?

Car2use is a car sharing platform and spin-off of Athlon. Athlon is an international leasing company with 500 employees and 120.000 leasing cars in the Netherlands. The principle of Car2use is the following: A car is placed on an industry-terrain, where there are a lot of potential Athlon customers. On the industry-terrain, the car is made sharable, only with potential customers that Athlon ascribes. Car2use contacts people in that area, who are available to utilize the shared car. This is the most flexible way of rental for Athlon. The car remains in possession of Athlon. The big challenge for Athlon is to research whether or not there is a profitable business case for roundtrip car sharing platforms. Car2Use is spin-off for Athlon when it comes to implementing car sharing schemes. Car2Use focusses on the B2B segment.

What is Claut?

Claut is a circular automotive consultant platform. They focus on implementation of circular economy business models, and its values. They work on a project base, financed by the government. Claut is founded in order to support partners towards the values that circular economy business models institutionalize. Claut initiated a mobility energy project in Holtum-Noord. They work on a project base together with 'Limburg Economic Development' (LED). In this project, they examine whether or not it is possible to combine local sustainable energy generation at an industry terrain with a car sharing platform.

What is StappIn?

StappIn originated from a family automotive company and leasing company, and wanted to broaden its ways in which value can be captured and created. They started doing research in collaboration with a student, and concluded that the trend of paying according to use offered perspective. An automated carsharing concept where customers can have access to mobility twenty-four hours per day was the starting point for StappIn. They wanted to automate this process, and started launching 'prepaid driving' without physical key transfer. In 2015, StappIn decided to build their own hardware and software that is needed for starting the car sharing platform.

What is Amber?

Mobility is an electric car-sharing company located in Eindhoven that mainly focuses on the B2B market. Amber has the goal to provide customers with unlimited access to on-demand guaranteed mobility. In 2021, Amber wants to exploit the Amber One, a shared autonomous electric vehicle. In order to reach that goal, amber developed a plan of four stages. This car is specifically designed to be shared, with a lifespan of 1,5 million kilometer. As a result of a long lifetime, the running costs will become extremely low, which suits a car sharing service. Amber currently operates within the first two stages, where BMW I3s are made sharable for B2B customers.

5.3   Description of the business models, strategies and barriers

Each of the ten identified electric carsharing initiatives will be analyzed and a description of business plan will be outlined, as well as describing the business development. Next to that, hurdles and difficulties that the initiative comes across are described. On the next page, factsheets of SnappCar, MyWheels, Buurauto, LochemEnergie, Car2go, Ecarshare, Car2Use, Claut, StappIn and Amber Mobility are provided. The information of Car2go is retrieved from literature (Suiker & Elshout, 2013). The information of the other electric carsharing initiatives is retrieved from interviews conducted with these initiatives.

Amber Mobility

What is Amber?

Amber Mobility is an electric car-sharing company that mainly focuses on the B2B market. Amber has the goal to provide customers with unlimited access to on-demand guaranteed mobility. In 2021, Amber wants to exploit the Amber One, a shared autonomous electric vehicle. In order to reach that goal, amber developed a plan of four stages. First, Amber created the 'Amber Mobility Platform' in a B2B environment. The platform offers companies a subscription on mobility, which is fully customized. With this subscription, companies can join the 'Amber Mobility Hub', where they get access to a fleet of BMW i3's. In the second stage, the B2C platform is used. After new companies join a hub, new hubs can be created, and as more people get involved, private users can join the Amber Mobility platform and help the Hub to grow further. In the third stage, as hubs become more occupant, autonomous cars can relocate in between users in order to guarantee mobility. In the fourth and last stage, the Amber One is introduced. This car is specifically designed to be shared, with a lifespan of 1,5 million kilometer. As a result of a long lifetime, the running costs will become extremely low, which suits a car sharing service. Amber Mobility currently operates in the first two stages.

Business development

Amber intends to become a round trip fleet based carsharing company. In order to find new customers, Amber uses their predictive software algorithm (Amber analytics) as a marketing device in order to persuade potential B2B customers who are not convinced to take part in carsharing. Furthermore, Amber analytics is mainly used to target big customers. Bringing on board big companies enlarges their fleet of shared EVs. Thus, focusing on big companies is a good way for expanding the system. In this way, more hubs can be put in place. When a large pool of shared EVs is in place, the self-driving BMW i3s will relocate the cars during the night. Relocating the BMW i3s is only efficient if there is a big pool of cars, as then the average distance of relocation will be less in comparison to a smaller pool of BMW i3s. Therefore, the predictive software algorithm is also used as a logistical engineering tool, besides functioning as a marketing device. When a large fleet of automated BMW i3s is installed that functions properly, Amber wants to introduce the 'Amber One' onto the market.

Difficulties

According to Amber, the main barriers for carsharing development are the OEMs (original equipment manufacturers), OEMs make high margins selling their cars. They want to maintain this business model. They have a lot of power, and even trademark 'range anxiety'. According to Amber, OEMs also negatively advertise electric cars. Besides the barriers of OEMs, there are a lot of fears people have when it comes to electric cars and carsharing. People are afraid of not having sufficient infrastructure and not enough charging stations available, There is a substantial amount of people that do not want to share rides with someone.

Business model

Value proposition

Autonomous electric car sharing is the ultimate solution, Amber proclaims. The vision of Amber is that autonomous driving is crucial for the future of mobility. The value proposition holds: mobility services more efficient, convenient and affordable than car ownership, by offering on demand electric mobility. Their end goal is to introduce the Amber One, an autonomous shared EV with the technology that benefits the car sharing platform. To bring 'Amber One' to the market, which will have environmental advantages over other cars, by making it modular, long distance, long life span and easily reparable, is the value proposition that Amber envisions.

Supply chain

Amber works together with TomTom as the map service provider. KPN provides the network that is necessary for data communication and location determination. The software for vehicle automation implementation is taken up by TNO. Amber is also partner of NVIDIA, who provides the image processing hardware for the incoming data from the sensors and cameras. Furthermore, Microsoft provides a reliable platform, which is called the Azure cloud platform. They also provide data resources needed to process the big amounts of data produced from the image processing. Athlon is also an important partner, because they are the leasing partner who provides the BMW i3s.

Customer interface

Amber currently focuses on B2B car sharing. Their customers are companies or public institutions. ABN Amro joined in as their launching customer, however Amber had to convince the actual company-users to go on board with using the BMW i3s as shared EVs. This means they focus on B2C car sharing as well. High Tech Campus Eindhoven, and Fontys are other organizations who make use of Amber's services. Next to that, private clients are important for the growth of Amber Mobility. They are also user-oriented, because it is all about getting company user on-board on using the service. There are two hubs that are used: one at the H.T.C. and one at ABN-Amro.

Financial model

Using the BMW i3s as sharing EVs costs twelve euros per hour. In the nights and weekends a customer is only charged when actually driving the car. When the Amber One will be introduced in 2021, it is estimated that the car can be shared for thirty three euros per week. Amber analytics is also used for analyzing mobility patterns of companies. It is a product that can show companies exactly by how much they can reduce their car-fleet size. It is thus used to convince companies who don't know if they want to go for car sharing yet, to use their car sharing service.

LochemEnergie

LochemEnergie works on a project basis, and participates in the IPEM project ('smart grid Lochem' project). The cooperative took part in this project with the goal: How can the behavior of citizens be influenced, and what is the effect of electric vehicles on the grid? Lochem began implementing 12 shared electric vehicles. After introduction of these shared EVs, LochemEnergie participated in the EFRO (European funding for regional development) project. In order for other municipalities to join the electric carsharing scheme of LochemEnergie, 'Elektrip' was set up, who facilitates the car sharing business. This is the carsharing service of LochemEnergie. Next to that, 'Stichting Oost-Nederland Elektrisch' was set up, and has the goal to stimulate smart mobility initiatives in the eastern part of the Netherlands. LochemEnergie invested in solar parks, wind turbine parks and water power. Thus, they not only invest in setting up a car sharing scheme, but also in sustainable energy generation, with the goal to bring together question and demand, and helping a small community like Lochem.

Business development

LochemEnergie is funded on a project base, because without funding, running an electric carsharing platform is not possible according to the project leader. LochemEnergie works with several fixed contracts. For example, the municipality of Lochem rent cars from Monday to Friday, and pays the full price. When residents of the municipality want to rent the EVs during evening hours or in the weekend, LochemEnergie can offer them a low price. Thus in order for citizens to take part in a cheap carsharing scheme, fixed contracts are necessary. The strategy for upscaling is providing more fixed contracts, which makes it possible to offer citizens a very low price, and in that way expand the business. This can be seen as a 'fit and conform' approach of empowerment. Thus, LochemEnergie wants to share the cars amongst inhabitants of the municipality.

Difficulties

According to project leader Tonnie Tekelenburg: "if there is no need to change for people, then nothing will change". This is the biggest barrier. For most people, there is no need for change. Furthermore, in the 'Achterhoek', there are no parking costs and most people drive an old car which is already been paid for. Depreciation costs are almost never taken into account. The consensus in the 'Achterhoek' is that people think that 25 euro for a shared EV per day is expensive. Furthermore, according to Tekelenburg: "a lot of people don't want to know what the second car actually costs them per month". Most people in rural areas are rather conservative when it comes to changing their mobility patterns. All the classical barriers for shared EVs like range anxiety and not willing to share also hold in the municipality of Lochem.

Business model

Value proposition

LochemEnergie wants to offer cheap shared EVs for local members of the cooperative, with the goal to trigger the energy transition and smart mobility initiatives. Profit that is made will be re-invested in the local community. Through the collaboration between local government, local business and local people, LochemEnergie contributes towards the energy transition and EV sharing concept. The cooperative's objective is thus helping small communities, who share EVs and are responsible for these EVs together, in combination with local sustainable energy generation.

Supply chain

The leasing companies 'Baan Twente', 'Mercedes Benz', 'Direct Lease' and 'Lease-unlimited' are the leasing partners of Elektrip. The company 'Casemaster Solutions', provided the software package, and therefore is an important partner. Next to that, collaboration between local government and business was essential to starting and maintaining the business. The EFRO funding is also essential, because without funding the car sharing scheme was not profitable for customers. Because of the strong sustainable and social motives, the foundation 'Stichting Oost-Nederland Elektrisch' is an essential partner in stimulating electric transport in the region of Lochem.

Customer interface

The projected customers who make use of the car sharing service of LochemEnergie (Elektrip) are inhabitants of the municipality of Lochem. The type of customers can be differentiated. Firstly, there are customers who intrinsically motivated because of increased use of sustainability in mobility. Secondly, there are customers who choose the cheapest form of mobility (during the first year the car sharing scheme was more cheap than regular transport). Thirdly, there are customers who like new forms of mobility, and are interested in technical advancements in transport. At last, there are customers who are not interested car sharing, and are more conservative.

Financial model

LochemEnergie provided the cheapest shared EV in the Netherlands, because of the support of the EFRO project. After LochemEnergie participated in the project, 40% of all costs were being covered. Therefore, in the first year, a car could be utilized for only 10 euros per day, including a full battery. Furthermore, the pricing structure is diverse, focusing on renting out per day part. In the future, a paying system will be chosen that includes the price per kilometer as well. In 2017, price per kilometer was not included in the price. Only the project leader of LochemEnergie is paid. The rest of the cooperative runs on volunteers. Because of this, the costs are minimum.

SnappCar

What is SnappCar?

SnappCar is a peer-to-peer car sharing company, with more than 30000 cars to be shared available on their website. SnappCar uses their website as platform in order for car users to rent out their cars. It is thus an enterprise website that mediates in the sharing of cars between private individuals. Car users rent out their own car via the website to others at a self-determined financial compensation. In order to make this possible technically, the car insurance of the lessor is replaced by a temporary insurance from SnappCar for the fixed rental period. SnappCar was founded by Pascal Ontijd and Victor van Tol in 2011, making it the first Peer2Peer car sharing platform in the Netherlands. In 2017, there were 250000 members and over 30000 cars were shared. It is largely financed by crowdfunding. More than half a million euros were invested by public people. SnappCar is a certificated social enterprise.

Business development

SnappCar targets individual renters as much as possible, through online marketing. The strategy is extensive investment in the concept (website) in order to match supply and demand. In this way, the attention of individual renters is attracted as much as possible. In the upcoming years, the goal is to enlarge their customer base. SnappCar also facilitates the process of leasing a car, and then provides discount if they use their platform. In this way, they greatly enlarge their customer base with people who share their car often, and are familiar with the concept. Thus, upscaling of the customer base through marketing and collaborating with the private lease market are the main tasks of SnappCar.

