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SUSTAINABLE BUSINESS MODELS - THE CASE OF CAR SHARING

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ABSTRACT

Replacing actual ownership of a commodity with a service that allows for temporary customer use of the commodity has been shown to be a good way to make industries more sustainable while retaining or even improving customer experience. However these kinds of services are often unsuccessful, because breaking the existing regimes requires systemic change involving enabling technologies, favourable governmental regulation, a successful market adoption strategy and a profitable business model. This study examines sustainable business models using the case of car sharing services. Using public sources a descriptive study is conducted on the business models of leading car sharing services in Europe and North America. From this data three different business model archetypes are derived: the freeflowing model, the traditional car sharing model and the peer-2-peer model. The three archetypes are fairly stabilized and there is little variation between the operators with the B2B-market probably being the next field to mature. Car sharing services also probably have a role in the diffusion of electric cars, because they work as a living laboratory for the car manufacturers in this respect and enable the building of charging infrastructure to new areas.

Keywords: Car sharing, Business model

INTRODUCTION

Car sharing services that allow consumers to rent a car on a minute or hourly basis are gaining momentum in the transportation markets. Although still relatively small compared to the car manufacturing industry these new ventures are starting to be a force to be reckoned with. In year 2013 the amount car sharing service users globally is 2.3 million and is estimated to climb up to 12 million by the end of the decade [1]. These estimates reflect similar growth trajectories as studies made in 2006, 2008 and 2010, which have shown year on year user base growth of approximately 38% [2].

Before the turn of the millennium car sharing players were small companies and cooperatives that operated on a national basis. In recent years things have changed however. For example Zipcar, a company founded in 2000, has grown to operate a fleet of more than 10000 vehicles in USA and Europe and has a turnover of hundreds of millions. Multinational companies from different industries are increasingly entering the arena as well. Car manufacturers Daimler, BMW, Peugeot have running car sharing programs, Honda has made a pilot on the field and Toyota, Mitsubishi is entering the market through partnerships [2]. General motors and Suzuki have declared plans to provide vehicles with technology needed specifically by sharing services [2]. Car rental companies are also in the game. Avis acquired Zipcar in 2013 thus becoming one of the largest players in the field [3]. Also Enterprise Carshare by Enterprise Holdings and Hertz 24/7 by Hertz are growing rapidly. Public service operators are experimenting in the field and Flinkster owned by the German train operator DB operates in some one hundred locations serving 250 thousand users.

According to Johnson and Suskewicz [4] the key to replacing the current unsustainable technologies with better ones stems from understanding “*that technologies don’t replace other technologies. Rather, systems replace systems.*” The authors argue that creating a superior technology is not enough, but a market adoption strategy has to be planned to ramp it up, profitable business model has to be built around it and government has to help the adoption with favourable regulation. Car sharing provides an excellent case for studying such a systemic transformation. Cities and municipalities have

been actively subsidizing car sharing companies in the form of free or discounted parking [2]. Daimler's market adoption strategy was to test its sharing concept Car2go in the relatively small German city of Ulm [5]. From this pilot it has grown into a global organization in operating in 26 cities in five countries many of which are already running profitably [6]. Thus the business model is already mature for large scale roll-out.

Car sharing services have been found to increase sustainable behavior among its users [7,8]. Car substituters and second car drivers have been noted to decrease the use of car after joining a car sharing scheme, whereas car usage of the people who do not have a car has not increased [7]. In addition to the environmental aspects car sharing has been studied to understand user motivations and behavior [7,9-11] to estimate its demand [9,12] and to understand its benefits to society [13]. However the business side of the services has received little attention. This article attempts to fill this gap by analyzing the business model archetypes i.e. generic industry models that many car sharing players use. The goal is to understand the mechanics of the car sharing business and to evaluate the strengths and weaknesses of the different models.

Underpinnings of business model research

During recent years, business models have been studied widely motivated mainly by rapid growth of e-commerce, which is demonstrated by the fact that in a review done by Zott, Amit and Massa [14] fourth of the 49 studies concentrated on issues concerning it. Previous theories have been ill-suited for understanding their value creation. Amit and Zott [15] demonstrate this by showing the deficiencies of value chain analysis, Schumpeterian innovation, resource-based view of the firm, strategic networks theory and transaction cost economics, when trying to understand it.

E-commerce is not the only driving factor to the on-march of business models however. They have received interest above all, because of the fundamental change in the way companies make money. In industrial era value creation was based on manufacturing a desirable product, packaging it and selling it to the customer. Because of the destructive power of the Internet and increasingly knowledgeable powerful consumers many industries need to reconsider how they create value. Indeed, these factors have driven the earning logic of some industries such as for example the music recording industry into deep crisis. [16]

Defining business models

Defining what is meant with business model is problematic. According to Zott, Amit and Massa [14] the concept of business model is used "to address or explain three phenomena: (1) e-business and the use of information technology in organizations; (2) strategic issues, such as value creation, competitive advantage, and firm performance; and (3) innovation and technology management." Thus unsurprisingly the term is used ambiguously. To achieve clarity Zott, Amit and Massa [14] emphasize the importance of defining what is included and what is excluded on the model in each paper that uses the concept.

