

E-car industry analysis from the perspective of business model dynamics

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ABSTRACT, the emerging e-car industry faces several challenges like limited driving range and too high car prices. Firms operating in this industry need to create value and must find a solution to overcome these problems. Due to new technologies and an increasing need for sustainability more and more automobile manufacturers enter the e-car industry -not only established, conventional manufacturers, but also new entrants. In the following paper resulting business model dynamics of the e-car industry are discussed and the business model of two exemplary e-car manufacturers are analyzed and compared. The purpose of this study is to gain an understanding of how new entrants of the e-car industry create value and compete with conventional automobile manufacturer. Therefore a literature review and a case study are conducted. From the two cases BMWi and Streetscooter Research GmbH it can be learnt that the e-car industry offers several possibilities for business models and that new entrants can, depending on their value proposition, find a niche in the heretofore not well developed industry. Like the case of Streetscooter shows, having a different mobility vision can be the starting point of success. Even if conventional automobile manufacturers like BMWi have a big advantage through established dealer networks, customers and brand image.

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Keywords

Business model, e-car, e-car industry, Streetscooter Research GmbH, BMWi

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3rd IBA Bachelor Thesis Conference, July 3rd, 2014, Enschede, The Netherlands.

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1. INTRODUCTION

In today's fast developing world and economies industry business models are changing quickly. In the last decade especially in the automobile industry huge shifts are perceivable. Due to finite resources (Kottler, 2011), the increasing price of oil (Becker et al., 2009; Sadek, 2012) and increasing ecological awareness (Gadenne et al., 2009) a lot of automobile manufacturers try to access the electric car market to meet the customer's demand of sustainable technologies (Chan, 2007). The whole car industry is on a technological move (Bozem et al., 2013). In the automobile industry not only engine concepts change but rather the business model concepts alter (Maxton, 2004; Chan, 2007) and as well 'constructions of complex social networks' (Kond and Bi, 2014, p.1). Thereto existing know-how must be applied in a completely new way (Stricker et al., 2011).

The 125 year old industry (Indra, 2012) converts and next to conventional car manufacturers like Audi, BMW and Mercedes-Benz (Siebenhüter and Meyer, 2011; Indra 2012) trying to enter the fast developing e-car market, also new smaller firms and start-ups are involved in capturing the market (Freyssenet, 2009). Generally an exceeding entering of manufacturers in the market can be expected (Kley et al., 2011) Former automobile manufacturer seek to find a way to keep pace with the technological innovations and new business concepts whereas new companies try to enter the highly competitive market with new business concepts.

This thesis will draw on the new situation in the automotive industry where a relatively young manufacturer called Streetscooter Research GmbH can compete with big carmakers or can find a niche in the e-car industry. Therefore, in this paper, as a case study, their business models will be analyzed and compared to the one of BMWi.

People involved in the automobile industry and especially in the e-car industry can experience examples of business models within the e-car industry and learn how a new entrants can penetrate a market and how established player in the automobile industry renew parts of their business model (in this case: starting a new sub brand) to be up-dated within the industry.

Thus, the central question to be examined in this paper is:

How do new entrants of the e-car industry create value compared to conventional automobile manufacturers?

The study will begin by outlining the theoretical framework. It is explained what business models and business model dynamics are and why business model innovation is essential. Then it is shown how business models can be analyzed and compared with the help of business model frameworks. Afterwards frameworks to explore macro environment of industries and the methodology are given. In the analysis part the dynamics of the e-car industry are explained and different common business models are presented. Then the business models of BMWi and Streetscooter are elaborated and compared and a macro-environment analysis of the two companies are given. Finally discussion and conclusion are elaborated and limitations and further research are remarked.

2. THEORETICAL FRAMEWORK

2.1 Business Models

Johnson et al. (2008) mention that "Business model innovations have reshaped entire industries and redistributed billions of dollars of value" (p.59). A good conceived business model is crucial for every institution regardless whether it is a new entrant or an entrenched business in the market (Magretta, 2002). It combines the potential of technology with commercial

value and releases financial worth from technology (Chesbrough and Rosenbloom, 2002). According to Chesbrough and Rosenbloom (2002) is "the ultimate role of the business model to ensure [...]" that it "delivers value to the customer" (p.529). It should be better than the previous objective and the target ought to be that the new business model becomes a standard and challenges next generation enterprisers (Magretta, 2002). Hence, "creating a new business model is [...] like writing a new story" (Magretta, 2002, p. 4) and designing it can be seen as art (Teece, 2010).

Thus, after finding a successful and working business model one should always keep in mind that "business models are often quite transparent and [...] easy to imitate - indeed, it is usually just a matter of a few years [...] before an evidently successful new business model elicits imitative efforts. In practice, successful business models very often become, to some degree, 'shared' by multiple competitors" (Teece, 2010, p.179).

But what exactly is a business model? A review of literature about business models shows that no general definition of the term 'business model' exists (Sharfer et al., 2005; Morris et al., 2005; Zott et al. 2011). According to Amit and Zott (2001) "a business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities" (p.511). Johnson et al. (2008) say that 'a business model, from our point of view, consists of four interlocking elements that, taken together, create and deliver value' (p.60). The four elements are according to the authors: value proposition, profit formula, key resources and key processes. Another definition is "A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams" (Osterwalder, 2004, p.15) Like Johnson, Osterwalder et al. (2005) also name four elements that they call 'pillars'. The four pillars are product, customer interface, infrastructure management and financial aspect. One can see that Osterwalder et al. (2005) likewise introduces the customer perspective. The customer perspective is also important for Teece (2010). "The essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit." (Teece, 2010, p. 172).

Generally one can say, to put it simply, that "a business model describes the rationale of how an organization creates, delivers, and captures value" (Osterwalder and Pigneur, 2010, p.14). It is prepared to "total value creation" for all sections concerned (Zott and Amit, 2010, p.218).

