Analysis of Business Models for Electric Vehicles' Usage

Bachelorarbeit

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1. Introduction

"*The production of electric vehicles is no option, it's a must.*"
(Norbert Reithöfer, CEO BMW Group)[1]

The quote of Norbert Reithöfer sums the situation of a whole branch up: the automotive industry experiences a paradigm shift. Driven by climate changes, global resources shortages, CO2 and everyone seems to be electrified. Most original equipment manufacturers (OEM) are investing significantly in developing electric technology and government across the world publishing plans to subsidize electric mobility. However, not only the vehicle itself gets new defined, but also the strategy of OEM's. Obstacles such as range anxiety or long charging times need to be addressed.[2] New business models are needed to successfully launch electric vehicles (EV) on the automotive market. Besides the vehicle, factors like charging infrastructure or integration of the vehicles into the energy systems play an important role for the usage of EV's. The challenge for OEM's is to offer a holistic approach for the EV's usage to add maximum value to the customers.
This thesis focuses on the analysis of current business models for EV' usage. For that reason, this paper investigates strategies of four selected OEM's. The aim is to find components inside business models, which are critical for EVs' usage. The overall research question is:

RQ: ***Which components should be in business model for the electric vehicles' usage?***

To answer this question, the thesis is structured into 5 chapters. After a short introduction, the reader is provided with background information and definitions about business models in chapter 2. Afterwards, the research methodology is described and used for the analysis of four business models. Chapter four includes a discussion about the result and shows implications for research and practice. Limitations of this thesis are presented as well in chapter four. Finally, a conclusion and outlook is given in chapter five (Figure 1).

[1] cf. (Wirtschaftswoche, 2012)
[2] cf. (BloombergBusiness, 2013)

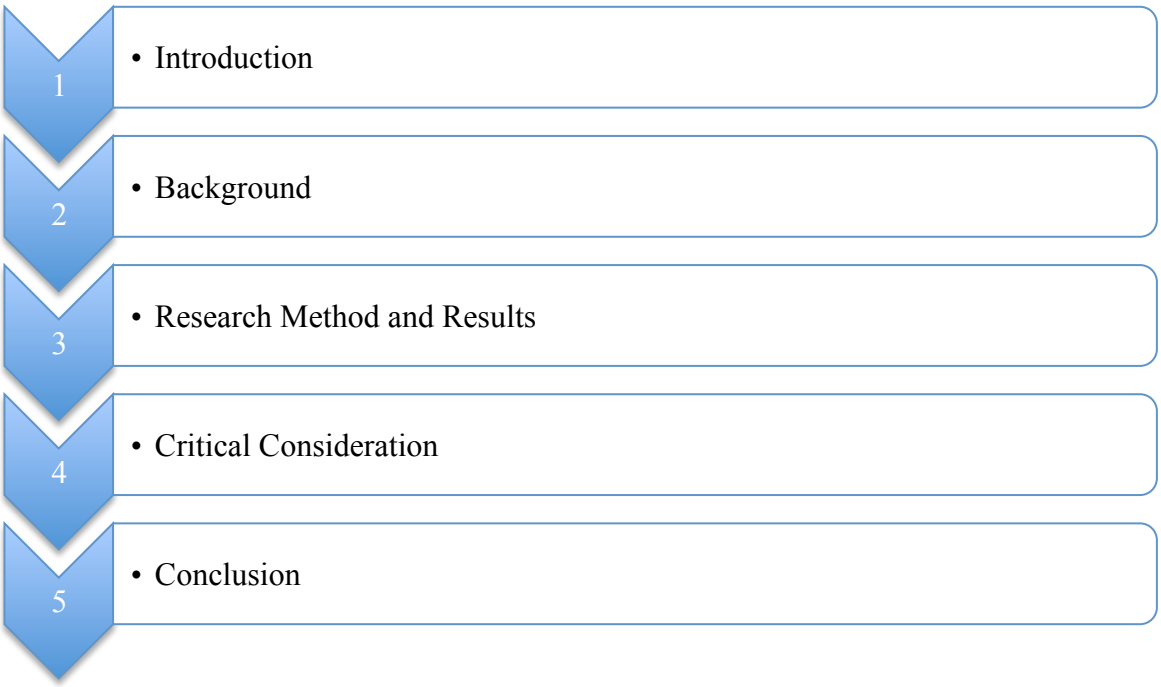

Figure 1: Structur of the work[3]

In this paper, the focus is mainly on pure electric vehicle (EV), so-called battery electric vehicle (BEV). However, the overall term for electric vehicles is plug-in electric vehicles (PEV). PEV is a superset of EV's that include BEV's but also plug-in hybrid vehicles (PHEV). BEV's utilize electricity from the electric grid to provide traction and include large battery pack to store the electricity. Compared to PHEV's, which have gasoline or diesel internal combustion engines (ICE) that extend the range of vehicles, BEV's utilize larger batteries to run exclusively on electricity. In this paper BEV are called EV.