This research follows the definition of business model described as follows by Teece [16]:

"A business model articulates the logic, the data, and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value. In short, it's about the benefit the enterprise will deliver to customers, how it will organize to do so, and how it will capture a portion of the value that it delivers."

Clear elements for conceptualizing the business model are thus *value proposition* to the customers and the company's *value capture* model. Organizing to deliver value is a bit more abstract. This is divided into internal organizing in the form of *key assets* and external organizing in the form of *value network*. This is in line with other business model conceptualizations made by Morris, Schindehutte and Allen [17] and by Demil and Lecocq [18]. The resulting business model is presented in Figure 1.

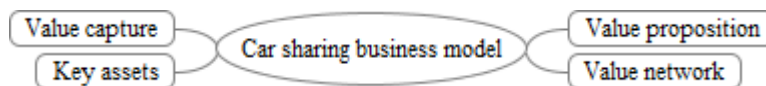


Figure 1. The high level business model framework.

Business model conceptualization allows researchers to identify business model archetypes that are used across company and industry borders [14,17]. Probably the most commonly known of these is the razor-and-blade model used in many industries such as for example gaming and printer industry, where a platform is sold with low or no profits and the profits are made with add-ons to the platform such as games or printer cartridges. This is an industry level study examining the business model archetypes of the car sharing industry. However the goal is not to create broader conceptualizations across industry borders.

Sustainable business models in the automotive industry

Hockerts and Wüstenhagen [19] have developed a framework for sustainable entrepreneurship, where small green entrepreneurs ‘Emerging Davids’ begin a sustainability transformation of an industry followed by the large incumbents ‘Greening Goliaths’. When the transformation reaches maturity some of the small companies have grown to be new incumbents and the existing players have permanently made their behavior more sustainable. The authors raise a fundamental research question, whether this has actually ever happened in any industry. The automotive industry does show a lot of potential for it with many sustainable business initiatives including hybrid cars, fuel-cell cars, electric cars and car sharing services.

The path to sustainability transition has not been easy. Pioneer car manufacturers have begun their first experiments with low and zero emission vehicles already in the eighties, but many projects concerning them have been discontinued. The problem is that the innovations needed for the industry transition are systemic in nature and require the cooperation from many technological players as well as public subsidies to set up of the infrastructure. Furthermore electric cars, fuel-cell vehicles and hybrids have been significantly more expensive than gas powered vehicles. Lack of interest among consumers to pay the ecological mark-up cost has resulted in car manufacturers dumping the low emission vehicle prices and selling them at a loss. [20]

The running costs of electric vehicles are lower than those of gas powered cars [21]. However it still entails a higher initial cost reducing its attractiveness to the consumers [22]. This has led the electric vehicle manufacturers to search for alternative business models to change the cost structure of the EVs [23]. These include providing customers with a battery exchanging service, selling the car but leasing the battery, or giving the car away and charging a per kilometer cost [22]. Interestingly the business models of electric cars are connected to those of car sharing. BMW’s Drive-Now and Daimler’s Car2go car sharing initiatives both have electric vehicles within their fleet. These are mentioned by Bohnsack, Pinkse and Kolk [23] to be a radical exception to the other electric vehicle producers’ product centric approaches.

METHODOLOGY

Because car sharing business models have not been studied extensively before, this study is explorative in nature. Therefore the concepts of the business model emerge from the collected data. The data is qualitative and it is gathered piece by piece to a common table representing the different attributes of the business models. The table shell is similar to “checklist matrix” described by Miles, Huberman and Saldaña [24], which is used to explore the attributes attached to a particular variable. Attributes are added to the matrix as new ones are found until saturation is reached.

Webpages of the companies work as the first dataset of this study. This data is complemented by selectively making news archive searches on the companies, which do not describe their business model extensively on their web pages. To increase the reliability of data gathering all online data sources that are used for the study are documented with the dates, when the data was captured. Thus

each data item can be linked to a source later on. This data is available on request. The second dataset consists of some five expert interviews. To increase validity through triangulation the business models created with the first dataset are presented to the interviewees for commenting. The models created for this paper however presents results only from the first dataset.

The organizations that are included in this paper are listed in Appendix 1. The primary interest of this paper is to examine sustainable business models. Thus the research focused on services that strive to replace a private car. Car sharing services are shown to have a significant effect on people either giving up their own cars or abstaining from acquiring one [2,7]. Traditional car rental companies were not included in the study. They have a different business model focusing usually on supplementing private car by providing the access to specialty cars such as vans or placing their fleet close to traffic hubs like airports and serving travelers [2]. The main separating factor that was used to scope out the rental services was that the minimum rental period provided by the services included in the study was one hour or less. Table 1 presents other distinguishing factors that were present in almost all the services with the exception of some peer-2-peer car sharing services:

| | Car sharing company | Rental company |
|--|----------------------------|-----------------------|
| Registration fee | Yes | No |
| Monthly/annual fee | Usually | No |
| Fuel included in the rental price | Yes | No |
| Reservation can be done | Spontaneously | One day in advance |

Table 1. The distinguishing factors between car sharing companies and car rental companies.