Difficulties

The biggest barrier for SnappCar is ignorance of the product. People still have to get to know the product. Some people stop using SnappCar after the first time, because they do not understand it or find it unpleasant, according to the finance manager at SnappCar. Users who utilize service more often are positive about SnappCar and find it pleasant. Therefore, the biggest barrier is the mindset of the potential clients. Another barrier is limiting capacity to grow further, because to start the business elsewhere, a lot of costs go the IT and marketing. All these marketing costs are necessary in order to get people familiar with the concept. According to finance manager Thijs Verhagen: "A car is still seen as a holy cow which people think of as very important. They are anxious that other people will bring damage to their car when they take part in carsharing. People find that nerve-wrecking".

Business model

Value proposition

SnappCar wants to offer a full alternative for owning a car, via the platform. They are convinced that cars can be dealt with in a smarter and more efficient way, because they believe that there are more than enough cars that can be shared amongst people. This goal is only reached when the density of shared cars is high enough in urban areas. They want to generate sufficient supply and demand in urban areas, and they see their platform not as a total solution, but as a means to use cars more efficiently. In the end, SnappCar wants to make the service multi-modal, together with buses, trains and e-bikes.

Supply chain

EuropCar is an important investor company for SnappCar. IT and marketing are very important elements in their business model. SnappCar does not know EuropCar's intentions for investing in their platform. The partnership with PrivateLease is important, because in this way SnappCar makes sure that the leased cars are being shared at the same cars. This makes them very useful cars in their sharing concept, because the supply side does not match the demand side. SnappCar also works together with Zuid-Lease. The collaboration with NS and Über is important for experimenting with multi-modal mobility solutions.

Customer interface

The demographics of customers is diverse. Mostly younger people who live in dense urban areas who do not yet own a car are familiar with the concept are take part in SnappCar's platform (interview 3). Elder people (60+), who only use a car incidentally and realize that their car is expensive, take part in car sharing. Also often families who own two cars and only use one car frequently take part in the concept. Next to that, there are car-enthusiasts who own an expensive EV but realize they do not use it every day, and therefore also join SnappCar.

Financial model

SnappCar makes a loss on their investment and that will continue for the upcoming years. Big investments have been made into the platform, IT developers and marketing. Those are the main expenses. More capacity and growth are necessary for SnappCar to make it a success. Matching the right person to the right car is a very complex task. Pricing for customers is arranged per day. In practice, between one and five days the car is shared by a customer. If rental time is longer, it is cheaper to go to a rental company. However, when rental times are really short, it is not beneficial for lessors to rent out their car.

Claut

What is Claut?

Claut is a circular automotive platform based on cooperation between partners. They focus on implementation of circular economy business models, and its values. They work on a project base, financed by the government. Claut is founded in order to support partners towards the values that circular economy business models institutionalize. According to Claut, the automotive industry struggles to take up circular business models, because the industry assesses these business models more as a threat than an opportunity.

Claut initiated a mobility energy project in Holtum-Noord. They work on a project base together with 'Limburg Economic Development' (LED). In this project, they examine whether or not it is possible to combine local sustainable energy generation at an industry terrain with a car sharing platform. Their goal is to research how those two different business models have a common ground with each other. As the actor of a consultant, Claut visited 75% of 40 companies that constitute the industry terrain at Holtum-Noord.

Business development

The strategy Claut deploys is creating value by finding the sub-optimality of the system. According to Claut, the success of the 'Holtum Noord' project is not dependent on the technology of carsharing. Rather, it is determined by the extent to which collaboration takes place between different companies. Claut is a mediator, because they want to find out if there is a need for companies to take part in a carsharing project, and actively try to connect those companies with the goal to capture organizational value. In this process, classical selection pressures have to be overcome. However, the mobility regime will not be transformed by companies who collaborate in sharing EVs.

Difficulties

According to Claut, too much emphasis has gone out to practice while in theory there are still a lot of scenarios in which carsharing systems can evolve in combination with generation of sustainable energy projects. Moreover, views on carsharing are still divergent by companies. As a consequence, it is difficult to bring different companies together. In addition, it is also difficult to bring companies on board because they often oppose changes in the cost structure of mobility. Furthermore, Claut experiences problems in setting up meetings for companies to discuss new ideas like carsharing, because a lot of companies are geographically distant from the headquarters of Claut. It is difficult to set up meetings with different companies in this way.

Business model

Value proposition

Claut's vision is to prepare, guide and achieve a circular automotive platform that will ensure increased value chain optimization (interview 4). The project at Holtum-Noord is an example of a project in which those circular economy objectives can be reached. They are a circular automotive platform based on cooperation between chain partners, with the goal to implement circular economy applications for the automotive sector into society. Claut is convinced that an optimal solution for an EV sharing system only can be found if more organizational value is captured. Claut strongly supports circular economics, because in this way more value is added to the EV.

Supply chain

The 'Mobility Energy Project' in Holtum-Noord is project based, financed by 'Limburg Economic Development'. In Holtum-Noord, Claut tries to connect companies with each other, in order to set up a micro-grid, where shared EVs are used for mobility and energy storage. There are several partners that were important for Claut. BMW, Zuyd lease, Stichting Limburg Elektrisch, Engie, Enexis and Pitpoint are parties that took part in meetings. BMW, Zuyd lease and Stichting Limburg Elektrisch were important for rolling out the carsharing platform, and Engie, Enexis and Pitpoint were important for discussing ideas about a local energy grid, fueled by sustainable energy.

Customer interface

Claut mapped the need for energy and the need for mobility of the companies at the industry park, and started with three companies that will use shared EVs from Ecarshare. The implementation of a micro grid is not yet feasible, because of several barriers that will be elaborated on in the next chapter. Claut thus tries to get on board companies at the industry park, so that they are going to use shared EVs for business trips. As indicated in figure 1 Appendix A, three companies join in and several others are considering to join the mobility energy project.

Financial model

Stichting Limburg Elektrisch and Ecarshare organized the EVs at Holtum-Noord. Ecarshare received governmental subsidies to accelerate, facilitate and support the installment of shared EVs and charging pole infrastructure in Limburg. Because the project at Holtum-Noord, was at the start-up phase, there was no financial model. Claut had problems getting companies on board, because they often compared their current mobility or energy bills with the shared EV system costs. Claut believes that a win-win is possible if local sustainable energy generation is combined with local consumption and storage in shared EVs.

MyWheels	mywheels

What is MyWheels?

MyWheels is a non-profit car sharing foundation located in Amsterdam, founded by Jules Brouwer in the 1990s. In 1993 the first car was shared (interview 5). The ultimate goal is to reduce the amount of cars in the Netherlands from eight million to one million. Their vision is that using shared vehicles are is the only way to reach that goal, because for each shared EV, 5 or 6 cars can be replaced. MyWheels started with their own cars, which had a fixed location. Those cars contained an electronic box, so that users could use a smart card or OV-chip card to open them. In 2011, MyWheels also started with including private offerings, so that private owners can do P2P car sharing at MyWheels as well. In that way a lot of shared cars are available in Amsterdam. MyWheels owns twenty shared cars, using the B2C model. In the future, more emphasis will go towards the B2C model, because MyWheels is convinced that a company can do a better job in maintaining the car, communicating between renters and lessors and ensuring the functioning of the hardware and software in the shared EV.

Business development

Mywheels wants to expand their B2C platform. In order to enlarge the placement of own cars, MyWheels is looking for partners in the lease market who are willing to share risks. Next to lease partners, also energy-cooperatives and municipalities can help in sharing risks when it comes to the placement of new cars, according to the COO of MyWheels. In addition, expanding the B2C platform, MyWheels emphasizes more on data analysis for determining favorable locations for installing cars. Next to that, they use community members and coordinators to promote MyWheels to municipalities. They are all volunteers.

Difficulties

The COO (chief operating officer) of MyWheels stated: "A lot of people complained that they did not use the p2p platform, because they considered that to be a hassle". This elucidates that it should be really easy for people to make use of the product. This problem has been solved by installing an electronic box in private cars for people who participated in the p2p platform. Another problem for the P2P market that car owners mention is that it takes too much time to maintain and clean the car each time when they rent it out, as well as the communication with the renter. Next to that, people rather use a fossil fueled in comparison to an EV for long distances. This has to do with range anxiety. Furthermore, MyWheels is always at risk when installing a car at a geographically favorable location.

Business model

Value proposition

MyWheels wants to offer sustainable and cost-efficient mobility via B2C and P2P car sharing models, on a non-profit base. Implementing shared EVs also stimulates the social aspects of a neighborhood, however, providing sustainable and cost-efficient mobility are the main goals. A non-profit organization is trustworthy in pursuing that goal, because they have no profit motivates in reducing the cars in the Netherlands from eight to one million (interview 5). In this way, not only the emission of CO_2 decreases, but with an EV, the car uses less energy.

Supply chain

MyWheels works together with leasing companies 'Mijn-Domein' and 'Multilease'. The software is produced in-house by employees. MyWheels has a lot of contacts with municipalities and Energy-cooperatives. They also has a lot of community partners. Each car therefore has an administrator. These administrators make sure that the car is cleaned each month, and help out renters when there are problems. Furthermore, MyWheels also has coordinators who goes to municipalities and other organizations with the goal to convince them to join the car sharing platform.

Customer-interface   Most

Customers are P2P users, located at Amsterdam or Wageningen, of which most lessors own a car that is two or three years old. MyWheels set up a marketing campaign together with Mijn-Domijn, in order to attract more clients. MyWheels sees B2C as their most important business model. A lot of car lessors mention that they spend a lot of time on cleaning the car and communication with the renter (Interview 5). Most of the P2P users only rent out a car twice a year. MyWheels believes a company is better at running a business like that. Most of the users feel strong towards a greener society. However, also because of the shortage of parking spaces in Amsterdam, people switch over to the car sharing concept.

Financial model

The financial model is based on the 'pay as you go' principle. There is also MyWheels premium, where a fixed amount of ten euros per month provides a discount on driven kilometers.

Consumers are not stuck to subscriptions, because in this way the maximum user friendliness will be reached Furthermore, MyWheels is the first car sharing initiative in the Netherlands that made a profit.

Ecarshare

eCARSHARE.nl

What is Ecarshare?

Ecarshare is an electric car sharing service, initiated by the foundation 'Stichting Limburg Elektrisch'. Employees that collaborated with the 'Stichting' were already working on the Ecarshare project. In 2013 the foundation did a feasibility study for shared EVs in the southern part of Limburg. It turned out that there was a lot of transport/mobility within that area, and little mobility outside that area. The municipality of Sittard-Geleen then wanted to start with 10 shared EVs. That was the direct reason for bringing Ecarshare within the foundation. After the Ecarshare project started growing in Limburg, there was an interest from the province of Noord-Brabant for the Ecarshare project. In Noord-Brabant, there already were some electric car sharing initiatives, like 'Paleiskwartier Elektrisch'. When Ecarshare started to offer their services to 'Paleiskwartier-elektrisch', they started a new company called EmobilityToolbox BV. This was necessary because Ecarshare was accommodated under 'Stichting Limburg Elektrisch'. Ecarshare mainly focusses mainly on the B2B platform. Ecarshare grew substantially, now exploiting 100 shared EVs. They want to expand further to 1000 cars. In Limburg, the parking pressure is lower in comparison to the Randstad, therefore, bigger companies are needed to act as main users, to expand the business.

Business development

Ecarshare is searching for organizations that act as a local hero, with the goal to support them with their extensive knowledge and experience in the field of electric carsharing. Ecarshare wants to centralize the system, and upscale it. By optimizing and centralizing the system, they want to become a service-provider for other electric carsharing initiative who do not have in-house knowledge and experience to set up a well-functioning electric carsharing platform.

Difficulties

It is difficult to persuade companies to start using shared EVs, because company leasing cars are also often used for private kilometers. Users often do not want to give up the possibility to invoice private kilometers. Invoicing private kilometers is not possible when a company choses to switch to shared EVs. This meets a lot of resistance from the user side of companies. The declaration culture is hard to change. This is a big barrier when approaching companies.

Business model

Value proposition

Ecarshare provides electric car sharing platforms for companies, local organizations and foundations. They believe in multi-modal mobility solutions, where the EV is just a link in the chain, and EVs are linked with E-bikes and public transit. Ecarshare wants to offer cheap mobility, where the user does not have the burden of owning a vehicle, but only the benefits of using it. Ecarshare wants to exploit shared Evs. Ecarshare believes in the growth of B2B car sharing schemes, because bigger companies act as main users. In this way, a more steep growth of shared EVs can be reached.