Author(s)	Definition
Timmers, 1998	“A business model is an architecture for product, service and information flows, including a description of the various business actors and their roles” (p. 4).
Amit & Zott, 2001	“A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities” (p. 493).
Magretta, 2002	“are, at heart, stories—stories that explain how enterprises work” (p. 87).
Chesbrough & Rosenbloom, 2002	“The business model provides a coherent framework that takes technological characteristics and potentials as inputs and converts them through customers and markets into economic outputs” (p. 532).
Mangematin et al., 2003	“Each business model has its own development logic which is coherent with the needed resources—customer and supplier relations, a set of competencies within the firm, a mode of financing its business, and a certain structure of shareholding” (p. 624).
Osterwalder, 2004	“A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company’s logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams” (p.15)
Downing, 2005	“is a set of expectations about how the business will be successful in its environment” (p. 186)
Morris et al., 2005	“concise representation of how an interrelated set of decision variables in the area of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets” (p.727)
Johnson et al. , 2008	“A business model, from our point of view, consists of four interlocking elements that, taken together, create and deliver value” (value proposition, profit formula, key resources and key processes) (p.60)
Teece, 2010	“The essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit.” (p. 172)
Osterwalder & Pigneur, 2010	“a business model describes the rationale of how an organization creates, delivers, and captures value” (p.14)
Casadesus-Masanell & Ricart, 2010	“A business model is [...] a reflection of the firm realized strategy” (p.195)

Table 1. Business model definitions

2.1.1 Business model dynamics

To sustain adjustment with “environmental changes” (Demil and Lecocq, 2010, p.236) like technology, regulation and market progress, organizations need to fit their business model in course of time (deReuver et al., 2007). It “may lead to avoiding unnecessary iterative development steps and path dependency” (Kijl et al., 2005, p.13).

According to Willemstein et al. (2007) “dynamics in business models can originate from two sources. First of all, the predominant business model applied by newly founded firms can change over time. Secondly, firms can shift from one business model to another. Such shifts are proposed to be triggered by the emergence of new profit generating opportunities that need to be utilized to enable firm growth” (p.222).

Specific for start-ups the adjustment of their business model to technological (essential in the R&D stage) and market-related dynamics in the early phases of the development process is important, whereas for entrenched and bigger firms these dynamics are fair. While regulative forces have generally hardly influence (deReuver, 2007 and 2009). Market developments like new entrants or rising expenses for materials can

sometimes be predicted and respond to and are therefore a sign for a change in the business model (Demil and Lecocq, 2010).

But not only external factors are determining for business models, also internal factors are crucial (Demil and Lecocq, 2010). If a firm operates in a highly turbulent external environment, a strong internal fit can compensate the poorly predictable external environment. They can use their own benefits that competitors do not have (Morris et al., 2005). “Internal factors include the outcomes of top (or middle) managers’ teleological decision processes, but also the consequences of the dynamics within or between core components” (Demil and Lecocq, 2010, p.236).

The PESTEL analysis is a tool to analyze macro environmental factors-dynamics- that influence business model dynamics (deReuver et al., 2009). Therefore the PESTEL analysis can be applied to get a better comprehension of what affects business models. It is explained in detail in section 2.2.

2.1.2 Business model innovation

Business model innovation comprises changes respectively advancement of individual elements of business models (Labbé

und Mazet, 2005; Lindgarth et al., 2009; Mitchell and Coles, 2004) respectively of the whole organization (Johnson, 2010). These changes should accomplish new mechanisms (Osterwalder and Pigneur, 2010). It can be extremely profitable if an organization is doing it right, can open new markets or change existing ones (Comes and Berniker, 2008). The change is quickly becoming as or more valuable than product or process innovation (Comes and Berniker, 2008). According to Malhotra (2001) it “is the key lever for global market share” (p.5) and corresponding to Sosna (2010) “the key driver of success” (p.383/384). Business model innovation can enable lasting competitive advantage with ‘dynamic, discontinuous and radical pace of change’ (Week, 2000, p.2) and has an impact on the long-term success of a firm (Comes and Berniker, 2008). Therefore it is highly crucial (Chesbrough, 2010). But one should not underestimate the process (Johnson et al. 2008; Chesbrough, 2007) and many firms struggle with business model innovation due to various barriers (Chesbrough, 2010). According to Chesbrough (2010) there is generally a lack of business model experimentation. Firms must accept that some new business models will fail but one can take lessons out of it and apply the knowledge for the next attempt of business model innovation. Another issue is the business model innovation leadership gap (Chesbrough, 2007). It involves that nobody in the organization is in the position or has the task to care for the innovation of the business model. Thus, firms should keep in mind who their leader for this purpose is. If a firm overcomes these barriers it offers according to Johnson et al. (2008) the following five chances: ‘1. The opportunity to address through disruptive innovation the needs of large groups of potential customers who are shut out of a market entirely because existing solutions are too expensive or complicated for them. [...] 2. The opportunity to capitalize on a brand new technology by wrapping a new business model around it [...] 3. The opportunity to bring a job-to-be done focus where one does not yet exist. [...] 4. The need to fend off low-end disrupters. [...] 5. The need to respond to a shifting basis of competition. Inevitably, what defines an acceptable solution in a market will change over time, leading core market segments to commoditize (p.64/65).

2.1.3 Business model framework

Business models can be analyzed and compared with the help of business model frameworks. Firms can also evaluate their business model with this tool (Chesbrough, 2007).

Bouwman and MacInnes conceptualized in 2006 the ‘Dynamic Business Model Framework’. Their notion is that business models have phases and can change over time. It can be used for new ventures and projects and also for entrenched firms in value webs.