2. Background

2.1 Business Models

A quick lookup in Cambridge Dictionaries Online returns the following definition for business model: "a description of the different parts of a business or organization showing

[3] own creation

how they will work together successfully to make money".[4] Twelve years ago in 2003, there was no combined definition for business model but there were two separate terms in Cambridge Dictionaries Online: "business: the activity of buying and selling goods and services, or a particular company that does this, or work you do to earn money" and "model: a representation of something, either as a physical object which is usually smaller than the real object, or as a simple description of the object which might be used in calculations".[5] The term business model is associated with the New Economy during 1998 until 2001. First usage of the term business model can already be found back in the 1950's but the authors all defined it differently and no common understanding or research existed.[6] In the 1970's, the concept of the business model was used in combination with the business information systems' research and thus mostly used in journals such as Journal of Systems Management or Small Business Computer Magazine.[7] Therefore, the business model origin derives from computerized modeling and creation.[8] During the 1990's, business models were used more in the context of strategy and used in conjunction with terms such as Revenue Model or Relationship Management.[9] With the establishment of the Internet, the concept of the business model became a focus of interest for companies. For firms of the New Economy and their investors, the business model often became the central aspect of a company. Even though the initial definitions of business models came into being at the end of the 1990s, the terms business model, business idea, business concept, revenue model, or economic model were generally used equivalent. The dominant understanding of the business model as a modeling tool retreated more and more into the background, and the strategic components of the term became increasingly important.

After the crash of the New Economy, several authors tried to formulate a general definition for the term business model. Due to the complexity of the business model concept, there was no general definition until today. Wirtz distinguishes business models among three basic approaches: information technology, strategy, and organizational theory.[10]

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[4] (Cambridge University Press)
[5] cf. (Osterwalder, 2004), p. 14
[6] cf. (Wirtz, 2011), p.7
[7] cf. (Zollenkop, 2006), p. 27
[8] cf. (Deelmann, 2007), p. 40
[9] cf. (Ghaziani & Ventresca, 2005), p. 543
[10] cf. (Wirtz, 2011), pp.7-18

An example for the information technology approach is the definition by Afuah/Tucci: "*A business model is a framework for making money. It is the set of activities, which a firm performs, how it performs them, and when it performs them so as to offer its customers benefits they want to earn a profit."*

With a high level of abstraction, Afuah/Tucci understand business models as a representation and as an abstract, corporate frame of reference. They emphasize the importance of business models within management-concepts through the representation of the combination of business models and competitive advantages. They state that a "[…] *business model is about the value that a firm offers its customers, the segment of customers it targets to offer the value to, the scope of products/services it offers to which segment of customers, the profit site it chooses, its sources of revenue, the prices it puts on the value offered its customers, the activities it must perform in offering that value, the capabilities these activities rest on, what must do to sustain any advantages it has, and how well it can implement these elements of the business model."*[11]

Depending on the organization-theoretical approach, the business model is seen as an abstract representation of the company's structure or architecture. Erikson/Penker determined the following roles characterized by organization-theoretical theory: "[…] *to better understand the key mechanics of an existing business,* […] *to act as basis for improving the current business structure and operations,* […] *to show the structure of an innovated business,* […] *to experiment with a new business concept or to copy or study a concept used by competitive company, and* […] *to identify outsourcing opportunities."*[12]

Due to the functional change of the business model to a management tool within the organizational business planning, strategy, it became more important as a basic theoretical approach.

Afuah revised his 2003 definition and focused more on the strategy within a business model concept: *"A business model is the set of which activities a firm performs, how it performs them, and when it performs them as it uses its resources to perform activities, given its industry, to create superior customer value (low cost or differentiated products) and put itself in a position to appropriate the value."*[13] Compared to his old definition, the latest one focuses more on the value chain logistic instead of competitive advantages. Within that

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[11] (Afuah & Tucci, 2003), p. 4
[12] (Eriksson & Penker, 2000), p.3
[13] (Afuah, 2004), p. 9

context, the value of customers for the success of a business is represented. Afuah identifies four core components: competition, resources, positioning, and cost. They all affect the probability and success of a business.[14]