Supply chain

Ecarshare originates from 'Stichting Limburg Elektrisch', where close collaboration with the municipality of Sittard-Geleen took place. Also the province of Noord-Brabant works together with Ecarshare. Governmental organizations, mainly municipalities are the most important partners. Furthermore, Zuyd-lease is also an important leasing partner.

Customer interface

Ecarshare tries to find customers that have the potential to provide hundred or a thousand shared EVs them self. Ecarshare then wants to sell their platform to those companies or organizations. They look at these organizations that are in between themselves and the market, and act as a 'local hero', because they are very local and stand close to the market. 'We Drive Solar' is such a customer. Also the municipality of Sittard-Geleen, and 'Zuiderland ziekenhuis' are public institutions that make use of Ecarshare's expertise.

Financial model

Ecarshare is non-profit, because it is a foundation. Since they utilize financial support from municipalities, they cannot freely operate within the market. They try to operate in between large organizations, entrepreneurs and public initiatives.

Athlon (car2use)

What is Car2use?

Business development

Difficulties
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Business model

Value proposition	Supply chain
Customer interface	**Financial model**

Buurauto

What is Buurauto?

Buurauto is an electric car sharing company who has the objective to share EVs amongst neighbors and friends. They started in march 2016 and in November 2016 the first car was taken into operation. At the end of 2017, more than 15 shared EVs are in operation. Buurauto aims at consumers, detached from companies. Buurauto distinguishes themselves from other companies because the idea is really simple: "share EVs with neighbors, nothing more and nothing less" (interview 8). Consumers decide how and when to utilize the car, which means they communicate with each other and make arrangements. The only function of Buurauto is to facilitate and administrate the process. Buurauto uses both the B2C and P2P concept. Buurauto finances everything themselves, and receive no subsidy from the government.

Business plan

The strategy that Buurauto uses is to focus on the private consumer. There lies the biggest potential for targeting people. Private customers can easily decide to become a Buurauto member. Johan Janse stated: "Private customers can easily decide to become a member of Buurauto, whereas a company always needs a business plan or strategy before decisions can be made". Therefore, the potential for targeting private customers is bigger compared to a company. Buurauto focusses on the bigger cities like Rotterdam, Den Haag and Amsterdam, but also smaller cities like Breda, Amersfoort and Eindhoven. These are cities where there often is a scarcity for parking spaces, however, the car is still available within walking distance. Buurauto is the facilitator, because they provide the administration and provide full service. Buurauto can be seen as a B2C platform, however, because they enable the users to self-regulate the usage of the car, it can be seen as a P2P initiative within a B2C platform.

Difficulties

The government does not take the appropriate measures in order to stimulate the sales of EVs. Guarantees on batteries and a premium for electric charging are not sufficient measures to stimulate the sales of EVs. Furthermore, users have to get used to changing their behavior. Sharing an EV with friends or neighbors demands more planning, besides the fact that users have to take into account the fewer kilometers that can be driven. The early adopters will still accept flaws in technology, but as technology improves and customers get used to using the shared EVs, the threshold of failure acceptance will go down, according to Johan Janse. Otakeys (hardware and software provider for shared EVs) still displays technology flaws.

Business model

Value proposition

The objective of Buurauto is to bring neighborhoods closer together. Sharing EVs between neighbors and friends who live nearby each other, lets the car serve as a social purpose. Sharing EVs is a means to reach that objective. This is the value that Buurauto holds. It is positioned as a social initiative in a district, but it also improves the air quality, because EVs bring about no fine dust. Buurauto therefore also serves environmental and sustainability goals. The reason for Buurauto to choose to share EVs amongst neighbors and friends is because this keeps it simple.

Supply chain

Buurauto works together with MijnDomein and BMW for leasing the cars. The hardware, which is necessary for sharing the vehicles is provided by Otakeys. Share2use provides software. Buurauto has no outside investors.

Customer interface

Buurauto focusses on different target groups. First of all, they focus on individuals who have affinity with the environment, and are willing to share the car amongst neighbors and friends. Next to that, Buurauto focusses on energy-cooperatives which are also potential clients. A third concept, is where companies make shared EVs available during the nights and in weekends. In this way, the car is used more effectively. A fourth concept, is where a Buurauto is used for transporting elderly people.

Financial model

During the first year, marketing expenses were the majority of the costs. A shared EV is more cost-effective than a regular car when they drive more than 20000 kilometers per year. Most customers drive 4000 to 6000 kilometers per year. That means that it takes approximately 4 to 5 customers to utilize one EV. The pricing structure of Buurauto is structured per kilometer.

StappIn

What is StappIn?

StappIn is a car sharing company which started from the idea that the current business models for automotive firms are finite. There is a growing demand for the 'pay as you go' concept. Stapp.In originated from a family automotive company and leasing company, and wanted to broaden its ways in which value can be captured and created. They started doing research in collaboration with a student, and concluded that the trend of paying according to use offered perspective. An automated car sharing concept in which people can have access to mobility twenty-four hours per day was the starting point for StappIn. They wanted to automate this process, and start launching 'prepaid driving' without physical key transfer. In 2015, StappIn decided to build their own hardware and software that is needed for starting the car sharing platform.

Business development

StappIn focusses on developing a total solution for hardware and software for car sharing platforms. Their strategy is renting out their hardware and software solutions via franchisees for the private user market, as well for the MKBs. In this way, they try to expand the B2B market, which they believe has the biggest potential and scalability for growth. In order to expand, it is necessary for the customer to have access to every shared car with the same access technology. StappIn tries to couple the different hardware solutions to their platform. In that way, the costs per kilometer goes down. As a consequence, carsharing becomes cheaper for both the customer and supplier.

Difficulties

According to CEO of StappIn: "The user experiences a threshold when it comes to carsharing. On the one hand, people often do not want to give up the benefits that owning a car provides. On the other hand, people have thresholds that are just not real, like thinking the car hasn't been cleaned and thinking it is quite a hassle to start using the car". Other barriers concerning the exploitation of B2B carsharing platforms are the abundance of different software and hardware systems. In the future, convergence of these different techniques should take place. In this way, it does not matter for the end-user whether you open a Mywheels car or a Car2go car. It has the potential to greatly reduce the price per kilometer. This is not the case right now and according to StappIn this is a barrier for further development of the market.

Business model

Value proposition

StappIn wants to capture the value for the 'pay as you go' concept. StappIn wants to make sustainable mobility accessible for everyone, by offering innovative car sharing solutions. They have the vision to couple all the available car sharing software and hardware solutions onto one platform in order to make the coupled solution available to end-users. In that way, it does not matter whether Greenwheels, Mywheels, Car2go or Europcar is used. The customer just sees the nearest available car, and is able to use it for car sharing purposes.

Supply chain

In the beginning, StappIn started collaborating with 'Otakeys', which is a hard- and software supplier for car sharing platforms. However, in 2015 they chose to develop their own software and hardware, in collaboration with software developing companies 'GoAbout' and 'Enroute', Together, they developed the hardware and software needed for launching the system. In this way, both partners are very flexible and the technology can be coupled with other apps. In this way, user-friendliness and comfort for end-users can be guaranteed (interview 9). StappIn wants to couple their software to other hardware suppliers, like for example the car sharing platforms FreeToGo and ITMoble

Customer interface

StappIn focusses on franchisees, of which there are 13 in the Netherlands. The private customer is thus approached via the franchisee. They install the technology StappIn developed in their cars. Private users utilize these cars. StappIn provides the consumer label and all the support that the franchisee needs, like marketing, leasing and insurance. That is the direction for the private customer. In the business market, MKBs are also approached by StappIn, and are offered the full package. For bigger companies, like leasing companies, the whole technology can be offered.

Financial model

StappIn invested a lot of resources in developing their own software and hardware solutions. They do not receive subsidees.

Car2go

What is Car2go?

Car2go is a German car rental company and it is a subsidiary of Daimler AG. Several car sharing services are provided in urban areas in Europe. Car2go offers one-way free floating rentals. Smart Fortwo are mostly used as shared EVs. Daimler introduced Car2go in Ulm, October 2008. In this experiment the cars were developed as internal business innovation units and tested by employees of Daimler. In November 2011, Car2go was introduced in Amsterdam. The electric car sharing project was initiated by Car2go and was facilitated by the municipality of Amsterdam, because they provided parking permits. These permits are valid throughout the city, and Car2go makes use of the already existing charging pole structure (Suiker & Elshout, 2013). There are currently 350 Fortwo's located in Amsterdam.

Business development

Car2go, which is a subsidiary of Daimler AG, is the first traditional car selling company to invest in selling mobility as a service, instead of selling cars. Car2go sells 'seat time'. The advantage Car2go has compared to other B2C companies, is that it has the first-mover advantage. In this way, the key element of its competitive advantage is their patented technology. They continue to implement and develop technologies that makes it easier for companies to manage fleet operations. Patenting new technologies that make it easier to share vehicles is important for Car2go, because in this way they hold on to their competitive advantage. Furthermore, it is essential for Car2go to work closely together with municipalities in granting access to the electric charging infrastructure and the subsidized parking spaces. They deploy a 'stretch and transform' strategy.

Difficulties

The success of Car2go is very dependent upon collaboration with municipalities. In Amsterdam, the municipality granted parking permits allowing to park almost anywhere in the city (tariff of 675 euros per year). However, there are still places in the city where the shared EVs are not allowed to park. Reservation of parking space can cause tensions with local inhabitants, who are negative because they see a shared car that is not used often but occupies a parking space. There are often other stakeholders with an interest in using public space as well, and the allocation of public space needs to be covered by law. Futhermore, in theory, free-floating carsharing systems have the potential to reduce the total number of cars in urban areas, however, according to Suiker & Elshout (2013) it is merely a substitute for public transit.

Value proposition

Car2go offers subscription packages for individuals or families living in dense cities, where car sharing can be an alternative for owning a car, as it eliminates costs related to financing and insurance for example. The marginal costs per kilometer of car sharing is lower than the high fixed costs involved in owning a car. Decreasing the amount of cars eliminates pollution like fine dust. More efficient usage of cars is one of the core values of Car2go, because it leads to less traffic and more free parking spots.

Supply chain

The municipality of Amsterdam facilitated Car2go in Amsterdam, and therefore is the main stakeholder. DaimlerChrysler and Smart in involved in providing the EVs. Nuon and Essent manage the charging points (Suiker & Elshout, 2013). Europcar and the Dutch Railways (NS) also collaborate with Car2go. Europcar offers a reduced tariff for customers who have to travel longer distances, and customers of NS who have a NS business card also have access to the Car2go cars.

Customer interface

Car2go focusses on dense populated areas , where there are diverse neighborhoods. In those areas, car ownership rates are less than in rural areas. Furthermore, sufficient parking spaces have to be made available to Car2go.The municipality of Amsterdam and the demographics of the inhabitants met all the requirements necessary for Car2go for initiating the project in 2011. According to Suiker & Elshout (2013), 45% of the customers do not own a car, 40,4% owns one car and 11,8% owns two cars.

Financial model

The financial model is similar for different markets, although rates vary by location. Car2go charges a per minute rate, where there is a discount for fixed rates for hourly or daily usage. The rates cover insurance, gas, rental, parking and maintenance. In most markets, car2go vehicles can park in either specially designated parking spots, or in standard parking areas, with a special permit from the local municipality. It was already noted that in Amsterdam the charging pole infrastructure was already in place.

6   Niche development

This chapter focuses on the niche level, whereas in the previous chapter, each business strategy was outlined individually. In this chapter, the electric carsharing niche will be outlined. Here, an elaboration on the network, learning processes and expectations will be described.

6.1   Network of the niche

In the previous chapter, the business models and business strategies per initiative were described. Several key partners were discussed for each carsharing initiative. In this section, the network of the niche will be outlined. The network is divided in three sub-networks. The P2P, B2C and B2B niche network. It will be shown that there are several important partners involved in each multiple type of carsharing platforms. Furthermore, it will be shown that carsharing initiatives are also key partners of each other.