	Concept	Organization XY
Drivers	<ul style="list-style-type: none"> Technology Market 	
Business model concept	<ul style="list-style-type: none"> Service Technology Organizational arrangement (value web) Economics 	

Table 2. Dynamic Business Model Framework by Bouwman and MacInnes (2006)

Johnson et al. (2008) developed a business model framework with the following elements a) Customer value proposition

including target customer, job to be done and offering b) Profit formula with the components: revenue mode, cost structure, margin model, and resource velocity c) Key resources including people, technology/products, equipment, information, channels, partnerships/alliances and brand and d) Key processes: processes, rules and metrics and norms (p.62)

The most common is the ‘business model canvas’ by Alexander Osterwalder that is based on his thesis ‘Business Model Ontology’ (2004) and later elaborated with Yves Pigneur in the book ‘Business Model Generation: a handbook for visionaries, game changers, and challengers’ (2010). The business model canvas consists out of nine building blocks that help to describe the business model elements of an organization. The blocks are: key partners, key activities, key resources, value proposition, customer relationships, channels, customer segments, cost structure and revenue streams. These blocks can be outlined more general in the four pillars of Osterwalder and Pigneur called product, customer interface, infrastructure management and financial aspects (Osterwalder and Pigneur, 2005).

Pillar	Block
Product	Value proposition
Customer interface	Customer relationships
	Channels
	Customer segments
Infrastructure management	Key partners
	Key activities
	Key resources
Financial aspects	Cost structure
	Revenue streams

Table 3. Coherence four pillars and business model canvas

2.2 Frameworks to explore macro environment of an industry

Environmental analysis is crucial for developing a sustainable competitive advantage and identifying opportunities (Lynch, 2009). In the literature several frameworks for exploring and analyzing the macro environment of an industry can be found. The most common analysis method is the PESTEL or PESTLE framework. The letters represent the initial letters of the analysis components political, economic, social, technological, environmental and legal. Next to an analysis of the environment an organization operates in this framework is also a tool to analyze data and information and enable the company to predict situations that it might occur in future (Bivolaru et al., 2009).

Other variations are PEST (Dare, 2006) and STEPE (Richardson, 2006). The original PESTEL was first designed by Aguilar as ETPS (economic, technical, political, and social). These are the core elements of most of the frameworks. Sometimes, depending on the environment to be analyzed, also other variations are necessary. One can also use, for instance, demographics and regulations as additional factors. Demographics are integrated in the DEEPLIST analysis (Finlay, 2000). As one can see, the different factors can be combined in multiple combinations so that it matches to the conducted analysis and environment.

In the following the PESTEL framework is used with the additional factors *demographics* and *regulations* due to their importance in the electric car industry.

3. METHODOLOGY

BMW <i>i</i>	Streetscooter Research GmbH
<ul style="list-style-type: none"> • Sub-brand of BMW (sell its products separately from BMW and Mini) • Founded in 2011 (BMW is founded in 1916) • Series production of BMW i3 since 2013 • Two models: i3 (urban electric car) and i8 (sports car) • Extra services like Drive Now (car sharing service of BMW<i>i</i>), Park Now, Charge Now, BMW Eco Route, • Production in Leipzig, Germany 	<ul style="list-style-type: none"> • Develops new mobility concepts for cities and overcrowded areas • Low cost e-cars • Founded in 2010 • Two models: Compact (urban electric car) and Work (transportation car) • Customers: e.g Deutsche Post; testing 50 vehicles • Production in Aachen, Germany

Table 4. Case studies BMW*i* and Streetscooter Research GmbH

This paper is based on a theoretical framework. It follows a qualitative, exploratory research approach, in order to gain insights into the progress of the e-car industry. For the literature part the sources were obtained from academic search engines like Google Scholar and Scopus by means of the literature admission of the University of Twente. In the analysis part the e-car industry and the business models of two firms within the e-car industry will be analyzed and compared.

For analyzing the business models the ‘Business model canvas’ by Osterwalder and Pigneur (2010) will be used since it is the most general and common framework for examining business models. It is not specified to an industry and a descriptive visual tool.

In the paper the business models of BMW*i* and Streetscooter Research GmbH are discussed. But, why exactly these two firms? Both produce e-cars and started their business in the last four years in this field: Streetscooter categorized as a start-up and BMW*i* as a sub brand of BMW AG. As far as one can state before the analysis, they have completely different business models to survive in the e-car industry. The interesting point is to learn and see how their business models are conceptualized and applied. Thus, the business models of the two firms will be analyzed in the following as examples of business models within the e-car industry.

The data and information for the comparison are gained from academic article, websites of the firms, newspaper articles, specialized journals, blog entries and interviews.

4. ANALYSIS: E-CAR INDUSTRY AND DYNAMICS

This section gives general information about the current development of the e-car industry.

The car industry has to face a high number of challenges like declining sales, changing customer needs and environmental regulations (Chan, 2007). It can be seen that the industry is changing and that new business models emerge. Especially the environmental aspect, the need for sustainable car concepts and the finiteness of fossil fuels let automobile manufacturers

enter the e-car market. Aspects like climate change and global warming (Chan, 2007) show that “rethinking about traditional individual mobility services” is needed (Kley et al., 2011, p. 3392).

The word ‘e-car’ is short for electric car that is a variety of an electric vehicle (EV), and can be defined according to the U.S department of energy as a car that “run on electricity only” and “is propelled motor powered by rechargeable battery packs”(U.S Department of Energy,2014). It has no backup fuel source.