The secondary interest of this paper is to focus on business models that are matured to the point, where they can be run profitably. This scopes out many players in the field, because numerically most operators in Europe are small organizations with fleets of a couple of cars that are being run by people that as a hobby. Although some of these might have a mature business model they do not have the pressure to ensure profitability, because the employees often do not get paid. To out scope the recreational players, only companies with a fleet of 200 cars or more are included in the study. This number is somewhat arbitrary, but seems to include less than 10% of the companies that clearly run the business seriously. Additionally some companies whose numbers are not public have been added to the study because they are being run by large corporations so they can be expected to be fairly big and to have growth aspirations. To limit the scope of the study further only certain countries were included in the study. USA, Germany, Switzerland, United Kingdom and France were concluded to be the biggest countries in car sharing according to the work by Shaheen and Cohen [2].

RESULTS

Three distinct business models can be identified from the results. Each model with relevant figures is presented in Table 2. The companies using the different models are quite similar with each other, but between the models there are distinct differences as will be demonstrated in later chapters. Companies using freeflowing model allow their users to make one-way trips within the area of their operations. Thus unlike in the other models the cars do not have to be returned to the same place, where they were rented. In P2P-rental the car sharing company works as a market mediator and a partner to the individuals owning the cars. Thus unlike in other models the cars are not owned by the car sharing company.

The business models require different strategies. From the users perspective in order for a freeflowing model to work there has to be enough cars to ensure availability, when a car is needed. A couple of cars scattered around the city would probably not be an attractive value proposition to the customers. However in other models geographically well positioned (e.g. in a university parking lot) cars serve a distinct user group who live near or frequently visit the location. Therefore freeflowing car sharing operators show significantly higher number of how many cars there are in one location of operation. In P2P-rental the primary function of the vehicles to their owners is usually not profit making as is in

the other models. The cars belong to individuals, who themselves use the cars and sell the overcapacity to other users for a price. Thus since listing a car to the services is usually free of charge fleet size is not an important investment decision like it is in the other models. This can be seen in the fact that the number of members per car is lower as is in the other models.

| Business model | One-way trips | Car owner | Members/Car | Cars/Location |
|------------------------|---------------|------------------|-------------|---------------|
| Freeflowing | Yes | Service provider | 12-60 | 135-2000 |
| Traditional carsharing | No | Service provider | 21-81 | 6-111 |
| P2P-rental | No | Individuals | 9 | |

Table 2. The different business models and relevant figures.

Generic business model of car sharing

Figure 2 presents the generic elements common to all business models derived from the data that are connected to the high-level elements - value proposition, value capture, value network and key assets - derived from the literature study. The value proposition is the largest element of the business model including the issues directly linked to delivering the service to customers. It includes three kinds of elements. Firstly it involves operational elements included in each rental. These include, when the cars have to be booked and who fuels up the car. Secondly it includes elements concerning the boundaries of an individual booking. These include whether one-way trips are possible, what is the minimum rental period and how wide the span of the membership is i.e. can a member subscribed in one city use the service’s fleet in another city. Thirdly it includes elements describing the service from the company’s side. These include the customer segments the service is directed to and the B2B-services that are provided specifically to business customers.

The value capture portion includes the mechanisms of how the car sharing company makes money. These include the different elements of pricing and the possible additional revenue sources not directly linked to the car sharing business. Key assets are primarily connected to the fleet including who owns the car, what is the fleet variety based on and whether there are electric cars on the fleet. Value network includes the primary stakeholders other than the customer. These include the important partners of the car sharing company and its owner.

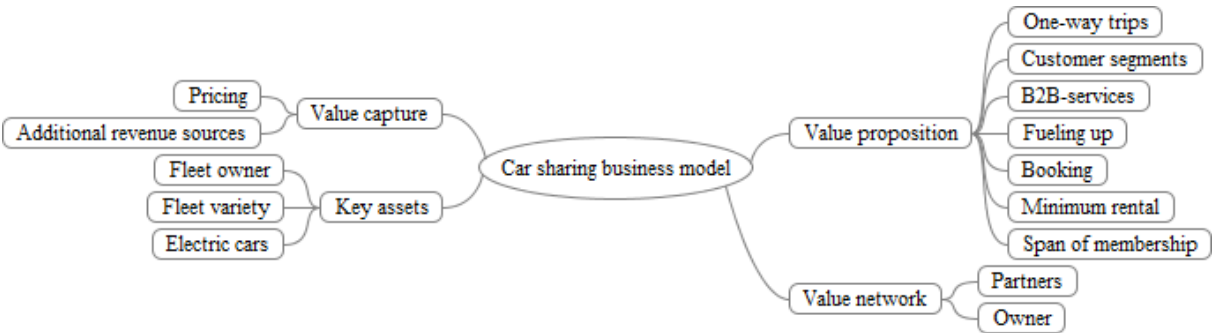


Figure 2. The different elements of the observed business models.