In figure 4, the network for two P2P carsharing initiatives is shown. SnappCar and MyWheels are two initiatives that are operating in a relatively young market. For peer-to-peer carsharing platforms, communication channels are very important for making people familiar with the carsharing concept. These two initiatives however differ substantially in how they target customers. SnappCar is a commercial company and wants to find as many potential customers as possible, as fast as possible. This is done by setting up huge and expensive marketing campaigns. Europcar (car rental company) is a big investor of SnappCar. This means that SnappCar's business model is largely funded by a large incumbent rental company, whose goal is to see whether or not rolling out a P2P carsharing platform is profitable in the long run. Besides marketing for finding customers, SnappCar also works together with Athlon (leasing company). In this partnership, SnappCar facilitates the process to private-lease a car, with the addition of providing discount when using the SnappCar platform to share this car. Again, SnappCar deepens its network by collaborating with a large incumbent company in order to find useful customers who are encouraged and are willing to share the car more often compared to private car owners. This is very different from how MyWheels uses its network to find customers. MyWheels is a cooperative and has less capital available for marketing. They deploy coordinators whose job is to promote MyWheels at meetings for municipalities, provinces and energy cooperatives.
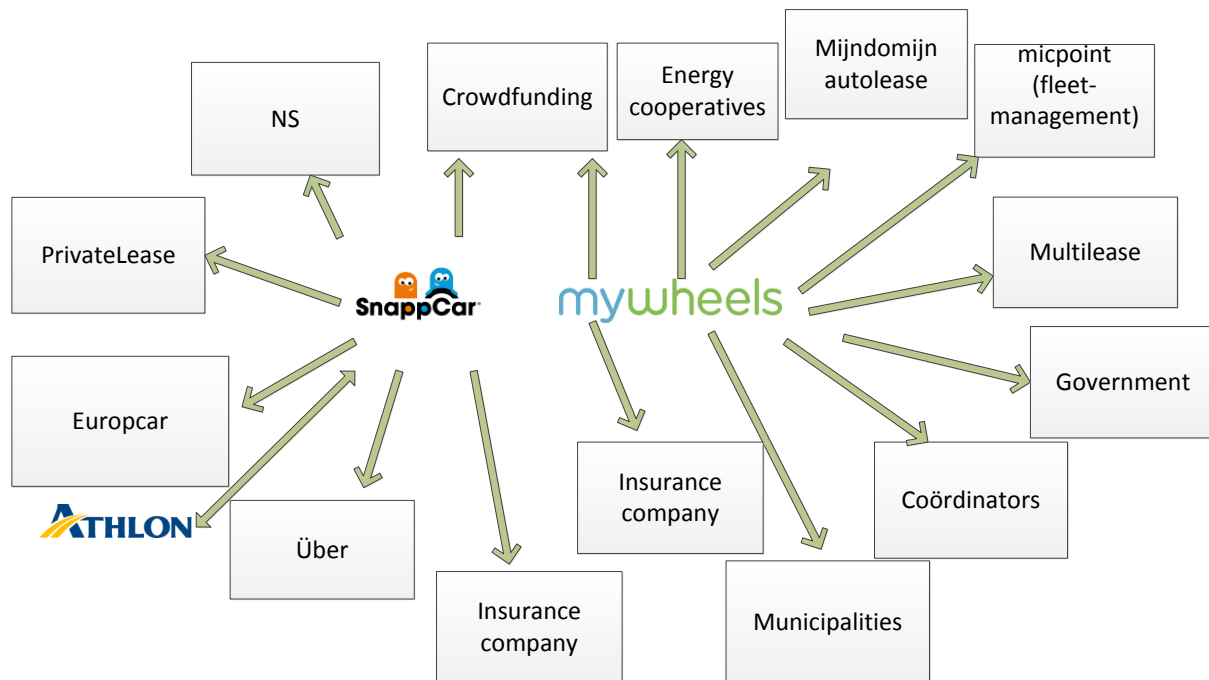
Figure 4: The peer-to-peer carsharing network

The difference in value proposition between SnappCar and MyWheels has led to SnappCar operating as a commercial company and MyWheels as a foundation. SnappCar business model is based on investing as much as possible into the software platform, Furthermore, SnappCar is able to make losses for years. MyWheels works with volunteers who act more locally to find potential customers. It can be concluded that the network of SnappCar is deeper, because representatives of the SnappCar network is more able to mobilize resources and commitment. The network of MyWheels is more broad, because they collaborate with LochemEnergie for example, which is an Energy cooperative that also experiments with electric carsharing. The involvement of this relative outsider is important to broaden cognitive frames and facilitates second order learning because LochemEnergie also gained a lot of experience with rolling out a carsharing platform.
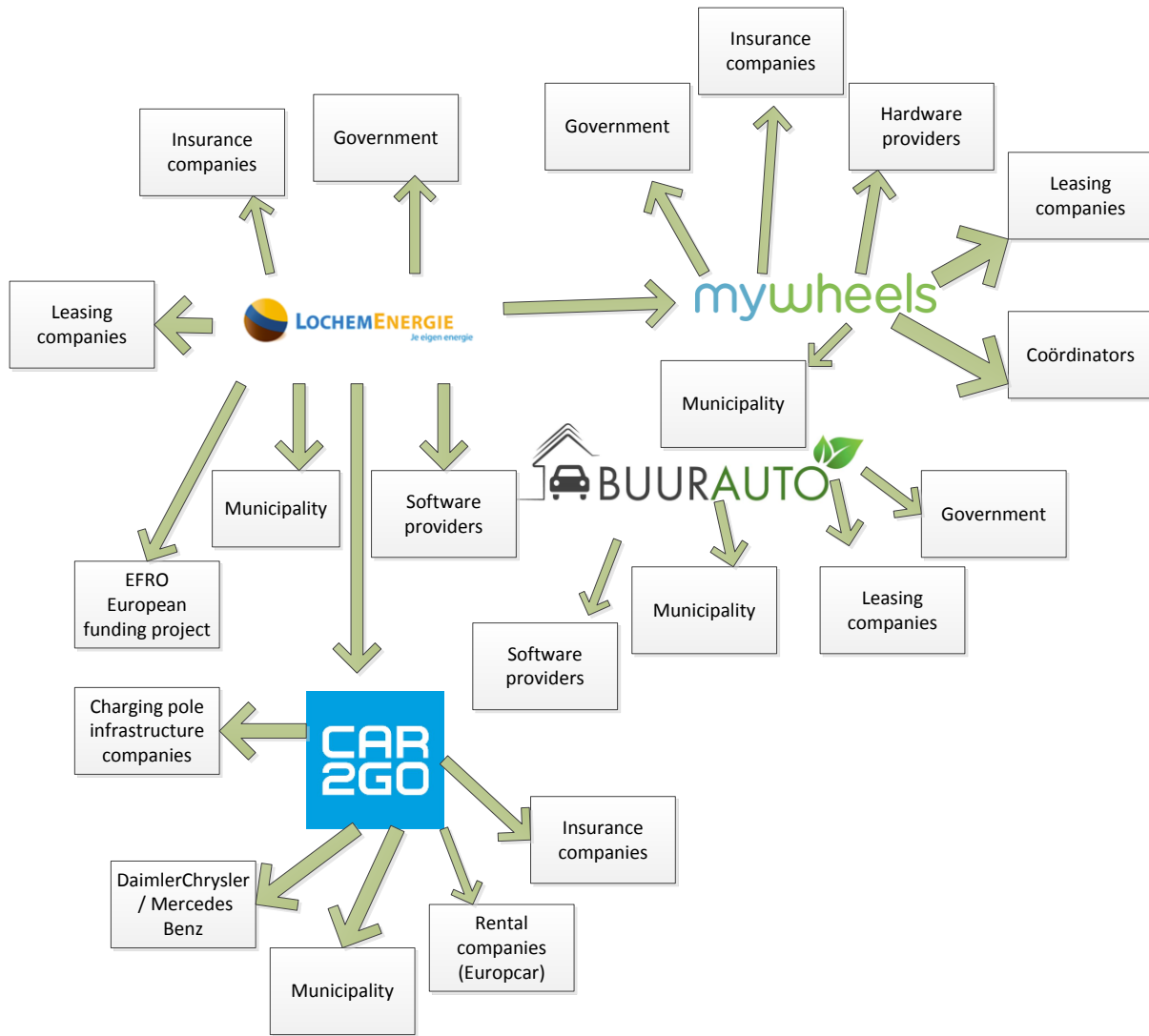
Figure 5: The business-to-consumer carsharing network

In figure 5 above the B2C carsharing network is depicted schematically. Next to the P2P platform does MyWheels also exploit the B2C platform. From figure 5, it can be seen that the B2C initiatives are also partners from each other. Car2go delivered EVs to LochemEnergie, which they used in the start-up phase for experimenting with shared EVs in Lochem. MyWheels and LochemEnergie are also partners, and exchange knowledge. Buurauto and Car2go are commercial initiatives. MyWheels is a foundation and LochemEnergie an energy-cooperative. Buurauto, MyWheels and LochemEnergie mainly focus on municipalities to do business with. Municipalities are not only seen as customers, but also as partners because they are public organizations and make the shared EVs available for their employees. Municipalities can also act as investor and facilitator. Car2go is a fully commercially driven initiative, initiated by Mercedes Benz, part of the DaimlerChrysler group. They are partner of the municipality of Amsterdam. The municipality does not act as customer, but as facilitators of parking licenses. The network of

Car2go is deeper in comparison to the other three carsharing initiatives, because powerful automotive companies invest large amounts of capital in it. The scale of the initiative also differs with respect to the other B2C initiatives. Car2go owns more shared EVs than all the other B2C initiatives combined (Car2go exploits around 350 EVs in the one-way carsharing scheme). The power of the network of Buurauto, LochemEnergie and MyWheels is that they have a broad social network, that operates locally. In this way, a lot of user-involvement discernable. This is mentioned by Aron Vaas, COO of MyWheels:

"We work together with LochemEnergie, because LochemEnergie has a big community. GreenWheels also placed a car in Lochem, but after half a year it was withdrawn again, because it was not used at all. It was not used, because the people have less connection with GreenWheels then they do have with LochemEnergie. They trust the local Energy cooperative (LochemEnergie). That is the reason why they take part in the carsharing scheme of Lochem, but do not take part in the GreenWheels platform".

This quotation underlines the importance of trust and the power of local networks, which is installed at LochemEnergie, Buurauto and MyWheels. The most important software providers are: Casemaster solutions, WeGo and Share2Use are used by these B2C initiatives. MyWheels and Car2go built their own software.
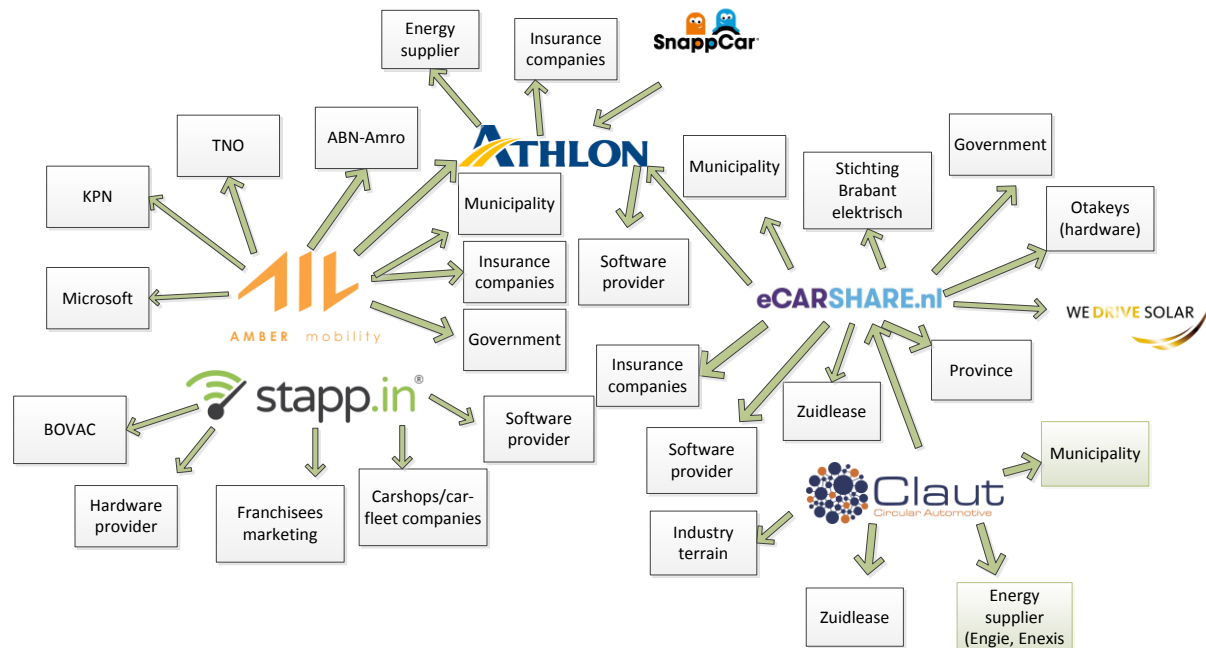

Figure 6: The business-to-business carsharing network

Figure 6 above schematically depicts the B2B carsharing network. Athlon (Car2use), Amber mobility, StappIn, Ecarshare and Claut are the B2B initiatives analyzed in this report. There are more B2B carsharing platforms in the Netherlands, which are not analyzed here. It can be seen that Athlon is an important link in the network. They own shares of Amber mobility, and also have an important connection with Ecarshare, because Athlon owns a majority of shares of Zuidlease, which is a leasing partner of Ecarshare.