In the electric vehicle outlook report from 2013, the International Energy Agency, an autonomous intergovernmental organization, reports that today 0, 02% of all passenger cars are e-cars. The target of this organization is to reach 2% electric cars of all passenger cars on the road by 2020. The report states that 20 million cars can be expected in 2020. Generally the global electric vehicle sale doubled from 2011 to 2012 and in 2012 the world electric vehicle sales exceeded 100,000 units for the first time (Electric vehicles initiative, 2014). Hence, one can see that the impact of the e-car industry grows but there are large sale differences in different countries. The most cars were sold in 2012 the USA (70%), 12% in Japan and 8% in the Netherlands (Electric vehicle initiative, 2014).

4.1.1 Dynamics of the e-car industry (PESTEL+DR)

The following PESTEL+DR analysis of the e-car industry is confined to the European e-car industry to restrict it to a distinctive area. Due to the in later sections following case study of two German e-car manufacturers, it seems meaningful to limit the analysis to .

Political

Political factors describe how governments interfere in the economy. Politics can have a significant impact on developments of industries (Kolios and Read, 2013). Researching for sustainable mobility is not only an economic and environmental issue but also affects national coverage due to limited fossil fuels (Tan et al., 2012). For the e-car industry the environment politics and infrastructure politics are of high importance. If the government in a country has high environmental standards, the more likely the citizens buy e-cars. For e-cars new infrastructure investments are necessary due to the need for charger. Therefore supporting infrastructure politics are essential for the electric car industry and governments need to invest in the infrastructure (MacKenzie, 1994). Next to the infrastructure, R&D incentives from the governmental side can also foster the industry and have a positive effect on technology development (Pingfang and Weimin, 2003).

Economic

Economic the costs of the electric vehicle, the energy consumption and its resulting costs are essential (Delucchi and Lipman, 2001). Also the emerging costs for new infrastructure facilities like charging stations are vital (Lassila et al., 2009).

Social

Social factors can affect the demand for products. In the e-car industry mobility habits and trends are decisive. Due to the massive and growing need for mobility are basic requirements given (Small, 2013). The space density enlarges the need for mobility differentiations and flexible vehicle concepts (Krämer, 2010).

Technological

At the present time the technologies for electric cars are not utterly well-engineered. The challenge is to find sustainable and economic competitive technologies. New technologies like the lithium ion accumulator can mean a breakthrough for the e-car industry. So far the battery of the electric vehicle is the most problematic element of the car due to its weight, limited capacity, range and costs (Stricker, 2011). The lithium ion accumulator solves the problem of the limited capacity and range due to its high energy and power density (Lu et al., 2013). Another new technology is the carbon body. In account of the weight of the battery, other parts of the vehicle must be lighter to compensate it. Therefore lightweight construction is a key factor in the e-car as well as in the normal car industry. Carbon is a lightweight construction material that is stronger than steel but likewise featherweight (Sticker, 2011). To relieve the battery, the energy saver mode is also a supporting technology. The car can be driven with limited engine output (Stricker, 2011).

Environmental

As already mentioned, in today's world is climate change and climate protection is a crucial issue. Therefore the need for new engine possibilities is high. Since electric vehicles have a lower ecological footprint than cars with combustion engines, electric engines are attracting increasingly more attention (Van Wee et al., 2012).

Legal

Legal factors in the e-car industry are close to the regulation factors. They depend on the law in Europe or other countries and regions (Abelein et al., 2012). Energy and environmental legislations are crucial for the automotive industry and if they are strict and straightened towards sustainability and environmental awareness it can affect the manufacturing policies that the manufacturers have to satisfy (Orlowski and Gründinger, 2011).

Demographics

In virtue of the growing world population and there will be increasingly more cars on the streets. It is expected that in 2020 7, 72 billions of people live in the world (Statista, 2014). In the growing metropolises of industrial countries, the number of traditional automobile owners stagnates. Distinctive customer segments do not draw on using public transportation but will use interconnected mobility solutions like shared cars, rented cars, share taxis, mini buses, public electro mobiles or rental bikes (Stricker, 2011).

Regulations

Governmental regulations and incentives can support the e-car buying behavior. The regulations like lower taxes for e-cars differ in each country. In the following are the regulatory incentives from different countries in Europe exemplary explained.

In the Netherlands tax reduction is up to 10-12% net of the investment. The government constructed 400 charging points and a high focus on battery R&D (30% of 2012 expense) (Electric vehicles initiative, 2013).

In Norway all e-cars are relieved from non-recurring vehicle fees (also sales tax). There is no annual road tax for electric vehicles, no public parking fees and toll payments. E-cars can use bus lanes, so they have next to financial advantages also driving advantages (Avere, 2012).

In Germany there is no annual circulation tax for a period of five years starting at the date of the first registration. The

government does not subsidize sales of electric cars but funds R&D (Electric vehicles initiative, 2013).

4.1.2 Business models in the e-car industry

Due to new trends, different new business models emerge in the e-car industry.

4.1.2.1 Battery-leasing model

The battery is the escrow problem of e-cars and influences the expense, heaviness and accomplishment (Du et al., 2012).

By virtue of the extra costs for the battery e-cars are distinctly more expensive in the manufacturing process than conventional cars (Kampller et al. 2013). It can be stated that the battery constitutes fifty percent of the total price of the car (Wen-Chen et. al, 2012) or depending on the size of the car up to 10.000 Euro (Kortus-Schultes, 2012). Therefore the cost pressure of e-cars is higher (Kampller et al. 2013). To overcome this issue "battery leasing has been introduced into the market by automobile manufacturers and power suppliers due to its potential to reduce the purchase cost of electric vehicles" (Li and Ouyang, 2011, p.3222). The vehicle and battery are merchandized separately with different business applications. The customer buys the vehicle and is thus the owner and the lease of the battery. This offers several benefits: keeping away the major risk factor battery from the customer and they can keep pace with new battery technologies and can switch the battery when it is necessary or desired (Faust et al., 2010). According to Faust et al. (2010) the battery-leasing model benefits the accessibility of competitiveness.