Traditional car sharing business model

The traditional car sharing business model is presented in Figure 3. The basic value proposition is based on hourly car rental with bookings that are done in advance and whose length has to be decided during the time of the booking. After the rental the car is returned to the same parking spot, where it was picked up. Customer is responsible for fueling up the car when the gas tank is less than ¼ full. Thus the service requires little attention from the company personnel. The span of membership is usually countrywide. Zipcar and Hertz 24/7 make an exception by offering global memberships meaning that a registered member is entitled to use companies’ services anywhere in the world.

The car sharing services target primarily individuals although many have service proposals also for families, universities and companies. The value proposition for families is usually common invoicing

although some services provide discounted or even free registration for additional family members. Universities are usually offered a car sharing stations near the campus to provide easy access to the shared cars for students. Businesses are provided more services including aggregated and itemized invoicing discounted pricing and possibilities for membership administration

The pricing consists of many elements. Possible elements include one-time registration fee, security deposit, annual or monthly fee, an hourly usage fee, and kilometer fee that can be calculated after a certain quota or starting from the first driven kilometer. The pricing scheme varies quite a lot between the different operators, but all of them have a time dependent usage fee and most also include a periodical fee that is invoiced either monthly or annually. The most common way of making additional revenues for customers is by offering deductible reduction with increased monthly cost. Few car sharing companies also have other additional revenue schemes such as selling advertisements space on the cars (City Car Club) and selling the fleet management technology for businesses (Mobility car sharing).

The fleet is owned by the car sharing company or it is leased from a capital partner. Some of the larger operators have electric cars in some locations, but in all cases they are a minority in the fleet. Most commonly the fleet variety is categorized according to the size of the vehicles and also pricing is classified accordingly each car size having certain usage fee despite of the model of the car. Usually this also means that the pricing is uniform to the user independent of the location, where the car is used. Interestingly the car sharing schemes owned by the car rental companies make an exception to this rule. Their fleet variety is dependent on the location and when reserving it is presented according to car models. Also the pricing is based on the location and particular car model.

Many car sharing companies are private, but increasingly especially the bigger companies are being owned by bigger more established transportation industry players. Car rental companies and public transit operators are especially active in the field. All car sharing organizations are not private companies, but cooperatives, whose shares customers can buy. Although this is more common among the smaller players Switzerland's only operator Mobility car sharing uses this organization form. Public traffic operators, car rental companies and other car sharing companies are the most important partners. Periodical subscribers of public traffic operators are often offered discounts, when joining a car sharing club. Car rental companies complement the business model by offering long term rentals, which often in car sharing companies is not possible. They usually offer beneficial terms to the customers of their partner organization. Car sharing companies also partner with each other to create a larger network of locations. The fleet of other companies can be used by registering to only one service. In Europe this trend is especially strong. There two large clusters have been formed, one by Cambio-Stadtmobil and the other by Flinkster-Mobility-Car2go.

On the face of it the business models of the different car sharing players using the traditional business model are quite similar. Although the terms and pricing schemes vary between companies the value proposition for the customers is more or less the same. The biggest differences come from B2B-capabilities, where there seem to be quite big differences. Some companies only offer possibility to common invoicing, but for example Mobility car sharing has standard packages offered according to the size of an organization. They are not restricted only to providing access to Mobility's fleet, but also fleet management outsourcing is on offer using either Mobility's car or the existing fleet of the company.

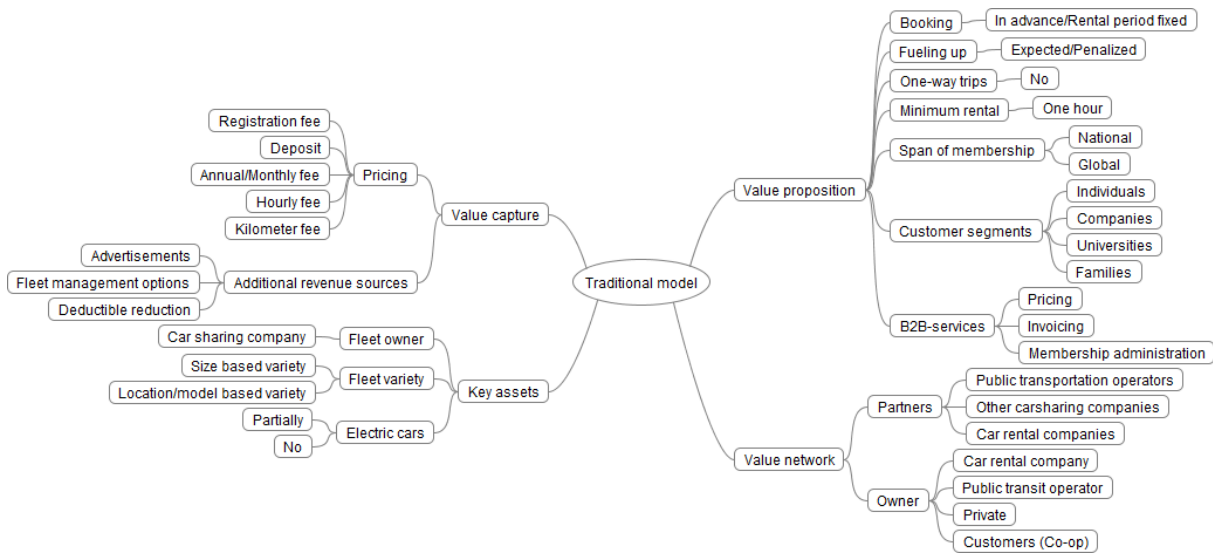


Figure 3. The traditional car sharing model

Freeflowing business model

The freeflowing business model is presented in Figure 4. What is particular about it is that it allows one-way trips and thus rental cost is calculated on minute not hourly basis. Usually the booking is open-ended and the time of the rental and the place of return do not have to be known in advance. With the exception of Autolib there is no annual or monthly payment for belonging to the car sharing club lowering the threshold of joining.