Claut is a partner of Ecarshare, because Ecarshare provided shared EVs for the project Claut was participating in. Ecarshare also conducts business for WeDriveSolar, which is an electric carsharing initiative in Utrecht, where shared EVs are connected with local energy generation in a neighborhood, and the EVs can also act as battery besides offering sustainable mobility.

All the initiatives in figure 6 except StappIn are dependent on the car- rental and leasing sector. All these initiatives share a lot of synergy with each other. Ecarshare and Claut are the only non-commercial initiatives. These initiatives therefore position themselves in between market players. They are funded by the government, which means that Ecarshare mainly conducts business with the public sector.

StappIn evolved from a car-dealer company to exploiting carsharing platforms. That is why their network is very closely related to car-shops and car-fleet companies. They developed their software and hardware in collaboration with franchisees. This collaboration creates a big network, which is very suitable for marketing.

The most software companies and hardware companies that are partners with B2B initiatives are Otakeys, Inverse, share2use and WeGo. Wim Geluk from StappIn stated:

"Especially Otakeys often is chosen as partner for providing hardware and software for carsharing platforms. However, there hardware is used by more initiatives in comparison to their software systems"

The software often was not suited for electric cars. Because of this reason, StappIn and Ecarshare started developing their own software in collaboration with other software companies. Because the B2B initiatives gained a lot of experience with a range of software providers through the years, important learning processes took place. It can also be seen from figure 6 that the B2B initiatives have connections to the other carsharing platforms (P2P and B2C). Athlon has a partnership with SnappCar, and Ecarshare conducts business for WeDriveSolar (B2C).

It is interesting to note that Amber Mobility, which is a rather small initiative, has a very deep network, involving Microsoft, KPN and TNO. Their network is also broad, because of the multiple kind of stakeholders , all contributing to a different segment, ranging from software development to research for automated systems. However, many partners are industrial companies. Relatively

little is known about societal actors and other outsiders, which may broaden their network even further.

Moreover, the B2B network is quite a diverse in terms of size, ranging from small initiatives to larger ones, which are often connected. A majority of this market segment is characterized by the involvement of Athlon. Besides rolling out their own carsharing business (Car2Use), they gain a lot of experience by looking at how other carsharing initiatives roll out their platform.

6.2   Learning processes of the niche

In this section, the first-order and second-order learning processes of the electric carsharing niche will be highlighted.

Learning processes for P2P

For P2P business models, a common shared first-order learning process is that all these types of electric carsharing initiatives are leaning more towards data analysis, serving multiple functions. More data analysis is necessary to match supply and demand.

At SnappCar, more focus goes out to improving the communication channels through which they reach renters (Interview 3). This is done through emails, websites, Facebook and google. Also here, more focus goes out to data analysis. In this way, supply can be matched to demand. Improving and automating communication channels demands huge investments. EuropCar, which is a big traditional car rental company, provided the funding for SnappCar.

Another first-order learning process is that further automation of the transaction between renter and lessor is necessary, because customers are mostly not satisfied with the amount of time and effort it takes to exchange cars. Most P2P carsharing initiatives therefore try to make the process as user-friendly as possible, by further automating the system with an electronic box in private cars.

For successfully unrolling a P2P carsharing system, big dense areas are needed. Only Amsterdam or 'The Randstad' are big enough in the Netherlands to fulfill sufficient supply. A first-order learning process here is that there is a shortage at the supply side. There is a shortage of people who put their car on the website, as a lessor. People tend to rent a car more easy, then to be the lessor. This is why a surplus of cars is needed in order for the P2P system to function optimally.

Both the P2P carsharing platforms underestimated that behavioral change of customers is a necessary condition for successfully introducing electric carsharing platforms. More needs to be done to enhance behavioral change. This is a second-order learning process. Furthermore, providing customers with optimal insurance in a financial way is a continuing learning process for P2P carsharing platforms.

Learning processes for B2C

For B2C business models, a common shared first-order learning process is that all these types of electric carsharing initiatives are leaning more towards data analysis, serving multiple functions. At MyWheels and Car2go for example, they are leaning more on data analysis with the goal of pro-active installing shared EVs at geographically favorable locations. They use data analysis for determining successful areas for doing business. In this way, they can act more pro-active instead of acting reactive to market demand. Before data analysis was used, they were dependent on customers reaching out to them. By using data analysis, it is more easier to expand the business. Thus, using more data analysis elucidates first order learning, because using 'data knowledge' as a marketing device is an alternative way of valuing and supporting the niche. Choosing geographically favorable locations for installing shared EVs is done by using data analysis. Demographic data of people provides insight in what the conditions are for installing EVs at a certain location.

There are several software and hardware packages that are used in carsharing initiatives in the Netherlands. 'WeGo', 'Share2Use' and 'Otakeys' are all important companies that offer software and hardware for electric carsharing initiatives. An important first-order learning process for a lot of initiatives was that the software is not well adapted for electric vehicles. Especially the software of 'Otakeys' is not functioning well for shared EVs, because the software does not connect the car to the charging pole infrastructure. Therefore, a lot of initiatives (Amber Mobility, MyWheels, Ecarshare, Buurauto and StappIn) adapted the software package in a way favorable for EVs. Changing the software favorable for a single business model takes a lot of time, effort and is accompanied by large expenses.

The level of automation is larger for the bigger carsharing initiatives. Small initiatives like LochemEnergie that start from scratch have to reinvent a lot of processes like marketing, determining a customer base and running an administration. When a shared EV breaks down, because for example a customer forgets to plug it in the recharger, often external service has to indent and solve the problem, whereas at bigger initiatives, these problems have been solved in advance by sending out automated text messages when the customer forgets to plug-in the EV into the recharger.

A big issue for all electric carsharing companies is making the business model profitable. Some business models have high occupancy rates in units of time, but not in units of kilometers driven. It is a big challenge finding out how to make this profitable. MyWheels is the only initiative that made profit exploiting shared EVs. A lot of initiatives are experimenting with multi-modal mobility solutions. For example, suppling E-bikes for short trips or connecting carsharing schemes with public transit.

For successfully unrolling a B2C carsharing system, big dense areas are needed. Only Amsterdam or 'The Randstad' are big enough in the Netherlands to fulfill sufficient supply. Also the other bigger cities in the Netherlands are used for the B2C market. For the B2B market, this does not hold. For the B2B platforms, business parks and industry terrains are important locations for unrolling the carsharing platform.

Learning processes for B2B

B2B initiatives are also leaning more towards data analysis, serving multiple functions. At Amber Mobility (B2B), data analysis is used for their 'Amber Analytics' tool, which serves as another function. This tool is used as a marketing device for tracking down mobility patterns of potential clients (companies), in order to explain with how much they can reduce their car-fleet size. This is interesting for companies, because sometimes they don't know if they want to go for carsharing yet, and are not convinced. In this way, data analysis is thus used as a marketing device.

A first-order lesson for the B2B market is that scaling up is only possible when large companies act as main user, with the addition that other companies or individuals are needed to increase the occupancy rate of the cars (Amber Mobility, Ecarshare). Thus, private customers can be taken into account, when the business has expanded. This is only feasible if B2B and B2C businesses work together with other parties. For a fleet of 1000 cars, a bigger organization is needed. Ecarshare for example fixes a lot of problems on location, but in the future when there is a larger fleet, the whole operation needs to be more robust. Another first-order learning process for the B2B market is, that in the end, it resembles the B2C market. For example, even when Amber Mobility or Ecarshare contract a big company to use their shared EVs, the customers of these companies still have to persuaded to join in. This marketing is done by the carsharing company (Ecarshare & Amber Mobility).

An important first-order learning process for initiatives is how to persuade customers to start using shared EVs. The sharing concept of cars is mostly a new concept for users for which it takes time to get used to. By first introducing fossil fueled cars as cars to be shared, it takes less time to adapt to the sharing concept, because customers are already familiar with driving fossil fueled cars. After customers are used to the sharing concept, electric vehicles can be introduced in order

to smoothen the process of adoption of shared EVs (Car2Use & StappIn). Most initiatives offer both fossil fueled cars and EVs. Not every carsharing business model analyzed in this report explicitly promotes EVs, although they do offer it.

A second-order learning process is the observation that more emphasis has to go out to changing behavioral change. Behavioral change of customers is a necessary condition for successfully introducing electric carsharing platforms (SnappCar, MyWheels, Ecarshare, Car2Use, Buurauto and StappIn). This holds for all the different carsharing schemes analyzed (P2P, B2C and B2B). In hindsight, most carsharing initiatives should have invested more in triggering behavioral change. Facilitation alone is not sufficient. Customers need to be stimulated, and provided with positive feedback. Using reward systems and gamifications in using a shared EV can help in enabling behavioral change.

6.3   Expectations of the niche

P2P carsharing expectations

Both SnappCar and MyWheels expect that their business in the future will largely consists of electric cars. According to Thijs Verhagen (finance manager of SnappCar): *"Electric driving is what I think the only future for the mainstream, although there will always be exceptions. Electric cars are more expensive to buy, as the operational costs are lower. This structure lends itself for carsharing initiatives (interview 3)".* Also Aron Vaas , the COO of MyWheels acknowledges the same expectations: *"An electric car is much cheaper than a fossil fueled car, in terms of gasoline consumption, maintenance and eventually also the depreciation costs. I expect that electric transport is going to be the number one way of transportation (interview 5)".* The majority of P2P carsharing platforms in the Netherlands expect a substantial growth of electric mobility. Furthermore, SnappCar argues that multi-modal solutions are important for future mobility. They experimented with multi-modal solutions, in collaboration with NS and Uber.

MyWheels exploits besides a P2P platform also a B2C platform. They expect that the B2C market will become the most important model in the future. This is surprising, because they exploit both platforms. From experience, they acknowledge that users often spend much time on renting out the car, because of cleaning, maintenance and contact between lessor and renter. MyWheels is convinced that a company or foundation can do a better job in manning these operations, and providing efficient communication towards the renters. Both SnappCar and MyWheels also expect that in the near future new technologies will emerge which makes it easier for private individuals to share their cars. According to MyWheels COO: *"The technology which ensures an*

easier sharing process between individuals will come anyway". At SnappCar, they think that friction processes between car owners become smaller at the moment that more technology is included in the car that automates the process of carsharing further.

SnappCar expects that within 15 years different carsharing platforms will merge with rental companies. The general consensus amongst the P2P initiatives is that the future of the P2P platform is very much dependent on progress of technology. This has the potential to take away the barriers that renter and lessor experience by means of automating the carsharing process.

B2C carsharing expectations

The carsharing initiatives that exploit the B2C model are very different in how to conduct business. From chapter 5 it can be seen that the value propositions of Car2go, Buurauto, LochemEnergie and MyWheels differ substantially. The expectations and visions these initiatives hold also are very different from each other. These differences in expectations are a consequence of the differences related to value propositions. However, a common expectation all the B2C initiatives hold is that by introducing shared EVs a contribution towards sustainability is made.

Car2go and Buurauto are commercially driven initiatives. They both target private individuals, which combined counts for 7,3 million cars. Their expectations about the future of the business differ greatly, because their business model is very different from each other. Buurauto expects that mobility can be changed if people start sharing EVs amongst friends, neighbors and family. In this way, mobility is changed at the roots. This is very different from how Car2go expects mobility to change. They want to offer a full alternative for owning a vehicle in a dense city where there is a shortage of parking spots. The expectations of Car2go are economically driven, and the expectations of Buurauto are driven socially. Despite these differences, both carsharing initiatives expects that experience, emotion and image are the most important drivers for the success of carsharing. Johan Janse, founder of Buurauto argues: *"I notice that a lot of carsharing providers think too much from a technical perspective, while carsharing is not technology, it is an experience, an emotion and an image".* "Furthermore, there are 7,6 million private drivers, which outnumbers the lease market greatly, and there is yet no business model that lies at the foundation of change for private customers". Buurauto therefore expects that the private market has the highest potential to bring about regime changes. This is also the market that Car2go ascribes.