4.1.2.2. Vehicle purchasing model

Like when buying a combustion engine car, some e-car manufacturers sell the car altogether (car plus battery). The purchaser is then owner of the car and certainly of the battery. E-car manufacturers like Tesla, BMWi, Volkswagen e-mobility and Renault use the vehicle purchasing model. It can be chosen between different strong batteries depending on the distance one drives on average every day. For instance, for the Tesla Model S the customer can select between three different battery options from 60 to 85kWh (Tesla, 2014).

4.1.2.2 Other emerging models and concepts

Carsharing

According to Andersen, Mathews and Rask (2009) "The key to the new strategy is to focus not on the cars, or the batteries or the sources of electric power, as such" (p.2481).

Frequently, not only the e-car itself is being offered by the automobile manufacturer but also additional services. For instance, BMW offers a carsharing service called 'DriveNow' in cooperation with Sixt or Daimler, who provides the same service called 'Car2go' in cooperation with Europcar (Beham & Freer, 2012). The rental car company arranges logistical matters and the car manufacturer provides the vehicle. Carsharing is a transportation concept that should diminish urban traffic (Katzev, 2003) and the user can drive a car occasionally without negative aspects of owning his own car (Shaheen & Cohen, 2007).

Electric vehicle network/ charging stations

Since e-cars regularly need charging opportunities, a completely new infrastructure system is needed. The target is to

have national wide coverage to ensure the charging. Most e-car owners charge currently their car at home. But to be completely mobile a whole network is required (Becker, 2013). This is crucial because the e-car industry can only be completely developed and sales will only increase if this basis- the engine- is assured. Therefore it is essential that not only governments and manufacturers support the expansion of an electric vehicle network, but rather other firms invest in the e-car industry and profit from it. Governments and manufacturers cannot alone build up a whole network system. Firms like RWE (RWE mobility, 2014) and E-ON (E-ON, 2014) started for instance in Germany to provide charging stations. Vattenfall concentrates on offering charging stations for households (Vattenfall, 2014). It can be assumed that electricity providers, thus not alone car manufacturers, can emerge with new business models and can profit from the e-car industry.

4.2 Comparison of the two Business models BMW*i* and Streetscooter Research GmbH

In the following section the business models of BMW*i* and Streetscooter will be elaborated and compared.

4.2.1 BMW*i*

BMW*i* is a sub-brand of the German premium automobile manufacturer BMW and founded in 2011. With this new brand the BMW group tries to enter into e-mobility with the two models i3 and i8. The main production of the e-cars is in Leipzig, Germany but there are also other competence network locations in Dingolfing, Landshut, Wackersdorf and Moses Lake, USA (BMW Group, 2013).

i3	<ul style="list-style-type: none"> • Complete electric engine :Megacity Vehicle • First high volume vehicle with a carbon-fiber reinforced plastic bodywork (improves weight and energy consumption) • Range 120-160 km Lithium-ion battery • Gasoline Range Extender as an option (extends the range to about 360km) • Launched in autumn 2013 • About 3.000 cars are sold until now (June, 2014) • World Green Car of the Year 2014 (wcoty, 2014)
i8	<ul style="list-style-type: none"> • Plug-in hybrid sports car • All- electric range of 37km • Start of introducing to the market: June 2014 • First year production is already sold out (state June 2014)

Table 5. Models of BMW*i*

Key Partners

Like for all car manufacturers, also for BMW*i* suppliers are essential key partners because of their innovativeness (Cousins et al., 2011). Dealers are the hub to the customers and energy companies help to develop the heart of the i-series. The carbon fiber plant is the key to the unique value proposition of BMW*i*: carbon bodies.

Key Activities

The main purpose of BMW*i* is manufacturing the models i3 and i8 and to sale and commercialize them (BMW Group, 2013).

Key resources

The key resources of BMW*i* are the suppliers and their dealers due to their closeness to customers (Azila and Zolkafli, 2011).

Cost structure

The cost structure of BMW*i* comprises research and development, the production plant in Leipzig, Germany and other overheads like wages and marketing. Additionally, BMW*i* invested in cooperation with the carbon specialist SGL in a carbon fiber plant in Moses Lake, Washington (The Seattle Times, 2013).

Value proposition

The value proposition of BMW*i* is that it offers sustainable mobility in the premium class automobile sector. It is also elected by the Dow Jones Sustainability Index as the most sustainable automobile manufacturer worldwide among other things because of its production plant with regenerative energy in Leipzig, Germany (Automobil Industrie, 2013). Moreover, BMW*i* offers its city vehicle i3 for 34.950€ including battery (in Germany). Also a Range Extender can be brought if the daily range of up to 160 km is not enough (Motor Talk, 2014). Therefore it is a car with full use value. Compared to the e-cars in the same segment like the e-Golf produced by Volkswagen it also offers a faster charging time (Auto, Motor und Sport, 2014). Furthermore, BMW*i* and as well BMW are worldwide the only car manufacturers that assemble carbon fiber in their serial production (Handelsblatt, 2014).

To avoid mobility limitations of BMW*i* car owners, BMW offers a service called 'BMW Add-on mobility service'. For longer distances like vacation trips customers can lend a conventional BMW car. The service is included in the leasing/financing agreement (BMW, 2014). Without great effort customers are not bounded to a short driving range and can use the BMW car also if the i3 or i8 do not offer enough space to stow luggage.

Customer Relationships

The customer relationships are established with the help of specialized dealers called BMW*i* Agents (BMW, 2014). The BMW*i* Agents are trained for the sale of electric cars and have special premises for the BMW*i* series. BMW*i* has the advantage that customers know what they can expect due to the high quality image of BMW as mother company. Therefore, even if BMW*i* has another customer segment than BMW, BMW*i* profits from the reputation of BMW and must not build up something completely new.

