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Sharing Economy - Downstream Extension of the Value Chain of German Automotive Manufacturers and of their Competitors

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Abstract

Although recent worldwide sales figures of the major German automotive manufacturers (Volkswagen, Daimler, BMW) are excellent, the European sales level has not been recovered post to the crisis (Statista 2015a and ICCT 2014). Multiple reasons are responsible for this sluggish recovery. The most significant factors are the continuously decreasing levels of real income, changes of mindset, the emerging importance of sustainability, the compliance with the increasingly stringent emission rules set by governments of developed countries, and the increasing costs of vehicle ownership run by internal combustion engine. German automotive manufacturers have seen the modifications of the market environment. Hence, they have tried to find the appropriate response by both introducing electric vehicles (EVs) and services that specifically target the younger generations. The main goal of this case study is to analyze how and why German automotive manufacturers and their competitors, e.g., the German railway company, respond to these challenges by extending their value chains and how they attempt to transform from classical automotive manufacturers to mobility providers.

Keywords: sustainability, automotive industry, downstream extension, value chain, car sharing, sharing economy

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Introduction

The financial crisis triggered by the subprime mortgage crisis has led to sinking industrial production rates in the automotive sector. Banks run by car manufacturers that provide services such as leasing and installment purchases have seen declining demand, and therefore attempted to offer other innovative services such as mobility packages (Büttner, 2012). Creativity also moved numerous manufacturers into a new field of the "sharing economy". The reasons for the rapid rise of sharing can be found partly in the changes caused by the financial crisis but also in the rapid development of information and communication technology such as the sharing of information via social networks, and the utilization of tablets and smart phones with GPS sensors. Certainly, even classic car rental companies have benefited from these technologies since they allowed them to track their fleet.

Having observed the success of the Zipcar car sharing service in the United States, German car manufacturers promptly started similar pilot projects, and eventually teamed up with traditional car rental companies to establish their own car sharing services. Similarly, the German railway company called Deutsche Bahn AG expanded its own value chain, and started a pilot project for car sharing in Cologne and Stuttgart in 2009. It is vital to distinguish between car sharing (for which the German literature also uses the English loan word Carsharing), car rental, and carpool (in German Fahrgemeinschaft). While car rental has been known for a long time, the idea of carpools and car sharing arose in the 1970s, triggered by the oil crisis. Car sharing is a

¹ Mobility packages are all-inclusive packages that include not just the purchasing or leasing costs but also carrunning expenses, such as insurance, tax, and maintenance costs.

service that provides individuals with personal cars for use, and it must be distinguished from carpools whose purpose is to share a ride. All these practices were strongly promoted by the emerging ICT. The use of cars can be either prearranged (carpool) or reserved (car sharing). The objective of this article is to analyze the car sharing landscape in Germany, created as it was by the most renowned German car manufacturers. Therefore, carpools provided by individuals to individuals (C2C) (like carsharing24/7 in Austria or Tamyca in Germany), rather than by companies (B2C), will not be described in depth.

Drivers of the commercial application of car sharing

If ICT and related technologies had not been developing at such a rapid pace, the sharing economy would not have achieved its current importance. The transformation that Western societies have undergone under the impact of the internet also increased concerns about global warming.

ICT

Thanks to the internet and the new approach of overall connectivity through social networks, people have started to share their private data. Although concerns about privacy and the protection of private data gained momentum, the attitude towards sharing remained affirmative. Personal computers have been increasingly replaced by tablets and smartphones as they allow greater mobility to users. The German statistics provided by ARD-ZDF (2014) depict an immense rise in numbers. For instance, in 2009 11% of mobile phone owners accessed the internet via their phones at least on occasion. By 2014, their share has grown to 50%. The frequency of internet access via smartphones peaked during the weekdays (BVDW-IAB, 2014).

This trend facilitated the development of both station-bound car sharing services (like cambio in Germany or Hancar in South Korea) and their freely floating alternatives (such as car2go, DriveNow, and Quicar in Germany). Smartphones enable their owners to find cars or stations in the nearby area and in some cases, they even work as keys to open car doors and start the engine.