Despite the big scale difference of the initiatives, all four B2C platforms work intensively together with municipalities. Car2go expects the municipality of Amsterdam to keep encouraging local companies to install recharging points for electric cars, as well as keeping up the favorable parking license policy for Car2go's Smart Fortwo's. For Car2go, the municipality is only a facilitator, but for the other B2C initiatives, the municipalities also act as customer. Hence,

LochemEnergie and MyWheels argue and envision that a pact between local governments, local business and local people is necessary to work together effectively, and hereby stimulate electric carsharing in the most positive way. However, MyWheels also argues that it expects that not a single car sharing initiative without subsidy can become commercially viable at the moment.

B2B carsharing expectations

It is noted by all the B2B carsharing initiatives that national and regional government is essential in promoting and subsidizing electric carsharing schemes in the Netherlands. Both on a local and a global scale the government can be a major actor in promoting this development. According to the CMO of Amber: "*I think that in the end the government will be more than happy to work with us, because actually one of their main goals is to make the society as a whole more sustainable, and we help them do that in a big way actually*". Amber Mobility is dependent on the municipal regulations concerning automated vehicles. Also other initiatives recognize the importance of the government in stimulating electric transport. According to Car2use: "*If the government decides tomorrow to make the Renault Zoë less expensive by making it 'bpm' free, it will have a big impact on the number of purchases made by private individuals*". However, not all municipalities are in favor of carsharing in city centers, because it does not necessarily reduce the number of car owners (Suiker & Elshout, 2013). A municipality or governmental organization can also be a customer when it comes to using shared EVs. They have the possibility to take up local initiatives, and accelerate the implementation of these initiatives by connecting them to other actors. According to Claut, municipalities are not efficient organizations in connecting different initiatives or proponents of electric carsharing with each other.

People are switching over from the idea that everything has to be owned, according to Amber. They argue that trends like sharing and sharing economy are taking over. All B2B initiatives expect behavioral change of consumers and companies is necessary in order for carsharing to grow substantially. Initiatives like Car2Use, Claut and Ecarshare argue that still a lot of behavioral change is necessary. Behavior is not expected to change quickly, according to Car2use. Consumers still have to adapt to share a vehicle, besides adapting to drive EVs. Because of the shorter radius of EVs, customers have to plan their trip more in comparison to regular cars. Next to that, customers have to take into account that each car has to be connected to the charging pole after their trip.

Furthermore, the B2B initiatives expect further development of the software and hardware that is used in the shared EVs. Experience has taught that most of the software was not well adapted to EVs. Most of the software systems do not work well for electrical mobility, because they do not take into account the shorter range of EVs and the waiting times at charging poles, as well as not taking into account often made user-errors.

Ecarshare and StappIn expect that in the future more attention will go out to multi modal mobility solutions. As the technology of the software and hardware improves, more modes of mobility can be connected. All the B2B platforms argue that in order to become viable, a big fleet of cars is necessary. When B2B platforms approach companies as potential customers, they often run into trouble because most employees in companies are used to kilometer declaration. Most employees have a (lease) car from the company, and are used to receive back the costs of using this car.

Car2use and Amber, who are partners, both expect that in the future more automated vehicles will emerge and will determine the success of carsharing.

7 Analysis of BS's and niche development

7.1   What is electric carsharing?

Car sharing is defined as short-term vehicle access among members who share a car or car fleet that is maintained, managed and insured by a third-party organization (Shaheen et al, 2015). The rates include maintenance, fuel and insurance. The electric carsharing initiatives in the Netherlands range from very small initiatives (Claut) to very big initiatives (Car2go). Three different types of e-carsharing platforms are often used: peer-2-peer carsharing, business-2-consumer carsharing and business-2-business carsharing. In dense urban areas, one way carsharing programs can be applied. In less dense areas, mostly roundtrip carsharing programs are applied.

In the 1990s, a lot of pilot programs failed because of 1st EV models. The initiatives proved feasible in terms of user satisfaction and range, but EVs gradually faded out of hybrid, roundtrip and station car programs (Shaheen & Chan, 2015). There were a lot of reasons for failure. For example, low reliability of first generation EVs, high insurance rates, decreased user demand, logistical challenges, not being viable economically and low public support. Now there is re-emergence, because of technological advancements, lower costs and longer range (Shaheen & Camel, 2016). The most important catalyst for re-implementation of EVs into carsharing programs was the role of public policy (e.g. supporting parking policies). In the future, battery technology will also have a big influence on the development of electric carsharing.

7.2   What e-carsharing business models and strategies can be identified?

In this section, the second sub-question will be answered. The different e-carsharing business models and strategies will be outlined.

In table 3 (chapter 5) it is listed for each e-carsharing initiative what business model is exploited (peer-to-peer, business-to-consumer, or business-to-business business model). Next to that, it indicated whether or not the software is produced in-house, or outsourced. It also shows if an initiative is commercial or non-commercial, and whether or not the e-carsharing operates on a local level or more globally in the Netherlands. In figure 5 (chapter 5), it is indicated what the orientation is of the e-carsharing initiative. It can be seen that most initiatives are economically oriented, in combination with an environmental orientation.

Both table 3 and figure 5 sum up the variation in how the different e-carsharing initiatives conduct their business.

P2P

When zoomed in on the P2P sector, it can be concluded that the business model and strategy of SnappCar is very different than MyWheels.

The development of SnappCar is a consequence of rigorous investments into software development and extensive marketing campaign, backed up by Europcar and crowdfunding. SnappCar has more than 350000 users. Upscaling is done by partnering up with leasing companies like privateLease for example. The strategy is extensive investment in the concept (website) in order to match supply and demand. In this way, the attention of individual renters is attracted as much as possible. In the upcoming years, the goal is to enlarge their customer base. They also facilitate the process of leasing a car, and then provide discount if they use their platform. This elucidates that the development of SnappCar is a consequence of strong connections to the incumbent auto mobility regime. SnappCar operates on a large scale, and growth is their number one objective.

MyWheels on the other hand has no strong connection to the auto mobility regime when it comes to the P2P carsharing platform. They deploy community members and coordinators to promote MyWheels to municipalities, on a voluntarily base. The development of P2P helps MyWheels to enlarge their customer base, which they believe will benefit the B2C platform they deploy. Furthermore, the electronic boxes for private cars for keyless openings is a strong tool in promoting the P2P platform without having to deal with time-consuming physical key transfer amongst renter and lessor. Furthermore, MyWheels does not only invest capital into the P2P segment, but most of all in the B2C segment.

The difference in strategy between SnappCar and MyWheels is a consequence of the different value propositions they proclaim. Where SnappCar's value proposition is to utilize cars more efficiently, MyWheels's value proposition states they want to reduce the number of cars, as a means to offer more efficient transport.

Both MyWheels and SnappCar invest a lot in developing their software. Both initiatives acknowledge the increasing importance of ICT and data analysis in the development of carsharing programs.

B2C

LochemEnergie, MyWheels, Buurauto and Car2go are the four identified B2C carsharing initiatives. These four initiatives differ greatly in size, strategy and business model.

LochemEnergie and Buurauto are the smaller initiatives and differ greatly in their business model and business strategy. LochemEnergie (Elektrip) was initiated by the Energy-cooperative that heavily relies on the work of volunteers. They had little knowledge on exploiting an e-carsharing

business. Their value proposition holds that they want to offer shared EVs for local members in the community, and want to re-invest the profit into the local community. Because LochemEnergie (Elektrip) is a local initiative, and it heavily relies on collaboration with the municipality, and it dependable on subsidy, they import all the know-how from other carsharing initiatives. By selling fixed contracts to the municipality, cheap mobility can be offered for the local community.

The business model of LochemEnergie is very different in comparison to the e-carsharing platform of Buurauto. Both initiatives are relatively small, however, Buurauto was initiated by entrepreneurs who hold the value proposition that e-carsharing initiatives should have a social purpose, that is, bringing neighborhoods closer together. EVs are just the means to reach that social purpose. Buurauto does not act locally and does not rely on funding. Here the strategy is to focus on private individuals who live in dense urban areas where there is a parking shortage.

Both e-carsharing initiatives outsource the software that is required for unrolling the platform. This is a big difference in comparison with the bigger B2C initiatives. MyWheels and Car2go are bigger e-carsharing platforms, and therefore have the capital to invest in producing their own software. This is done in the anticipation that as the e-carsharing market grows bigger, only a few software packages remain, which will become very expensive or hard to purchase as a consequence of intellectual property rights.

Furthermore, fixed contracts ensures the possibility to offer citizens a low price. This is a strategy that LochemEnergie performs for attracting new customers. MyWheels tries to expand the system by searching for partners who are willing to share risks. These partners range from leasing companies to energy-cooperatives and municipalities. Buurauto offers different kind of contracts.

It is important to note that all the small B2C initiatives are not convergent in their strategy of maximizing the occupancy rates of the cars. There is not yet a dominant business strategy for unrolling B2C platforms. There are many investment strategies possible, and the initiatives seek different strategies for risk diversification. The bigger carsharing initiatives like Car2go and MyWheels developed in-house software, while smaller initiatives like LochemEnergie and Buurauto out-source the software development. Inverse, Casemaster-solutions, Otakeys, Share2use and WeGo are typical e-carsharing (software) companies in the Netherlands that contributed to the development of software needed for unrolling an electrical carsharing scheme. The software is not always well adapted to EVs, and as a consequence, bigger initiatives invest a lot of capital in engineering software that fits their platform the best way possible. All B2C initiatives acknowledge the importance that ICT has on the development of the e-carsharing platforms. Furthermore, all B2C initiatives heavily rely on data analysis for positioning new cars at geographically favorable locations.

B2B

The B2B market in the Netherlands is an interesting emerging market, because there are different initiatives who differ a lot in their business model and strategy. Ecarshare is an initiative that evolved from a foundation (Stichting Limburg Elektrisch) to a company that not only focusses on finding new B2B customers, but also provides services for other e-carsharing initiatives. Their strategy is searching for organizations that act as a local hero, with the goal to support those organizations in centralizing the system by optimizing it. Ecarshare wants to act as service-provider for other e-carsharing initiatives, who do not have the in-house knowledge and experience necessary for setting up a well-functioning e-carsharing system. For example, Ecarshare facilitated the shared EVs for Claut and WeDriveSolar (e-carsharing initiative in Utrecht). Claut is an initiative that works on a project basis, and writes on tenders set out by municipalities or provincial governments. It is run by zzp'ers.

Amber Mobility is an initiative set up by TU/e students who wanted to provide customers with a shared autonomous EV. Amber uses their predictive software algorithm (Amber analytics) as a marketing device in order to persuade potential B2B customers who are not convinced to take part in carsharing. Furthermore, Amber analytics is mainly used to target big customers. Bringing on board big companies enlarges their fleet of shared EVs. Thus, focusing on big companies is a good way for expanding the system for Amber Mobility.

StappIn and Car2Use are two initiatives that originate from incumbent automotive companies. Thus, the B2B initiatives have their roots in entrepreneurial activity, governmental organizations and commercial incumbent automotive companies. The main strategy of the B2B initiatives is focusing on large potential customers, and heavily rely on incumbent regime actors and current infrastructure. StappIn focusses on developing a total solution for hardware and software for car sharing platforms. The strategy is renting out their hardware and software solutions via franchisees for the private user market, as well for the MKBs. In this way, StappIn tries to expand the B2B market, which they believe has the biggest potential and scalability for growth. In order to expand, it is necessary for the customer to have access to every shared car with the same access technology. StappIn tries to couple the different hardware solutions to their platform. Thus, it can be stated that the B2B strategies are very divergent.

7.3   How do BMs and BSs shape the creation and development of the niche?

In the introduction, it was stated that it is still unclear how the different e-carsharing initiatives and their business strategies add up to each other and lead to development of the niche. In chapter 6, the first- and second-order learning processes, expectations and network was described. For a niche to develop, the network, learning processes and articulated expectations should stabilize over time , and form stable rules. In this subsection, it will be described that seven different elements of business strategies can be identified which are important for the development of the electric carsharing niche. These elements of the strategies were visible in most of the initiatives, and therefore contribute towards the creation and development of the niche.