Channels

Like almost every firm in the economy also BMW*i* sets a high focus on social media like Facebook, Twitter and YouTube to stay in contact and to inform its customers (Allfacebook, 2011).

Customer Segments

The target customers of BMW*i* are urbanities living and working in large cities respectively metropolises. According to BMW*i* they are consumers who think that green is the new premium. Therefore they are no classical BMW portfolio

customers. They are technology-affine and opinion leader due to the sustainability factor of the BMW*i* brand (Automobil Industrie, 2013).

Revenue Streams

BMW*i* realizes its profits with the sale of its two models i3 and i8. Along with it, they offer the already mentioned carsharing service called "DriveNow" (DriveNow, 2014).

Key partners	Key activities	Value proposition	Customer relationships	Customer segments
Suppliers	Production i3 and i8	Sustainability in the automobile sector; Range Extender;	Specialized dealer called BMWi Agent'; customers can expect green cars with the quality of BMW	Urbanities living in metropolises;
Dealers	Sale/marketing	Battery in price included;	Channels	"green is the new premium";
Energy companies	Key resources	Fast charging time;		technology-affine people;
Carbon fiber plant	Supplier	Use of carbon fiber/ own production	BMWi Agent'; Social media;	opinion leader;
	Dealer	BMW Add-on mobility service;		no classical BMW portfolio customers
Cost structure		Revenue streams		
R&D; Carbon fibre plant in Moses Lake, Washington;		Sales i3 and i8;		
Plant in Leipzig; Overhead costs;		extra services like 'DriveNow';		
		Marketing;		

Figure 1: Business model canvas BMWi

4.2.2 Streetscooter Research GmbH

Streetscooter Research GmbH is a start-up and produces e-cars that are developed for short ranges called "Short Distance Vehicles" (Streetscooter, 2014). The target of the two founders, who are professors of the RWTH Aachen University, is to offer affordable mobility. To implement their idea they analyzed every construction part of e-cars and matched it to "Lead Engineering Groups" to build it as economic as possible.

In 2010 more than 25 companies and 16 departments of RWTH Aachen University started to work together to develop a complete electric vehicle portfolio. Today their industrial consortium consists of with over 80 companies. At the moment they have two models: Compact and Work. Compact is already launched on the market and Work will be introduced to the market in 2015. At the moment Streetscooter has a production capacity of 3000 cars per year and plans 5000 cars per year in the next years.

Compact	<ul style="list-style-type: none"> • Full electric car • Today only a prototype • Planned market launch in 2015 • Passenger car
Work	<ul style="list-style-type: none"> • Full electric car • Transportation car • Individual manufacturing for each fleet customer

Table 6.: E-car models Streetscooter Research GmbH

Key Partners

The key partners of Streetscooter Research GmbH are medium-sized suppliers and firms mostly situated in the area of Aachen. They have access to a large industrial consortium (Industrieanzeiger, 2011).

Key Activities

The key activities are next to manufacturing e-cars and researching for new models, the sale to key accounts like Deutsche Post AG and municipal Aachen. In 2015 Streetscooter will start to sell their city car model Compact in free sale to the public (Streetscooter, 2014).

Key resources

The key resources are the already mentioned medium-sized suppliers and the research and development of the RWTH Aachen University (Industrieanzeiger, 2011).

Cost structure

The cost structure of Streetscooter is composed of their R&D in cooperation with the RWTH Aachen University, normal overheads like wages, buildings and exhibitions. Another cost factor is the production plant in Aachen, Germany (Aachener Zeitung, 2014).

Value Proposition

The unique value proposition is that Streetscooter offers sustainable low-cost e-cars that are affordable for everyone. Their target is to offer in 2015 a model called Compact for 5000 € plus a monthly fixed rate of 150 to 200 € for the battery, car workshop services and power (Handelsblatt, 2011). So the firm follows the battery-leasing model.

Customer Relationships

Since Streetscooter does not sell in free sale to the customer yet, their customer relationship management takes place on exhibitions and in meetings to fleet customers like Deutsche Post and the municipal Aachen. But of course they also follow a social media strategy via Facebook, Twitter and YouTube (Streetscooter, 2014). They also inform via local press and automobile journals.

Channels

Their main channel is direct contact to their customers. One can get information about new developments also via a blog and social media channels (Streetscooter, 2014). There is also a contact form available.

Customer Segments

At the moments, the customer segment consists out of firms and municipalities, also called fleet customers, due to their high purchase quantity (Flotte, 2011). They can buy the transportation car called "Work". For 2015 Streetscooter plans to introduce their passenger car "Compact" to the market. Then their customer segment extends to urbanities who would like to be sustainable and mobile on a low-cost base

Key partners	Key activities	Value proposition	Customer relationships	Customer segments
Medium-sized suppliers; Industrial consortium;	Sale to key accounts like Deutsche Post and municipal Aachen	Low cost structure/ affordable e-cars; Sustainable mobility for everyone; Leasing of battery;	Social media; Direct contact; Exhibitions;	Urbanities living in metropolises; Firms/municipalities; Fleet customers;
	Key resources		Channels	
	Medium-sized suppliers; R&D from the RWTH Aachen University;		Social media; Blog; Direct contact;	
Cost structure			Revenue streams	
R&D; Overhead costs; Plant;			Sale to fleet customers; in 2015: end-consumers;	

Figure2: Business model canvas Streetscooter Research GmbH

Revenue Streams

The revenue streams of Streetscooter are not well developed and exploited yet because they only offer one car model at the moment. Their current profits are turned from their sales to Deutsche Post AG and to municipal Aachen, Germany (Aachener Zeitung, 2014).