Global warming

In response to global warming, people started to adopt a more environment-friendly approach. Climate change has become an increasingly important issue in recent years. Governments are compelled to regulate emissions, reduce waste, and penalize improper water utilization. The European Energy Efficiency Directive set the goal to save 20% of the European Union's primary energy consumption by 2020 (European Commission, 2015 and Someren, Someren-Wang, 2012). Although the initial targets showed favorable levels, German manufacturers could not make a greater commitment than to achieve a CO2 emission level of 95 g/km in their new cars by 2020. While Volkswagen undertook to achieve this target and has hit it with its BlueMotion Polo (CO2 emission level: 87 g/km) (Hofmann, 2014), Daimler and BMW must strain themselves harder. In 2015, Daimler has already achieved its voluntary target for CO2 emissions (125 g/km) in the passenger car sector (Daimler, 2015). The performance of BMW seems to be the most promising as it achieved a reduction of 30% between 1995 and 2010, and has set the target to reduce the CO2 emission of its vehicles by another 25% by 2020 (BMW, 2015). It is obvious that these manufacturers need an urgent plan to comply with the targets.

Accordingly, they have been developing electric and hybrid engines. For instance, Daimler introduced hybrid and electric models such as Smart, AMG, and E 300 BlueTEC Hybrid. Each of the major German car manufacturers contemplated for a long time whether to develop hybrid and pure electric vehicles, or to develop engines compatible with bio fuels. They are hard pressed to become proactive, and they need to find sustainable solutions, such as reducing fossil fuel consumption and contributing to develop a new generation of renewables, rather than using biofuel. Although the use of biofuel can reduce CO2 emissions, it is prone to create a wide range of other problems, including the artificial scarcity of cropland, the spread of monocultures, and increased methane emissions by livestock (Shafy, 2007).²

New mobility approaches

Shifts in mobility requirements also play a vital role. Although European registrations showed a positive tendency in 2014 with a total improvement of 5.7% in sales within the EU (Bekker, 2015), the younger generation is still hard to please; and car manufacturers often find it challenging to persuade them to purchase passenger cars (Figure 1). An example is provided by the 2009 statistical data of the German Federal Motor Transport Authority, which revealed that the share of new vehicle buyers among the new generations (aged 18-29) shrunk by half over the last ten years (Fournier et al, 2014). This can be partly attributed to the fact that there is a high unemployment rate in Europe that disproportionately affects young job seekers, and partly to the changes in the needs of young people. The younger generations are the most concerned about ecological topics (GHG, health issues, global warming) and economic issues.

² Methane is an aggressive GHG whose contribution to global warming is about 23 times higher than that of CO2.



Figure 1: Change in new passenger car registrations in the EU (2004-2013) (12)

As a result, in the last ten years the number of purchased bicycles has shown a considerable growth in Germany, most Western European countries, and Japan (Bike, 2015). The top ten countries with the most bicycles per capita also express the leading trends in these countries. Bicycles are popular, since they constitute an alternative to motorized cars. According to the survey carried out by Sinus for Federal Ministry of Transport and Digital Infrastructure (2014), the second most available vehicle after a passenger car (80%, 1.4 per household) is the bicycle (72%, 2.4 per household) in Germany. They contribute to a healthier life, the shortening of the time of travel compared to cars, a decrease in traffic congestion in metropolises, and a reduction in travel expenses. Kuruma banare, a Japanese expression for "demotorization," is now in full progress (Fournier et al, 2014 and Küemmerling and Heilmann, 2013). Congestion in metropolitan areas is already a severe problem, and high parking fees actually impede parking, which in turn makes parking extremely time-consuming. Consequently, the sharing revolution (also including EV fleets) can also contribute to a more efficient use of space, since passenger cars are just parked and stand still for approximately 90% of their life time.

According to (Fournier et al, 2014), the positive effects of the collaborative consumption of car sharing are the following:

- Fewer number of cars in downtown areas
- Less crowded parking lots and less need for new parking spaces
- Introduction of new EV fleets with zero emissions
- Simplified fee calculation that contributes to cost transparency
- Enjoyment of driving new cars without the purchase pressure
- More flexibility in public transportation and analogous mobility concepts offered by cooperating railway companies

In addition, car manufacturers can set up and operate unified fleets, which also drives the maintenance cost lower (Csizmazia, 2010). Consumers may be reluctant to purchase cars in the future; instead, they will search for other options. Public transportation remains one of the main options, but instead of using a single modal transportation (taking a bus or a train only), a combination will be set by consumer preferences (choice of multimodal transportation). Accordingly, new mobility concepts will be established. There are factors that will also affect the development of mobility, such as spatial differences (rural areas vs. urban areas), distance of travel (short-distance vs. long-distance trips), and weather conditions.