Unlike in other business models the fleet of the freeflowing car sharing companies is usually standardized and thus cars of different sizes or vans are not on offer. All operators except Quicar also have electric cars within their fleets and Autolib and Multicity operate only with them. The electric fleets make a slight variance to the logistics of the general freeflowing model. The cars with combustion engines can usually park anywhere on the roadside within the area of car sharing company's operations. Electric vehicles however have to be parked on charging stations and plugged in to ensure that the vehicles can be used by the following users. The fueling up of the non-electric vehicles is included in the service and customers are rewarded with free miles for doing it.

From the customer's viewpoint the value proposition of the different operators is quite similar. Although electric fleets bring some constrains for the customer's journeys, because cars parking spots are fixed, dense charging networks ensure that one-way travel is quite similar as with cars with combustion engines. The main differences between the operators would seem to come from the size and seriousness of the operation. Multicity and Quicar appear to be pilots as they are fairly small and operate only within a single city. Autolib is expanding within France and is taking first steps to internationalization by going to Minneapolis. Car2go and DriveNow are major international operations with Car2go growing very aggressively.

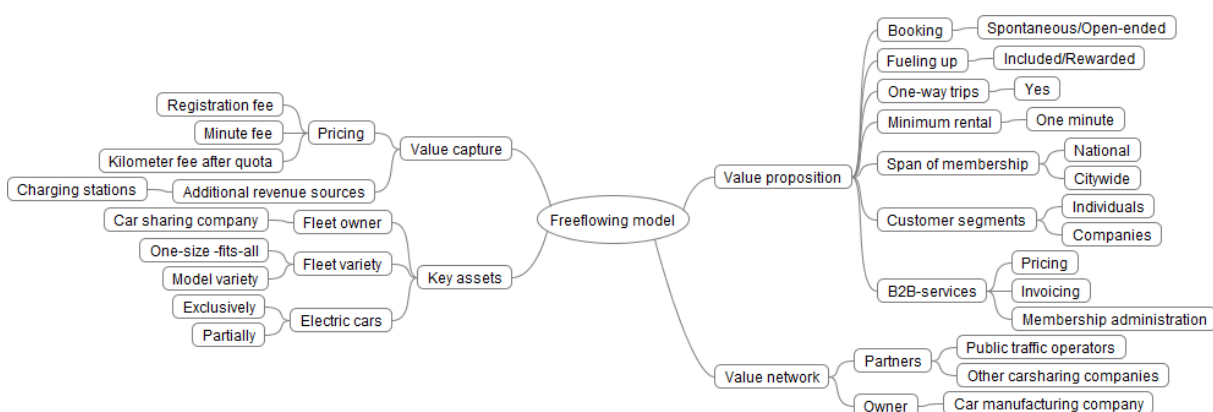


Figure 4. The freeflowing business model.

P2P business model

The P2P business model is presented in Figure 5. The P2P business model deviates quite significantly from the other two. There the company enabling car sharing does not own the vehicles at all, but only works as a marketplace where individuals can rent their cars to other individuals. Besides car booking there are a lot of functionalities that the P2P operators provide to the car users and especially to the car owners. The platforms have a bidirectional recommendation system, where owners and users can rate each other according to the success of the transaction. The renters' identity is ensured as well as the fact that they have a valid driver's license. The company also provides insurance for the rental periods.

From the users point of view the value proposition resembles that of the traditional car sharing model. However the transactions are not quite as effortless, because they usually require that the car owner accepts the booking and that the owner and the user meet for key handover. Getaround however also provides technology that enables trusted users to reserve and use the car automatically, but it costs extra for the car owner. The span of membership is the whole area of operations of the service, however it should be noted that none of the P2P car sharing service work on international level. The fleet consists of any cars that are registered on the service and is only constrained on terms dictated by the insurance. There are no or only a few electric cars available as not many individuals own them.

In addition to the familiar hourly and kilometer fee some of the P2P-services also have a booking fee and an insurance fee that is charged from the user. Unlike in the other business models fuel is not included in the rental price, but the user must pay for it himself/herself. The car has to be fueled up to the same capacity, where it was when it was rented. The value capturing of the model is mainly based on the commission that is collected from the car owner for each successful transaction, which is in the ballpark of 30-40% of the earnings received by the owner. All P2P car sharing companies are so far private and judging from the descriptions of the companies they are still in the start-up stage.