There are seven important elements of business strategies that impacted the development of the electric carsharing niche so far. First of all, ICT, software development and data analysis is becoming more important for electric carsharing initiatives. For all three different types of business models (P2P, B2C and B2B), initiatives are leaning more towards data analysis, serving multiple functions. Most initiatives that have sufficient capital at their disposal, recognize the importance and develop their own software. Amber Mobility, SnappCar, MyWheels, Ecarshare, StappIn and Car2go are all e-carsharing initiatives who developed their own software applicable for their market segment (P2P, B2C or B2B). Smaller initiatives like LochemEnergie, Buurauto, Car2Use and Claut do not have in-house IT. They bought the software systems from other carsharing initiatives or companies specialized in producing hardware and software systems for the carsharing market..

Secondly, in the emerging shared EV niche, there is a strong collaboration and involvement of the initiatives with the auto-mobility regime (car rental companies). Almost all the e-carsharing initiatives have very strong links to the mobility regime. For example, all the different business models that were studied lease EVs from leasing companies, with Car2Use as an exemption. Four out of ten initiatives (SnappCar, Car2Use, StappIn and Car2go) have very strong link with incumbent auto manufacturers, auto-dealers or lease-companies. They have no intention of changing the auto-mobility regime, rather they anticipate on the market and try to capture value that is otherwise captured by new entrants like MyWheels, GreenWheels or other carsharing initiatives. SnappCar for example is funded by Europcar, which is a big car-rental company in the Netherlands. The e-carsharing initiatives that are less dependent on the auto-mobility regime (Amber Mobility, LochemEnergie, Claut, MyWheels, Ecarshare and Buurauto) actively try to collaborate with leasing companies to share risks together, with the goal to enlarge the amount

of EVs in a faster way. Thus, in a direct or in-direct way, is the e-carsharing market largely dependent on the current auto-mobility regime.

Thirdly, governmental organizations (municipalities, provincial government and national government) are important customers, partners and facilitators of the electric carsharing initiatives. Both municipalities and central government policy have a big influence on the development of electric carsharing schemes.

Fourthly, initiatives are leaning more towards multimodal mobility solutions. A shared EV is in this way only a link in the chain. All three types of business models are experimenting with multimodal mobility solutions. SnappCar, Ecarshare and Car2Use are experimenting with multimodal mobility solutions. Electric scooters and E-bikes are also mobility options that can be selected from by customers. Especially for shorter distances, using electric scooters and E-bikes are actively promoted and lead to more sustainable transport. Using buses and trains are also embedded into the multi-modal system. In the value proposition of these three e-carsharing initiatives, it is stated that shared EVs are not the solution in itself, rather they only fulfill a partial function. Experimenting with multi-modal solutions is still in a very young phase, with Ecarshare leading the way because they offer a multi-modal model on one app.

Fifthly, electric carsharing initiatives put more emphasis on behavioral change when it comes to establishing customer relationships. Almost all initiatives underestimated the influence of behavioral change on the success of the shared EV initiative. In the P2P market, initiatives like SnappCar and MyWheels experience consumer resistance when it comes to key-transfer processes between lessor and renter, and experiment with keyless systems in order to stimulate the P2P market by making it more efficient. In the B2C and B2B market, carsharing initiatives realize that more emphasis has to go out to strengthen customer relationships by providing positive feedback in the car. Gamification and stimulation on the dashboard of the car can help in establishing behavioral change that is necessary for the future success of shared EVs. Providing positive feedback is necessary for keeping customers satisfied, and learning them about how to use the car the right way.

The sixth element holds that smaller initiatives make great use of local communities, while bigger initiatives put more emphasis on extensive marketing. This holds because bigger initiatives have more capital at their disposal, and are less dependent on the local landscape. MyWheels, LochemEnergie and Amber Mobility uses the local community for finding investors, customers and promoters. These initiatives act as a local hero, in promoting sustainable and efficient transport. MyWheels works with volunteers who act more locally to find potential customers. Car2go, Car2Use, StappIn and SnappCar have a lot of financial back up, and are able to invest large amounts of capital in marketing and in-house IT.

The seventh important element of a business strategy is the collaboration between initiatives. Because there is little competition, the incentive is higher to work together and lessons are learned more globally. MyWheels for example also collaborates with LochemEnergie, and Ecarshare works together with Athlon and provides services for Claut and WeDriveSolar. The involvement of LochemEnergie, which is a relative outsider because it is an Energycooperative, broadens cognitive frames and facilitates second order learning because they have gained a lot of experience with users in a neighborhood where there is little experience with electric carsharing.

These are the most dominant elements of strategies deployed in the electric carsharing initiatives that lead to further niche creation and development.

7.4   Emerging niche character

Chapter five explored the different business strategies of the initiatives and chapter six described how the niche is nurtured, by exploring learning, networks and expectations. In this sub-section, the emerging character of the e-carsharing niche is outlined.

The results in chapter five and chapter six described the business models and business strategies of the different initiatives, that together constitute the emerging e-carsharing niche in the Netherlands. In this section, different arguments will indicate why the e-carsharing niche in the Netherlands is in an early stage of development. In figure 8, five different stages of niche development processes are described.
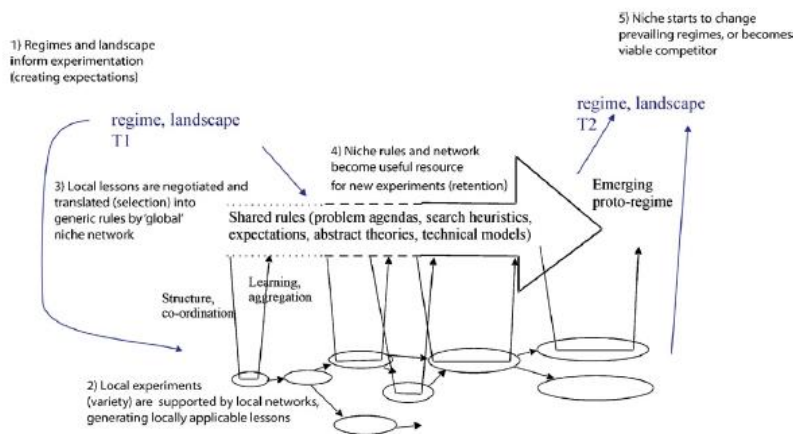

Figure 8: local and global niche development processes

An emerging niche is often characterized by large involvement of governmental support, which can decrease selection pressures (Smith & Raven, 2012). In the Netherlands, LochemEnergie, Claut and Ecarshare depend on governmental monetary support and other types of involvement. Municipalities often act as customer, by buying fixed contracts. The provision of fixed contracts by electric carsharing initiatives to municipalities has a positive effect on the occupancy rates of the EVs. Furthermore, municipalities also act as a facilitator, by the allocation of parking spaces for shared EVs, and provide a discount for these initiatives. Moreover, municipalities also grant subsidies to sustainable mobility initiatives. Thus, municipalities in the Netherlands are important actors in helping initiatives to grow, by acting either as a customer, facilitator or investor. Since the e-carsharing market in the Netherlands is heavily involved and influenced by municipalities on way or another, it can be stated that the niche is not yet in a phase where it can sustain itself without governmental support.

Secondly, there is a lot collaboration between the initiatives in the Netherlands, which suggests a niche that is still learning local lessons. According to Thijs Verhagen from SnappCar: *"Competition is small because the demand is bigger than supply".* This illustrates why there is a lot of collaboration between initiatives. For example, upscaling from 100 to 1000 EVs requires a big change into the organization. Most initiatives do not have the capital and organizational means to enlarge the numbers of shared EVs in their organization, and therefore partner up with bigger initiatives who can act as a service provider. This is the case for Ecarshare, who act as a service provider for smaller initiatives who lack experience with unrolling a carsharing platform. They have a lot of experience when it comes to expanding a carsharing system in an efficient manner. They utilize and exploit this experience by providing services for other electric carsharing initiatives in the Netherlands like 'We Drive Solar'. A lot of initiatives in the Netherlands (Amber Mobility, LochemEnergie, SnappCar, MyWheels, Buurauto) are still searching for ways in which they can expand their customer base. Car2go is an exemption to this finding.

Thirdly, almost all initiatives are not yet able to create a business that is profitable. This is often the case for sustainability transitions. This elucidates that bringing sustainable innovations to the market, especially in the first stages of development, has to overcome a lot of barriers. Almost all initiatives are still very much dependent upon the current mobility regime, in terms of investments and utilizing the leasing market. For example, EuropCar invested large sums of money into SnappCar. Athlon is also an active investor in new mobility initiatives.

Fourthly, here is not yet a dominant business strategy that is efficient in upscaling the number of EVs. This underpins the emerging character of the niche. Shielding is very important in early niche development. All the initiatives are still seeking for new strategies for upscaling. As indicated in the previous sub-section, there are different strategies whose goal is to enlarge the fleet of EVs. For example, new collaborations between initiatives and leasing companies in which risks are

distributed in a different manner is a way which may have a positive effect on the growth of shared EVs in carsharing platforms.

At last, there is a big difference in value propositions between the carsharing initiatives. Different value propositions lead to different strategies. Amber Mobility focusses on more automation, but Ecarshare and Car2Use focusses on multimodal solutions and Buurauto focusses on the social aspect of sharing a car. Since it is not clear what kind of business model (P2P, B2C or B2B) is going to be dominant in the future, no convergent strategy trend of the niche can be identified. It has been shown that business strategies are divergent. Niche development is highly dependent on collaboration between the e-carsharing niche and the auto-mobility regime on the one hand, and on the IT regime on the other hand. The e-carsharing niche can be seen as a niche in the auto-mobility regime, on which the development is also influenced by the developments in IT. As a result, it can be stated that there is not yet a global niche development process visible. The niche development is still in a stage where local lessons are still negotiated and translated into generic rules. A lot of experimentation still takes place.

8 Discussion

This chapter contains the discussion of the results. After a discussion of the findings, the strengths and limitations are provided and an outlook for further research will be highlighted.

8.1   Discussion of the findings

In the introduction chapter it was described that air pollution, traffic congestion and shortages of parking spaces can be addressed more effectively. E-carsharing can be a solution to these challenges, because of its positive environmental characteristics. The growing importance of IT in mobility opens up transformative potential for the development of e-carsharing. The combination of EVs and IT with the growing need for flexible mobility alongside CO_2 reductions has enabled the development of a wide range of e-mobility initiatives in the Netherlands.

The e-carsharing initiatives operate in a market dominated by incumbent auto-mobility companies and rental companies. The e-carsharing niche is relatively young in the Netherlands. In the past five years, substantial development took place. The business strategies that were deployed by the initiatives differ a lot. There are many types of initiatives, each with their own challenge. In the results chapter 5 and 6 it was described how the different business strategies add up and lead to the development of the niche. In this section, an interpretation of these results will be outlined. The findings in chapter 5 and 6 will be critically reflected on two themes: Transformative potential and sustainable potential. Seven important elements of business strategies that impact the development of the e-carsharing niche were identified, and will be critically reflected.

Sustainable potential

Electric carsharing initiatives put more emphasis on behavioral change when it comes to establishing customer relationships. Almost all initiatives underestimated the influence of behavioral change on the success of the shared EV initiative. Although gamification, stimulation via the dashboard and providing positive feedback has the potential to change the perception of customers, there is no indication that it will lead to a growth of e-carsharing customers. The results showed, that, initiatives in hindsight indicated that they underestimated behavioral change. This does not indicate that implementing gamifications and stimulations via dashboards in relation to sustainability is a strategy that has a positive effect on e-carsharing initiatives. Amber Mobility, LochemEnergie, StappIn and SnappCar stated that the sustainability argument is not going to bring on board a lot of new customers. The sustainable potential that e-carsharing prescribes has little effect on the development of the market. Furthermore, for 3 out of 10 initiatives (SnappCar, Car2Use and StappIn), EVs are not the main focus for running a carsharing scheme.

The business model framework of Boons and Lüdeke-Freund (2013) does not apply well to the BMs of Car2Use, StappIn and Car2go, because they are inextricably linked with the incumbent mobility regime, and are therefore linked with a neoclassical business logic. For example, the

business model of Car2Use is fully dependent on Athlon, because Car2Use is initiated by Athlon. Car2Use is interested in whether or not the business case for electric carsharing is profitable. The economic values are not balanced with the ecological and social values. According to Boons and Lüdeke-Freund (2013), a balanced fulfillment of customer needs will require enhanced offerings of which the profit is insecure during implementation. It can be stated that the locked-in infrastructure of Car2Use is a barrier for the development of a business model for sustainability. Moreover, automotive firms are hindering their business models to go into a direction that promotes the business models for sustainability, because their goal is to sell as many cars as possible. The business rules and success metrics that are being used by the incumbent auto-mobility actors are not in line with the elements that are needed for a successful BM for sustainability. Since the electric carsharing market in the Netherlands is highly affected by the influence of regime actors, it will be a challenge to establish sustainable business models for the future.