German automotive manufacturers have sought to add value to their customers by creating new, more efficient and more eco-friendly engines. Although it is hard to please the younger

generations, the manufacturers, having established car-sharing fleets, gave them the chance to try a car and decide later whether to purchase it. According to (Lenz and Fraedrich, 2015), car sharing can be categorized in three ways:

- a) The classical single-station bound approach. Customers pick up the vehicles at a station (e.g., in a public parking lot), and they also return it there (Quicar, Flinkster).
- b) The multiple-station bound approach, where the automobiles can be picked up at one station and returned to another, spatially different station.
- c) The free floating approach implemented by Daimler (car2go) and BMW (DriveNow) in their car sharing enterprises, where people can pick up a selected car based on the GPSsupported app on smartphones, and they can leave it in a vacant parking lot. Nevertheless, cars are not allowed to leave the designed zone.

Car-sharing users in Germany are usually below 40, and they have a higher educational background (either qualified to enter or graduated from college and university) with a relatively high income level. Moreover, a large percent of them are frequent users of urban public transportation services. An excellent public transportation infrastructure seems to be a fundamental precondition of car sharing as the length of travel required to pick up a car or leave it significantly influences the attractiveness of this mobility concept. Therefore, co-operation between car-sharing enterprises and public transportation providers is most desirable (Lenz and Fraedrich, 2015).

Car Sharing Providers

In Germany, the largest car sharing fleets are provided by the major automotive manufacturers and by the largest public transportation provider, the Deutsche Bahn AG. To depict a potential direction of car sharing, Multicity will be added to the list as it is run by the French automotive manufacturer, Citroen. If the car-sharing service is station-based, the stations can be easily accessed as they are located at busy public transportation intersections, terminal stations, airports, and railway stations. Even in the case of the free floating system, consumers are required to leave the cars in the zones determined by the suppliers. Obviously, drivers have a larger anticipated freedom, but this is a bit deceptive. Consumers, who live and work in such urban areas, travel about 7,000-8,000 km per annum, and thus it may not be worth for them to purchase a car. They need cars only in a limited number of cases. The pooling effects ensue from the proximity within the urban areas and the frequency of demand for car sharing (Rennhak and Benad, 2013).

Car-sharing suppliers are responsible to provide clean, well-maintained, and flawlessly operating cars, either in parking lots or at stations. If cars have to be brought to petrol stations, users will be rewarded by additional time free of charge. In average, consumers can book their cars 15 minutes in advance or simply by passing-by the car, unless it has been reserved earlier by another person. Fixed costs of parking, taxes, and insurance primes will be covered by suppliers. This situation is advantageous to users, who also benefit from reduced organization time and complexity.

Although the number of car-sharing companies has been increasing, this article describes only the major providers with their cost structures and special services. The analysis should reveal parallels and enable a quick comparison of fees involved in the use of car sharing. In appendix in

section nine a table reveals the major approaches of the largest car sharing companies in Germany with their diverse pricing strategies.

car2go

car2go started as a cooperation between Daimler and Europe's largest rental car company, Europear. The car2go Ltd. is a subsidiary fully owned by Daimler AG, while the car2go Europe Ltd. is a car-sharing provider joint venture between car2go Ltd. and Europear. The fleet is composed of various Smart models that have internal combustion engines or electric engines. The first pilot project was carried out in Ulm, Germany, followed by a second project in Austin, Texas, and a third one in Vancouver, Canada. The success of these projects led to incorporations in Germany, the United States, and Canada in 2011-2012. Currently, the joint venture's services are available in eight countries. Driven by high ambitions, it recently signed a memorandum of understanding with the Chinese city of Chongqing to expand its operations.