4.2.3 Comparison

Looking at the two business models of BMWi and Streetscooter one can see that the two firms have completely different *value propositions*- the heart of each business model. The target of BMWi is to ensure sustainable mobility in the premium sector and to be a “pacesetter for future mobility” (BMW Group, 2014, p.16). Therefore the price of the end product is less determining for BMWi. The customer does not have to expect less quality or ride. This is further evidenced through their partnership with a carbon-fiber plant in Moses Lake, USA and the resulting use of carbon-fiber-reinforced plastics (CFRP) for the body of the e-cars. BMWi has the financial backup of the BMW Group and can invest in larger projects- financial possibilities that Streetscooter as a start-up does not have.

Similar to the strategy of BMW they also want to be and to stay with the new sub-brand “the world’s leading provider of premium products and premium service for individual mobility” (BMW Group, 2013). Thus, one can say that the strategic objectives of BMWi can be deduced from the corporate strategy called “Number One”. BMWi also would like to be the number one e-car manufacturer worldwide. They have no inferior aspiration.

Streetscooter has an entirely different approach. Their target is to provide cost-effective sustainable mobility for everyone. The car models have a basic design and their objective is to provide mobility with no frills. The minds behind Streetscooter would like to dissuade society from thinking that e-mobility is only for a wealthy target group. They want to act on a different price level as BMWi to the increasing urbanization and growing metropolis.

For the *key partners* Streetscooter has a reasonable solution their suppliers and partners are bonded in an industrial consortium meaning that autonomous companied jointed together to work for the project Streetscooter. Thereto the two founders used their contacts to establish it just the same as their R&D capabilities from the RWTH Aachen University.

BMWi has the advantage that the brand can use the suppliers from the BMW Group but also works with new suppliers/ new suppliers for new components like Samsung for the battery

(Welt, 2013). Additionally, as already mentioned, they have the possibilities to invest in suppliers/partners like the carbon fiber plant to use the material as a competitive advantage.

Key activities and *key resources* are comparable. Both firms produce and sell their cars and use suppliers as their key resources. The same also applies for the *cost structure*. Except the fact, that the cost dimension of BMWi is much larger because of the higher production level and the more developed brand. Streetscooter has no regulated production flow.

The *customer relationships* of BMWi are much more developed (BMW i Agent). Streetscooter, due to the start-up status, is in the setup mode. They must use exhibitions and other channels to reach customers attention.

As customary, both manufacturers use social media as a *channel* to their customers. BMWi has also local BMWi agents which is particularly advantageous compared to the only local and direct communication possibility with Streetscooter.

The *customer segment* is despite of one essential point quite similar. Both companies address their e-cars to urbanities that would like to be sustainably mobile. The essential point is that their targets are two different asset groups respectively for Streetscooter people that does not want to invest too much money in an e-car or do not emphasize premium mobility. Additionally Streetscooter also focuses in the beginning of their sales on higher purchase quantities through fleet customers.

The *revenue streams* of Streetscooter are currently not completely enlarged. Therefore a clear statement cannot be made about it whereas BMWi reckons to earn money with every sold i3 (Welt, 2013). Furthermore the car sharing service “DriveNow” and applications are revenues of BMWi.

5. MACRO ENVIRONMENTAL FORCES E-CAR INDUSTRY

In the last sections it is explained what a business model is, what its dynamics are, the importance of business model innovation and how to analyze a business model with the help of a business model framework. Furthermore the dynamics of the e-car industry are recorded via a PESTEL+DR analysis and popular business models and possibilities are given. The case study of a conventional e-car manufacturer and a new entrants contains the creation of a business model canvas for each firm and a comparison. Now a point is reached where one has to think about what firms can learn from it. Coming back to the research question: *How do new entrants of the e-car industry*

create value compared to conventional automobile manufacturers? It can be seen that there are several different possibilities to enter and survive in the e-car industry.

The target is to find out how specific BMWi and Streetscooter with different backgrounds create value and also what other firms can learn and how they can draw a lesson from it.

The automobile industry as the major industry of the e-car industry is driven by several arising dynamics that are the basis for entering the e-car market.

The players of the industry need to be aware of the key factors influencing the e-car industry. These are factors that can lead automobile manufacturers and completely new firms in this sector toward e-mobility.

- Urbanization: increasing metropolis
- Regulations
- Environment: climate change and resulting consequences
- Economics: Increasing prices of fossil fuels and limited resources
- Culture: mobility as a must, increasing environmental awareness, desire for sustainable mobility, changing values

In the following a macro environment analysis of the two companies is conducted and visualized in Figure 3.

5.1 BMWi

Urbanization

The increasing urbanization forced BMW to create a car that fits to the needs of customer living in metropolises. Also the car sharing service 'Drive now' is adapted for those requirements. Therefore the macro-environmental force urbanization is strong.

Regulations

More and more regulations in the field of environmental sustainability lead BMW towards the sustainability concept of environmental friendly production and mobility and the resulting establishment of the BMWi sub brand. If regulations are getting stricter in different countries BMW secures itself with a backup strategy. This macro-environmental force is thus important for the mother company and also for BMWi.

Environment

Due to climate change and resources that are limited, customers' environmental awareness increases. The former product spectrum of BMW offered no emission free driving, thus BMWi addressed no customers that emphasizes pollution control. Hence environment is also a strong force.

Economics

Even if resources are limited and prices of fossil fuels increase is BMW one of the most successful automobile manufacturers in the world. They still have high sales figures. But like already mentioned, BMW also wants to be successful in the e-car market. Thus the economic factor is of course important for BMW but not that crucial.

Culture

The desire for sustainable mobility and the changing values of customers forced BMW to offer alternative mobility possibilities like e-cars and car sharing. The whole new BMWi concept shows that culture is a strong dynamic.

5.2 Streetscooter

Urbanization

The whole firm concept of Streetscooter is oriented towards sustainable, alternative, low-cost mobility for urbanities. Hence the factor urbanization is for both companies an important one.