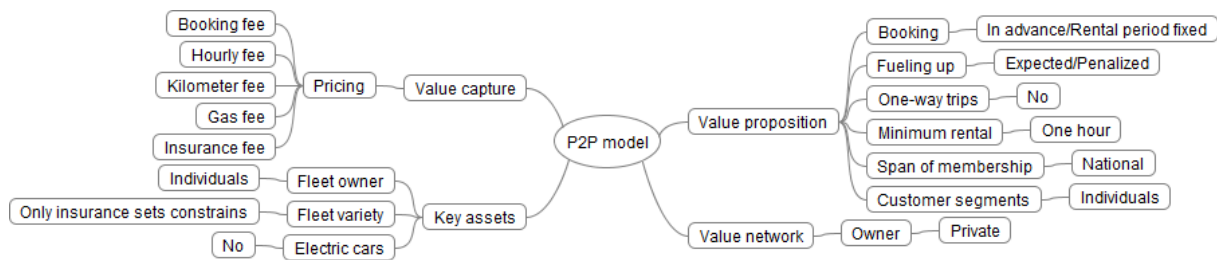


Figure 5. The P2P business model.

Cross model analysis

Similarity of the business models of different players indicates that the freeflowing model and the traditional model are reaching maturity. P2P model does not seem to have reached its maturity and it is questionable, whether the model works in short term rentals at all. The differences within companies using the same business model are quite subtle and it is likely that customers are starting to have certain expectations on how the models should work. The similarities go to detail level. For example with an exception of one service all the traditional car sharing model operators expected the customers to leave the fuel tank ¼ full. This kind of operational similarity enables quick learning curve for old car sharing customers moving to a new location where there is another service available. Another sign of maturity are the signals of competitive elements. The partnering between car sharing companies in Central Europe and clusters formed consequentially indicate that they are no longer competing only against car ownership, but also amongst each other. City Car Club also gives free registration for users that resign from another car sharing club.

The maturity of the basic business logic does not extend into additional revenue sources and B2B proposition however. Almost all the traditional and freeflowing model operators have some kind of a B2B proposition, but their versatility differs substantially. It is likely that companies in many countries are not yet used to using car sharing services and thus the market is just emerging. The offerings are

also likely to evolve as business customers' interest in the services evolves. For example until now there is no operator offering car sharing services directed exclusively to B2B-customers, but given increased market growth and complicating demands from the companies, this could change.

Electric vehicles are present within car sharing services much more than they are generally in traffic. This is understandable, because of the environmentally conscious user base and the focus on total cost of ownership. It is likely that electric cars can work as a competitive advantage since the users might be interested in vesting in a service according to its environmental friendliness. The initial cost is also probably not as big an issue to the car sharing companies, who see the cars more as an investment and quite often have some kinds of lease arrangements to finance the vehicles.

CONCLUSIONS

The three business models all have their up and downsides, when considering their value proposition to their customers. Although freeflowing model's value proposition can easily be considered superior, because there are no monthly fees, customers only have to pay for the time that the car is actually used and one-time trips are possible, it can only work on highly dense populated areas. For example the smallest city, where freeflowing model is present Car2go's pilot city Ulm excluded is Minneapolis, which is a city of some 400 thousand inhabitants serving a metropolitan area of 3.4 million people. Traditional car sharing model can thrive in much smaller communities. It only needs large enough local demand, because the cars are always returned to their pick up spot. For the same reason it is also fairly easy to set up personalized pick-up points for major customers. The same is true for P2P model, which can thrive in even smaller communities than the traditional model, because there is no profitability demand for the vehicles. Also pricing and value proposition is pretty much the same for longer rentals that take-off from and return to the same place.

Dominant design is a central topic in industrial evolution referring to a technology that gains the de-facto standard position within an industry forcing all the current and future players to adhere to it in order to survive [25]. According to Teece also the requirements to business models change upon its emergence [16]. For now it would seem that when considering the more mature car sharing business models - the traditional model and the freeflowing model - that neither of them clearly dominates over the other. Both have large customer bases and compete in the same cities for example Berlin. Time will tell whether P2P model for hourly rental is feasible or whether the whole market moves towards long term rentals. This will probably depend on a number of factors. These include at least on how P2P players manage to integrate technology to enable opening the car for the renter automatically, whether the car owners and the renters on a larger scale appreciate interaction with each other or not and the prices the car owners want for renting their vehicles.

The interplay of 'Emerging Davids' and 'Greening Goliaths' described by Hockerts and Wüstenhagen [19] can be seen in a quite clear way in car sharing services. The authors have characterized the take-off and maturity of diffusion of more sustainable products as the emergence of 'High-growth Davids' who eventually become Goliaths themselves and industry Goliaths entering the markets eventually resulting in sustainability innovation becoming an industry standard. Although small compared to the size of the automotive industry in total the presence of many of the big car manufacturers is a clear indication of their interest in the market. Car2go has clearly grown beyond a pilot phase with a fleet summing up to ten thousand vehicles and a goal to making a billion dollar turnover with the concept by the end of the century [26]. On the other hand one of the pioneering players Zipcar has grown from a start-up into the biggest player in the field with a turnover of hundreds of millions.