Although car2go provides a freely floating service, parking should take place in the operation zones. The membership fee (validation fee) is nonrecurring, and the costs are transparent. Cars can be opened by the validated chip cards, and most recently by the application on the member's smartphone. A member currently pays EUR 0.29 per minute or EUR 14.90 per hour, while the cost is EUR 0.19 per minute if the car is parked. If the rental starts or ends in a special business zone, or outside the predetermined zones, an additional fee of EUR 4.90 will be charged. For frequent users, car2go offers two minute-based packages (120 and 300 minutes). The own risk share³ is EUR 500 in case of an accident, but can be reduced by a little sum of money.

³ The share that hast be borne by the driver.

Members can find a passenger car located nearby through a browser or a smartphone application, or they can simply call the hotline. Parking regulations are subject to the regulations enforced in the cities where the cars are used. The minute costs imply the length of driven way, insurance, fuel (or electricity), and parking costs if not stipulated otherwise. Today car2go has 1,000,000 registered members, and operates in 30 cities in Europe and North America. Currently, the fleet is composed of 12,500 passenger cars, of which 1,200 are EVs. In Germany alone, it has 3,000 vehicles and about 160,000 registered users (car2go, 2015).

DriveNow

DriveNow is a joint venture between BMW and the car rental company Sixt. It is a seamlessly working organization where Sixt is responsible for the logistics and BMW for the fleet. The pilot project took off in 2009 in Munich, Germany, and was incorporated in 2011-2012. It operates a freely floating car sharing service. Its fleet is composed of more models (Mini Cabrio, Clubman, Countryman and BMW X1 and most recently with BMW i3) than that of car2go, its largest competitor. Similar to car2go, the cars are to be picked up and returned within the designated zones. There are exceptions like Cologne and Dusseldorf where users can return their cars in any of these cities for an additional fee. Like in the case of car2go, membership starts with an activation fee, and there is no monthly fee.

The costs are somewhat higher (EUR 0.31-0.34 per minute) but the models are better suited for transportation. While car2go's Smarts are two-seated, the models offered by DriveNow are either four- or five-seated. Additionally, the parking rate is cheaper (EUR 0.15 per minute). Short-term reservations may be made 15 minutes in advance, for free. Long-term reservations are offered at a price of EUR 0.10 per minute. Additionally, packages are offered on a prepaid

basis or on a monthly basis. The prepaid package (500 minutes) includes 200 km free of charge drive and extra distance costs at a rate of EUR 0.29 per km. Hour-packages come with different lengths of distance. For instance, the 3-hour package includes 80 km, while the 9-hour package includes 200 km. The monthly packages work similarly, except that each includes a 200 km free of charge driving distance for the contract period of 30 days. The starting price is EUR 16, which includes a 60-minute driving time for regular users. The own risk share is EUR 750 which can be decreased to EUR 350 (at the additional cost of EUR 1 per booking) or to zero for an annual payment of EUR 199 (DriveNow, 2015).

DriveNow gives its members a radio-frequency identification (RFID) chip, which can be attached to the driver's license and used on the windscreen where the reader is installed. DriveNow quickly put the issue of electro mobility on its agenda. Accordingly, the first EVs started to operate in the U.S. and Germany from mid-2012 and 2013, respectively. The number of its EVs (currently around 70) is far lower than the EV fleet of its main competitor, car2go. The number of currently registered members is about 470,000. At present, DriveNow offers car sharing in four countries.

Quicar

Compared to the other German manufacturers, Volkswagen entered the market relatively late. In 2013, its pilot project, launched in 2011, was in test phase only in a single city, Hannover. It still does not offer services in any other city. In contrast to the other companies, Quicar operates station-bound car sharing. Similar to the other two car-sharing operators, Quicar has a registration cost. Members receive an RFID chip that can be stuck on the driver's license.

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Additionally, Quicar offers a credit card through the cooperation of Volkswagen Bank and Visa Card.

The costs are lower, i.e., EUR 0.25 per minute during driving and EUR 0.05 per minute during day-time parking, with no costs incurred during night parking. The driving costs refer to the first 150 km. For this distance, the cost includes fuel, cleaning, maintenance, and tax. Parking fees must be paid by drivers. The own risk share currently stands at EUR 1,000 if no related service is booked. This sum can be reduced either to EUR 350 by paying EUR 2.50 per drive or an additional Quicar Pro package can be booked and paid annually. This costs EUR 99 p.a. or EUR 10 per month. In addition, Quicar offers traditional rental services that start from 24-hour rentals, and the daily cost decreases once the car is rented for a week or more. As an overall service, it seems to be substantially more expensive than the cost of the other two manufacturers. Quicar operates a single-model fleet with the model Volkswagen Golf VI BlueMotion. The supply is comprised of 200 cars and 100 parking spaces at the moment (Quicar, 2015).