Transformative potential

First of all, an important finding was that that software development and data analysis is becoming more important for electric carsharing initiatives. For all three different types of business models (P2P, B2C and B2B), initiatives are leaning more towards data analysis, serving multiple functions. Although software development and data analysis has a big influence on the transformative potential of the carsharing market, it also has a transformative potential on the current auto-mobility regime. This means that it is hard to predict in what way software development will contribute towards the development of the e-carsharing niche, taken into account the big influence of software development onto the automobility regime. The development of the e-carsharing niche is dependent on the developments of the IT regime. There are many exogenous factors influencing the e-carsharing niche. Besides the influence of the IT regime on the e-carsharing niche, the rental and automobility regime also influences the development of the niche. These exogenous factors are not systematically researched.

Secondly, the emerging e-carsharing niche has strong collaborations and involvement with the auto-mobility regime. Because of the dependency on the automobility regime, the viability of the e-carsharing niche is very uncertain. It also means that initiatives who are operating independent from regime actors are more prone to risks. The solution to avoid risks for the initiatives on the on hand is strong collaboration with municipalities (Ecarshare, MyWheels, LochemEnergie). Although collaboration with municipalities has a lot of advantages in terms of shielding and nurturing the niche, it does not contribute to empowerment of the e-carsharing niche. On the other hand, a solution to avoid risk is changing the risk profile. MyWheels for example wants to set up new risk profiles with leasing companies. This risk diversification strategy can also be applied to municipalities or Energy cooperatives. Risk diversification is beneficial for electric

carsharing initiatives like MyWheels, because it opens up new possibilities for enlarging the fleet of EVs. These business strategies indicate that initiatives are still searching for ways in which the e-carsharing system can expanded. There is not yet a convergent strategy that ensures a viable business case. However, collaboration between leasing partners and carsharing initiatives that lead to new business strategies indicate the willingness to try out new strategies, and possibly open up new space.

Thirdly, it was shown that more attention goes out to multimodal mobility solutions. A shared EV is in this way only a link in the chain. All three types of business models are experimenting with multimodal mobility solutions. SnappCar, Ecarshare and Car2Use are experimenting with multimodal mobility solutions. Although this might be a good strategy to expand the carsharing market, experimenting with multi modal solutions is still in a very early stage, and it is not at all certain that this will contribute towards a growth of the carsharing market. Next to that, it demands more extensive apps and integration of different platforms of mobility. Following the multi-modal strategy will lead to a bigger dependency on the IT regime, because IT companies produce the software necessary for an integration of multi-modal solutions.

In general it holds that there are strategies identified in this explorative research that have the potential to change the selection environment, and there are BSs that actively create competitiveness within an unchanged selection environment. Car2Use and StappIn have a business drive that is based on the logic of owning a car. They both originate from an incumbent traditional rental company and car dealer. Their main customers and supply chain all heavily rely on networks which are stable and are part of the current mobility regime in the Netherlands. They do not want to change the selection environment, rather they utilize the EV for marketing purposes and try to sell mobility as a service. LochemEnergie, SnappCar, Ecarshare and Buurauto are initiatives that try to set up a viable e-carsharing service, but they do not actively try to reshape the selection environment. Their business strategies are based on finding ways to expand their business within the selection environment that they operate. For SnappCar, strong connections to the incumbent rental companies helps in growing their business. Moreover, the extensive marketing campaign that SnappCar launched, is also backed up by Europcar's investment. In this way, SnappCar uses the existing selection environment.

Amber Mobility, however, does try to actively reshape the selection environment, by working together with the municipality of Eindhoven to enable BMW i3s to automatically relocate on the bus lanes in Eindhoven at night. This would enable Amber to install an efficient pool of cars. MyWheels also tries to change the selection environment by setting up new types of collaborations with incumbent leasing companies. MyWheels is looking for partners in the lease market, municipalities and energy-cooperative to share risks. In this way, more shared EVs could be brought onto the market, and new business models for exploiting EVs could open up new

space and nurture the niche. MyWheels uses this strategy because leasing companies have more capital in comparison to (electric) carsharing initiatives. Car2go also works closely together with municipalities in granting access to the electric charging infrastructure and the subsidized parking spaces. They actively reshape the selection environment of EVs in Amsterdam.

Thus, there is transformative potential for the e-carsharing niche in two different ways. The first transformative potential has to do with automating the sharing process, which is dependent on legislations granted by governmental organizations and developments in the IT sector. The second transformative potential has to do with finding new ways of redistributing risks in the supply chain. This transformative potential is dependent on the willingness of leasing companies, governments and energy cooperatives to start supporting and collaborating with the e-carsharing niche in a new way.

8.2   Strengths and limitations

This research comprises of several strengths and limitations that will be discussed in this sub-section. First of all, from the nine interviews that were held with e-carsharing initiatives, seven out of nine interviews were held with a CEO, CMO or COO. That contributes to the validity because their visions, opinions are experiences are a result of decisions that they themselves have had a direct influence on.

Secondly, semi-structured interviews contributed to the richness of the data, because most of the initiatives are very different from each other. By interviewing in a semi-structured way, more context is provided and contributed to further insights for describing the overall case study.

thirdly, it is a strength in this research to focus on business strategies rather than only business models. In this research, the goal was to explore the e-carsharing niche development in the Netherlands. In order to emphasize on the process of understanding how the different initiatives contributed to niche development, and to understand how the initiators handle the broader context in which they operate, it was chosen to focus on business strategies rather than just focus on business models. Business strategies allows a broader framework than describing a business model. Analyzing business strategies contributes to the theory, because in this empirical research a lot of focus goes out to understanding the broader context of business processes. Nevertheless, a BM is useful in saying something valuable about a BS.

Fourthly, another strength in this research is the combined top-down and bottom-up approach that is used in the analysis of the e-carsharing niche. Transition literature proved useful in understanding shared lessons, aggregated expectations and formed networks. In this way, it

could be determined in what phase the niche development was in, by using SNM as a top down tool. In this way, the development of the niche can be understood at a more global level. On the other hand, by the identification of the different business strategies, understanding development of e-carsharing initiatives on a firm-level can be understood. Because the e-carsharing niche in the Netherlands is in its emerging phase, it is important to understand the factors on a local (e-carsharing initiative) scale as well as the factors on a broader scale (shared lessons, expectations, formed networks and external factors) that influence the creation and development of the niche.

Besides the indicated strengths, several limitations can be identified that influenced the outcome of the research. First of all, only a part (ten out of twenty) of the e-carsharing initiatives in the Netherlands were interviewed. There were several interesting initiatives not researched. Share2use, StudentCar, WeGo, GreenWheels, WeDriveSolar, ConnectCar are all examples of (e-carsharing) initiatives doing business in the Netherlands, that did not participate in this research. The initiatives that were not interviewed could have affected the results I found in this research. The set of initiatives that characterize the case study does not represent more than 80% of the e-carsharing initiatives active in the Netherlands. Especially Share2Use and WeGo, who are actively involved in developing software, could have provided new insights regarding the influence of IT on the e-carsharing niche development.

Secondly, this research aims to provide an answer to the question how the different business strategies of the e-carsharing initiatives impact the creation and development of the niche. However, no time-study is conducted which researches how strategies change over time, or how aggregated lessons, formed networks or articulated expectations change over time. A longitudinal study would help grasp in what way business strategies impacted the development of the niche. This holds, because answering the research question implies answering a cause and effect relation. However, interviewees are asked for describing development of their initiative. When a longitudinal study is conducted, the development of the niche in time can be studied.

Thirdly, only one person per initiative was interviewed. Interviewing several persons per initiative would have led to more cross-referencing and data validation. Furthermore, no quantitative data is used in this research. Quantitative data could be helpful in comparing different initiatives, and back up the qualitative data from the interviews. At last, no research has been conducted in what way the IT regime influences the mobility regime. From the result chapter it was shown, that the software sector as a whole, had an enormous influence on the development of the initiatives.

9   Conclusion

This chapter contains the conclusion of this research.

This research has focused on the development of electric carsharing in the Netherlands. E-carsharing arises through problems such as air pollution, traffic congestion, shortage of parking spaces and high energy prices. Carsharing is defined as short-term vehicle access among members who share a car or car fleet that is maintained, managed and insured by a third-party organization (Shaheen et al, 2015). In the Netherlands, the number of people taking part in carsharing is growing rapidly (Jorritsma, Harms & Berveling, 2015). There are several e-carsharing initiatives in the Netherlands. Peer-2-peer carsharing, business-2-consumer and business-2-business carsharing schemes are applied. Each type of initiative has its own barriers and challenges. The niche seems promising, but it is unclear how the different e-carsharing initiatives and their business strategies add up to each other and lead to niche development. This resulted into the research question:

How do business strategies of electric carsharing initiators impact the development of the electric carsharing niche?

It can be concluded that there are several aspects of business strategies of the 10 identified electric carsharing initiatives that impacted the development of the niche. A lot of e-carsharing initiatives are leaning more towards data analysis and IT development. Next to that, collaboration with government, municipalities and the auto-mobility regime actors is necessary for setting up a viable business. Furthermore, making the e-carsharing system multimodal, and emphasizing more on actively influencing behavioral change leads to further development of the niche. At last, collaboration between the initiatives and making use of local communities are helpful in learning local lessons and translating them into generic business rules.

The e-carsharing niche in the Netherlands, which is studied as a case study, can be considered as a niche which is heavily influenced by the auto-mobility regime where business rules are stable and networks are rigid and deep. The e-carsharing niche consists of a wide range of different types of initiatives, where business strategies are divergent.

The transformative potential of the niche is not considered to be large, because of the fact that the niche is largely dependent on the automobility (rental) regime, IT regime, municipalities and government. Shielding is still very important in the niche, hence there is not yet a dominant business strategy visible. However, new types of business strategies are emerging, where new types of risk profiles between initiatives and leasing companies are tried out in order to accelerate the implementation of shared EVs. In this way, selection environments are actively changed. Amber Mobility for example wants to work together with the municipality of Eindhoven to implement legislation that makes it possible to enable BMW i3s to automatically relocate on the bus lanes at night. When selection environments are changed actively, it opens up new space and triggers the transformative potential of the niche. Reshaping the selection environment still happens at a low pace.

The sustainability potential of the niche is uncertain. Six out of ten initiatives (Amber Mobility, LochemEnergie, Claut, Ecarshare, Buurauto and Car2go) have embedded sustainable values in their value proposition. However, even these initiatives affirm that no extra customers will be brought onboard because of the sustainability argument. 6 out of 10 initiatives are commercially and economically driven. Therefore, business models for sustainability (BMfS) of Boons and Lüdeke-Freund (2013) do not apply well to the BSs of Car2Use, StappIn, Car2go, Amber Mobility, Buurauto and SnappCar, because they are inextricably linked with the incumbent mobility regime and do not account for a harmonization of ecological, economic and social values.

The ten identified e-carsharing initiatives in the Netherlands differ greatly in size and in type. The niche is at a stage where local lessons are learned and translated into more generic rules. There are hardly any second order learning processes visible, with the exemption of focusing more on establishing behavioral change. The development is still in an early stage, where little can be said about the pace and direction of development. There are many exogenous factors influencing the niche. The research question cannot be answered in a rigid way, because it is a complex question.

This research is an explorative study, with the goal to identify business strategies of e-carsharing initiatives that explain the development of the niche. Future research is necessary to study the development of the e-carsharing niche. A longitudinal study is needed to explain the findings in further detail, through time. However, the results of this research can be used as a starting point for future research, where more emphasis should go out to the way developments in the IT regime influence the e-carsharing niche. More emphasis should go out to the relation between the e-carsharing niche and both the IT and automobility regime.

Thus, the following conclusion about the e-carsharing niche in the Netherlands can be made: Seven important elements of strategies are found amongst the initiatives that most likely have an influence on the development of the niche. The niche itself, however, is still in an emerging stage and little can be said about the future of the niche, because it is influenced by many exogenous factors (IT regime, government, automobility regime) on which the effect on the niche is not systematically researched.

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