The connection between electric vehicles and car sharing services is interesting. They have the potential of being major contributors to their adoption. For the car manufacturers and the battery manufacturer Bolloré owning Autolib the services work as living laboratories, where the technologies can be tested. Also as mentioned before they create demand that is not as dependent on the initial investment as the consumer markets. Commercial and business fleets have shown their significance in the diffusion of sustainable innovation in the case of the hybrid car Toyota Prius, which was at first very successfully sold to these particular customer segments and has up until now sold more than a million units [20]. Also it has been shown in earlier studies that one significant psychological barrier

for the consumers to buy an electric car is the non-existence of charging infrastructure, which creates a fear of running out of power and being stranded on the road [22]. A potential solution for this could be provided by electric car sharing operators. Bollere is already offering individuals a possibility to use its charging poles for a cost.

LIMITATIONS AND FURTHER RESEARCH

This research has several limitations most significant of which are connected to the used data sources. Because the data is gathered from public sources it is likely components of business models that the companies consider trade secrets are not revealed by it. Especially the cost side of the profit model is practically non-existent. For example there is no information of how parking is arranged with the municipalities and how insurance for the cars is negotiated, which are known to be important issues in the car sharing business [2]. This research does give however a rather extensive picture on the visible value proposition, which can be expected to reveal the business model quite extensively, because the service is largely co-created with the customer. The expert interviews collected as a second dataset is likely to shed some light on the back-office activities, but to the most part they are an issue for further research. It would be interesting to consider the interplay between the service front and back-office to see, whether same value proposition can be delivered with different back-office configurations.

Another interesting topic for further research is to observe the interplay of the business models of car sharing companies and their owners. Competing with two business models has raised a lot of interest among researchers recently [27,28] and car sharing industry provides an interesting arena for this sort of research as many players with different interests are entering the field. To car manufacturing companies there are clear risks of conflicts since one car sharing car is calculated to replace 12 owned cars [7] and thus there is a clear risk of conflict and cannibalization of existing business. On the other hand for public service operators there are clear synergies as car sharing usage has been shown to correlate positively on the usage of public transportation [7].

REFERENCES

- [1] Navigant Research, *Carsharing Services Will Surpass 12 Million Members Worldwide by 2020*. Available: <http://www.navigantresearch.com/newsroom/carsharing-services-will-surpass-12-million-members-worldwide-by-2020> [Accessed on 2013, December 12], (2013).
- [2] Shaheen, S.A., Cohen, A.P., Carsharing and Personal Vehicle Services: Worldwide Market Developments and Emerging Trends. *International Journal of Sustainable Transportation* , 2013. 7 (1), 5-34.
- [3] Kell, J., *Avis to Buy Car-Sharing Service Zipcar*. Available: <http://online.wsj.com/news/articles/SB10001424127887324374004578217121433322386> [Accessed on 2014, April 2], (2013).
- [4] Johnson, M.W., Suskewicz, J., How to jump-start the clean-tech economy. *Harvard Business Review* , 2009. 87 (11).
- [5] Borroz, T., *Smart car2go, From Ulm to Austin*. Available: <http://www.wired.com/autopia/2009/03/mercedes-car2go/>; [Accessed on 2014, 14 March], (2009).
- [6] Clark, J., *What's next for car sharing?* Available: <http://europe.autonews.com/article/20140207/ANE/140209903/whats-next-for-car-sharing> [Accessed on 2014, 18 March], (2014).
- [7] Meijkamp, R., Changing consumer behaviour through eco-efficient services: an empirical study of car sharing in the Netherlands. *Business Strategy and the Environment* , 1998. 7 (4), 234-244.

- [8] Firnkorn, J., Müller, M., What will be the environmental effects of new free-floating car-sharing systems? The case of car2go in Ulm. *Ecological Economics* , 2011. 70 (8), 1519-1528.
- [9] Prettenthaler, F.E., Steininger, K.W., From ownership to service use lifestyle: the potential of car sharing. *Ecological Economics* , 1999. 28 (3), 443-453.
- [10] Bardhi, F., Eckhardt, G.M., Access-Based Consumption: The Case of Car Sharing. *Journal of Consumer Research* , 2012. 39 (4), 881-898.
- [11] Costain, C., Ardron, C., Habib, K.N., Synopsis of users' behaviour of a carsharing program: A case study in Toronto. *Transportation Research Part A: Policy and Practice* , 2012. 46 (3), 421-434.
- [12] Ciari, F., Schuessler, N., Axhausen, K.W., Estimation of Carsharing Demand Using an Activity-Based Microsimulation Approach: Model Discussion and Some Results. *International Journal of Sustainable Transportation* , 2013. 7 (1), 70-84.
- [13] Fellows, N.T., Pitfield, D.E., An economic and operational evaluation of urban car-sharing. *Transportation Research Part D: Transport and Environment* , 2000. 5 (1), 1-10.
- [14] Zott, C., Amit, R., Massa, L., The Business Model: Recent Developments and Future Research. *Journal of Management* , 2011. 37 (4), 1019-1042.
- [15] Amit, R., Zott, C., Value creation in E-business. *Strategic Management Journal* , 2001. 22 (6-7), 493-520.
- [16] Teece, D.J., Business Models, Business Strategy and Innovation. *Long range planning* , 2010. 43 (2-3), 172-194.
- [17] Morris, M., Schindehutte, M., Allen, J., The entrepreneur's business model: toward a unified perspective. *Journal of Business Research* , 2005. 58 (6), 726-735.
- [18] Demil, B., Lecocq, X., Business Model Evolution: In Search of Dynamic Consistency. *Long range planning* , 2010. 43 (2-3), 227-246.
- [19] Hockerts, K., Wüstenhagen, R., Greening Goliaths versus emerging Davids — Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. *Journal of Business Venturing* , 2010. 25 (5), 481-492.
- [20] Pinkse, J., Bohnsack, R., Kolk, A., The Role of Public and Private Protection in Disruptive Innovation: The Automotive Industry and the Emergence of Low-Emission Vehicles. *Journal of Product Innovation Management* , 2014. 31 (1), 43-60.
- [21] Thiel, C., Perujo, A., Mercier, A., Cost and CO2 aspects of future vehicle options in Europe under new energy policy scenarios. *Energy Policy* , 2010. 38 (11), 7142-7151.
- [22] Kley, F., Lerch, C., Dallinger, D., New business models for electric cars—A holistic approach. *Energy Policy* , 2011. 39 (6), 3392-3403.
- [23] Bohnsack, R., Pinkse, J., Kolk, A., Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy* , 2014. 43 (2), 284-300.
- [24] Miles, M.B., Huberman, A.M., Saldaña, J., *Qualitative Data Analysis : A Methods Sourcebook*, 2014. (Sage).