Flinkster

Flinkster is the car-sharing service run by DB Rent Ltd., a company owned by Deutsche Bahn AG. It is the largest car-sharing service provider in Germany, with 3,100 cars (including 100 EVs) and 800 stations in 2013. Deutsche Bahn realized the changes in demand, and started to offer these services under the name of Flinkster as a pilot project launched in Cologne and Stuttgart in 2009. Flinkster operates station-bound services in most of the major German cities; while in Munich drivers have a slightly greater degree of freedom as the cars are to be returned within a designated zone, known as *Parkraumquartiere München*. Furthermore, cars can be

reserved and used in a few other European cities as well. The membership fee is waived for those who hold a valid railway concession card (BahnCard) but members still have to register for car sharing in a separate procedure. If the member lacks a BahnCard, the current starting cost is EUR 50.

The pricing is divided into three categories in Germany (nationwide tariff, local tariff, oneway offer) that is extended by the Austrian tariff. There are eight different car categories, including seven for passenger cars and a minivan category. Consequently, the price structure is more complex and members have to spend more time to search for information (increased search costs). The minimum cost starts at EUR 1.50 per hour during the night whereas the day tariff starts at EUR 2.30 per hour and EUR 0.18 will be additionally charged for each driven kilometer as "consumption lump sum" for fuel or electricity (25). The daily price starts from EUR 39 for the first day and then from EUR 29 for each consecutive day. The own risk share is the highest with EUR 1,500 and it can be cut to EUR 300 by taking the yearly insurance package at the expense of EUR 90 per annum (Flinkster, 2015).

Multicity

The first three car-sharing companies, as well as the one operated by Deutsche Bahn AG, emerged in Germany, and they are either joint ventures or fully owned by German enterprises. In contrast, Multicity was founded by Citroen, a French car manufacturer. It operates the only free floating car sharing venture based solely on electric vehicles (350 Citroen C-Zero cars). Once the remaining battery level is low, drivers must take them to a charger station. The service is currently available only in Berlin. The registration fee (EUR 9.90) is much lower than that of the other larger companies. Once the registration is completed, a membership card will be issued, which can be received by mail or at a service point.

The minute tariff is EUR 0.28, while the maximum daily tariff is EUR 39. The nearest cars can be found on the internet or on the smartphone application, and can be reserved 15 minutes in advance free of charge. The own risk share is EUR 500. The company offers prepaid packages on its website, such as 100 minutes (EUR 0.25 cent/minute), 250 minutes (EUR 0.22/minute), and 500 minutes (EUR 0.20/per minute). The prepaid packages are limited only to the remaining minutes, and have no other conditions (Multicity, 2015).

Ongoing Market Consolidation

Co-operations among car sharing providers show that the market started to consolidate. Interestingly, Flinkster and MultiCity started their co-operation early, at the start of Multicity's operations in 2013. The next major move was the partnership between the two large car sharing operators, Flinkster and car2go, in 2015. If the user is registered at either one of the partners, there is no need for additional registration. Now the cars of car2go or Flinkster can be reserved and opened by using the smartphone of the user (Autobild, 2015a).

The vendor lock-in effect is almost negligible in the market. Although car sharing operators seek to keep their registered members by creating a barrier in the form of membership fees, the cost is low. Customized offers may impede a switch to alternatives. Flinkster is a good example of this situation. The lock-in effect is strong, since commuters – who by nature hold the concession card – have no additional registration fees but enjoy more benefits (such as discounted train tickets). Moreover, Flinkster users have access to free floating car sharing in seven cities through their partnerships with car2go and Multicity. The number of operators is

increasing, but at the same time the largest operators dominate the markets by partnerships. As always, small operators must seek forms of co-operation to survive.