Regulations

Thus Streetscooter produced no cars with combustion engines, regulations towards environmental friendliness are not vital. In the future when more e-cars on the streets, this could change.

Environment

The two core points of Streetscooter are sustainability and a low-cost structure. Therefore environment is a crucial factor for Streetscooter.

Economics

Streetscooter tries to circumvent economic weaknesses from the beginning. Nevertheless are economic factors also crucial for Streetscooter if they change for instance.

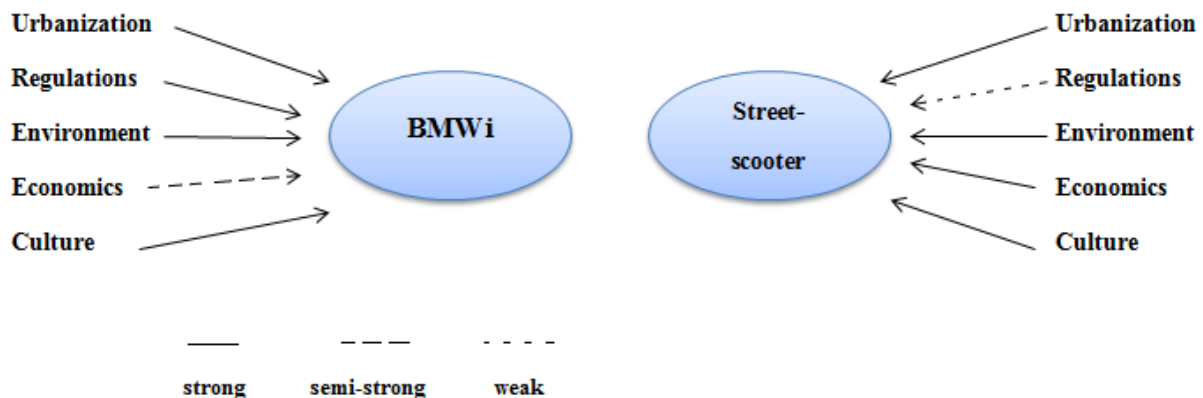


Figure 3. Macro-environmental forces of BMWi and Streetscooter

Culture

As with BMWi the changing mobility culture is a strong factor for Streetscooter. The firm offers the answer to sustainable, inexpensive urban mobility.

6. DISCUSSION AND CONCLUSION

The goal of this paper was to identify business model dynamics of the e-car industry in general with a focus on value creation of conventional automobile manufacturers and new entrants within this industry. From the two cases it can be learnt that the e-car industry offers several possibilities for business models and that new entrants can, depending on their value proposition, find a niche in the heretofore not well developed industry. Like the case of Streetscooter shows, having a different mobility vision can be the starting point of success. Even if conventional automobile manufacturers like BMWi have a big advantage through established dealer networks, customers and brand image. Looking at the strategy of BMW, one can see that it fits to the business model of BMWi. Their two main goals are “to be profitable and to enhance long-term value in times of change” (BMW Group, 2014). With the help of the sub brand BMWi they can advance towards their goals. Streetscooter’s strategy is not clarified like the one of BMWi but one can assume that it can be formulated in the following way: to supply sustainable and cost-efficient solutions for inner-city traffic. It describes their unique value proposition.

Looking ahead one can expect an increasing potential of the whole industry. If the charging infrastructure will be better developed and distributed, the supply of power is better ensured. Also governments need to support the e-car industry. For instance, in the Netherlands the government provides a provision with basic supplies of charging points in the whole country (Electric vehicles initiative, 2013). That gives customers greater security and they therefore buy more likely an e-car.

On the 12th of June, 2014 Tesla Motors, Inc. declared not to “initiate patent lawsuits against anyone who, in good faith, wants to use our technology” (Tesla Motors, 2014). The American company that produces premium electric cars and electric vehicle powertrain components is a mastermind in the e-car industry (Mangram, 2012). Depending on the validity of this blog entry of Elon Musk (CEO) and how Tesla Motors will handle their patents, it can be a big chance for conventional automobile manufacturers and for new entrants to have a look at the technology know-how of Tesla. It could be a technological start or a start for following another technological idea.

The current case of Tesla Motors shows that at present time e-car pioneers have the problem that they do not have enough competitors. The open-sourcing strategy should help other manufacturers to develop own e-cars faster so that over time e-cars are not exotic on the streets anymore. Through rivalry with competitors the industry can attract more attention and thus more customers. Only if e-cars are becoming mainstream, building up infrastructures will be worthwhile. More competitions signifies more players on an equal level and thus partnerships can be build up and costs for research and development can be divided. Up to now it is common in the automobile industry to delve in own research centers to entail a competitive advantage. Afterwards the technologies are sold to competitors (Manager Magazin, 2014).

But besides that, if the e-car industry solves the two main problems of too high purchasing price and too short driving range it can make an interesting turn and the industry will be fast-paced.

7. LIMITATIONS AND FURTHER RESEARCH

Several limitations to this research deserve attention and provide guidance for future research. First of all, in this paper the case study is limited to two German e-car manufacturers.

For further research it is advisable to enlarge the number of cases and to consider also non-German companies. Additionally, this paper is mainly based on a literature review. Even if newspaper articles, specialized magazines and websites are included, direct case studies in close collaboration with e-car manufacturers will give a deeper insight into their business model structure.

Since, the industry is at an early stage, doing an enlarged analysis at a later time will bring new and more exact findings.

The theoretical relevance of this paper is the elaborated macro-environment model showing the strength of factors influencing BMWi and Streetscooter.

Furthermore, people involved in the automobile industry and especially in the e-car industry can experience examples of business models within the e-car industry and learn how a start-up can penetrate a market and how established player in the automobile industry renew parts of their business model (in this case: starting a new sub brand) to be up-dated within the industry. They can see it as practical information.

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