[25] Suárez, F.F., Utterback, J.M., Dominant designs and the survival of firms. *Strategic Management Journal* , 1995. 16 (6), 415-430.

[26] Daimler-Chef Dieter Zetsche - "Wir wachsen dynamischer als Audi". Available: <http://www.auto-motor-und-sport.de/news/daimler-chef-dieter-zetsche-wir-wachsen-dynamischer-als-audi-7944962.html> [Accessed on 2014, March 18], (2013).

[27] Markides, C., Charitou, C.D., Competing with dual business models: A contingency approach. *The Academy of Management Executive* , 2004. 18 (3), 22-36.

[28] Markides, C.C., Business Model Innovation: what can the Ambidexterity Literature Teach Us? *Academy of Management Perspectives* , 2013. 27 (4), 313-323.

APPENDIX 1: THE CAR SHARING COMPANIES CHOSEN IN THE STUDY

| Name | Country | Cars | Loc. | Memb. | Memb. /car | Cars /loc. | Owner | Car ownership | Fleet logistics model |
|----------------------|----------------|-------|------|--------|---------------|---------------|-----------------------|------------------|--------------------------|
| Multicity | Germany | 350 | 1 | 4500 | 13 | 350 | Citroen and Flinkster | Owned cars | Freeflowing |
| Autolib | France | 2000 | 1 | 105000 | 53 | 2000 | Bollere | Owned cars | Freeflowing |
| Quicar | Germany | 270 | 2 | 7000 | 26 | 135 | Volkswagen | Owned cars | Freeflowing |
| Car2go | International | 10000 | 26 | 600000 | 60 | 385 | Daimler | Owned cars | Freeflowing |
| Drive-Now | International | 2350 | 6 | 88000 | 37 | 392 | BMW | Owned cars | Freeflowing |
| Cambio Carsharing | International | 1600 | 44 | 58000 | 36 | 36 | | Owned cars | Round-trip rental |
| Citeecar | Germany | 442 | 4 | | | 111 | | Owned cars | Round-trip rental |
| Greenwheels | International | 2000 | 125 | | | 16 | | Owned cars | Round-trip rental |
| Mobility car sharing | Switzerland | 2650 | 470 | 105000 | 40 | 6 | | Owned cars | Round-trip rental |
| City Car Club | United Kingdom | 720 | 16 | | | 45 | | Owned cars | Round-trip rental |
| Uhaulcarshare | USA | | 40 | | | | U-haul | Owned cars | Round-trip rental |
| Hertz 24/7 | International | | | | | | Hertz | Owned cars | Round-trip rental |
| Enterprise Carshare | International | | 130 | | | | Enterprise Rent-a-car | Owned cars | Round-trip rental |
| Zipcar | International | 10000 | 170 | 810000 | 81 | 59 | Avis budget group | Owned cars | Round-trip rental |
| Flinkster | International | 3800 | 100 | 250000 | 66 | 38 | Deutsche bahn | Owned cars | Round-trip rental |
| Stadtmobil | Germany | 1800 | 77 | 38000 | 21 | 23 | | Owned cars | Round-trip rental |
| Ford car sharing | Germany | | | | | | | Owned cars | Round-trip rental |
| teilAuto | Germany | 500 | 15 | 17000 | 34 | 33 | | Owned cars | Round-trip rental |
| Getaround | USA | | 5 | | | | Private | P2P | Round-trip rental |
| Nachbarschaftsauto | Germany | | | | | | Private | P2P | Round-trip rental |
| Buzzcar | France | 7764 | | 72410 | 9 | | Private | P2P | Round-trip rental |