Conclusion

The current study concludes that car sharing may become profitable on the long run but only in an environment where certain factors (such as high population density and welldeveloped public transportation infrastructure) are given, while other factors such as pricing play a secondary but increasing role. Legislative regulations regarding the emissions and areal use of over-aged automobiles further support the growth of car sharing industry. Still, car sharing is not an established sector. The providers have been exploring the markets carefully and may attempt to utilize car sharing as a test field for accepting newly built technological solutions. The new technological solutions of manufacturers, e.g., developing electric engines instead of internal combustion engines, are vital to comply with emission regulations. To legislative the transition toward less emission, or even the complete elimination of emission, is too slow, and laws have been enacted to expedite the process. Still, due to infrastructure deficiencies (like long charging times and the scarcity of charging stations), EVs are not as widespread as desired by the German government. Therefore, the major German manufacturers have been hesitant to introduce pure electric cars for years, while they introduced a number of models with hybrid engines.

Although the study concentrates on the big ones of car sharing companies, the major strategies of car sharing are represented well. While Flinkster and Quicar offer station based services and also attract users with the classical car rental services, the other two (DriveNow and car2go) charge high daily fees which distinguish them from the classical service providers. An exception is shown by MultiCity with its low daily rental fee, however, it is indisputable that users will not have long trips by virtue of the inadequate infrastructure for EVs. It is recognizable that the three major German manufacturers have slightly different approaches to participate in the car sharing market. Taking Daimler's car2go as an example, it is obvious that the one-model strategy generates cost related scale economies. Furthermore, it restricts the use of cars only to cities and their regions where they are available, e.g., higher number of kilometers leads to progressive increase in price (only for the first 50 km there is no extra charge per kilometer, but per minute only). Besides, it can be assumed that the strategy focuses on winning the younger generations as customers since the used model Smart was created for them, but has not generated the expected sales results for years. MultiCity has a similar strategy with the difference that it deploys purely electric vehicles in its fleet. The multi-model offers of DriveNow and Flinkster cater the most users and accordingly, they seem to be the most successful implementations of car sharing strategies. In the case of Flinkster, it is clear that car sharing services became an organic element of multimodal transportation services which contribute additional value to railway passengers. BMW explores the market for electric vehicles with its EV, BMWi. The fee calculation of these two providers is more complex and the fees seem to be more expensive than of the other competitors.

Pricing is important to lead demand for car sharing and it needs to be further analyzed by future researches. Currently, it is not clear which car sharing approach (free floating or station based) and pricing strategy could yield best at the end and which approach can be really considered as best to decrease emissions and to lessen pollution in cities.

Questions

- 1) Will car manufacturers have to shift to become competitive mobility providers?
- 2) Will the German manufacturers be able to remain the largest car sharing providers?
- 3) Do manufacturers need any incentives to create fleets composed exclusively of EVs?
- 4) Will manufacturers switch to provide EVs soon in the future once infrastructure has been developed well?
- 5) Will it be possible for manufacturers to convert the youth to purchase their own cars, i.e. will there be any chance to reverse the process of "demotorization"?
- 6) Are the facilitators and market environment given solely in Germany, or are they applicable in the entire EU and in other industrialized countries?
- 7) Which can be the potential reasons for different pricing strategies in car sharing?

Appendix

Provider	Sharing strategy	Pricing	Hour tariff	Prepaid
				p ackage
DriveNow	free floating	EUR 0.31 driving / EUR 0.15 per parking	3 hours - EUR 29	offered
		minute	6 hours - EUR 54	
		(valid for 80 km/use)	9 hours - EUR 79	
			24 hours - EUR 109	
Flinkster	station based	day tariff EUR 2.30/h, night tariff EUR	daily:	not offered
		1.50/h	1st day EUR 39	
		+ EUR 0.18/km	from 2nd day EUR 29/day	
car2go	free floating	EUR 0.29 driving / EUR 0.19 per parking	EUR 14.90 per hour	offered
		minute	EUR 59 per day	
		(the first 50 km are free)		

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Quicar	station based	EUR 0.25 driving / EUR 0.05 per parking	EUR 40 per day	not offered
		minute	EUR 200 per week	
		(valid for 150 km/use)		
MultiCity	free floating	EUR 0.28 driving / EUR 0.05 per parking	EUR 25 per 100 minutes, etc.	offered
		minute	max. daily fee EUR 39	

Table 2: Current fee structure (Autobild 2015b, car2go, DriveNow, Flinkster, Multicity, Quicar)

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