When looking at the classic business model for Internal combustion engine vehicles (ICE), the car manufacturer promises to deliver the customer a high quality vehicle with the individual features the customer wanted. A value proposition defines the promised value of the product offered to the client beforehand. The value chain configuration describes the potential possibilities to design the product offered with regard to the different shareholders involved. The car manufacturer produces the vehicle using the supplier parts and combustion engine and delivers the product to the final customer who then uses it over a certain period of time. The customer chooses who carries out repairs or maintenance; this is not usually explicitly stipulated. Other stakeholders operate the infrastructure in the form of filling stations so that mobility can be guaranteed. The revenue model represents type of payment the customer makes to the supplying shareholder as part of the offer. The revenue model has been designed so far along the lines that the customer pays the car producer for the vehicle in the form of a sales price or a leasing rate. Repairs or maintenance work on the vehicle and fuelling are charged separately to the customer by the respective services provider.[15]
The classic business model described here, large parts of which are used for ICE vehicles, cannot be transferred to mobility concepts based on electric drives because of technological restrictions. If innovative mobility concepts are considered, the integration of mobile energy storage into the power system or the build-up of charging infrastructure, then it is inevitable that there will be shifts in the value chain, the revenue model, and the value proposition. Classic business models are more product-oriented, which means the focus is on the core product and services are seen as supportive instruments, which helps to sell the product and strengthen customer loyalty.

For instance, a car manufacturer focuses on the car but also offers financing, insurance, and repair services. That approach cannot be transferred to electric mobility concepts because of technological restrictions. If innovative mobility concepts like EV's are considered, the integration of mobile energy storage into the power system or the build-up of charging

[14] cf. (Wirtz, 2011), pp. 60-61
[15] cf. (Kley, Lerch, & Dallinger, 2011), p. 3394

infrastructure, then it is inevitable that there will be shifts in the value chain, the revenue model, and the value proposition. Therefore, business models for EV's must be product-oriented but also service-oriented to provide the customer not only with the car but also with services like mobility guarantee or transport service.[16]

2.2 Business Models for Electric Vehicles

Tukker derives three different main characteristics of business models that are positioned along a continuum between offering purely a product (tangible) and purely a service (intangible) (see Figure 2) and can be transferred to business models for mobility concepts.[17] The first characteristic describes the product-oriented business model. Here, the manufacturer offers additional services to the core product. These classical business models do not contain any performance guarantees once the customer has purchased the product. The focus of the manufacturer is therefore still on the core product and services are seen only as supportive instruments which help to sell the product and strengthen customer loyalty. One characteristic of this category is that additional services do not begin during the vehicle's service period. Typical services offered in product-oriented business models are for instance, financing, insurance as well as inspection and repair services. In contrast to category one, categories two and three, know as ''service-oriented business models'' are applied in the vehicle's service period and are determined as new or innovative business models because of their novelty and limited distribution. Service-oriented business models can be further split up into the two categories of ''use-oriented'' and ''result-oriented''. The core product is no longer the focus but rather a contractually guaranteed performance even after delivery, which is provided with the help of the core product. If this concept is transferred to mobility offers, for use-oriented business models, this means that a certain value is promised with the purchase of a vehicle. For EV's this covers mobility guarantees, car-sharing concepts, or fleet concepts, for example, which guarantee the supply of vehicles or of mobility services without the customer having to actually own a car. For result-oriented business models, in contrast, this means that the final customer can always get from point A to point B with the help of the mobility provi-

[16] cf. (Kley, Lerch, & Dallinger, 2011), p. 3394
[17] cf. (Kley, Lerch, & Dallinger, 2011), p. 3394

perspective. The products of the analyzed OEM's are offered in different markets, however the business model approaches are reliable basics for potential entrants in the EV ecosystem.

5 Conclusion and Outlook

In summary, this paper has explored business models for electric vehicles' usage in the current market. In order to determine components inside business models a morphological analysis was described and used for the comparison of business models of four different car manufacturers: Renault, Tesla, BMW, and Volkswagen. The results have shown that the manufacturers do not provide holistic approaches yet but rather focus on vehicle and battery characteristics as well as on charging infrastructure. Moreover, a lack of alternatives for the integration of the vehicle into the energy system could be analyzed.
Through the analysis, the author has provided recommendations for practice and research. Further strategies in business models should focus on the integration of the vehicle into the energy systems and the second-life usage of batteries should be incorporated in vehicle and battery characteristics.
As a result, the paper has offered practical contribution concerning the description of current business models to provide reliable basics for prospective entrants in the electric mobility.

Nevertheless, the development and improvement of existing business models for electric vehicles' usage will highly depend on the market demand. Currently, sales of electric vehicle are lower than expected and manufacturers hesitate to invest in research and development. Another crucial factor will be the oil price. If it remains low as in the beginning of 2015, it will boost sales of combustion engines vehicles and weaken sales of electric vehicles.
Looking ahead, one can expect an increasing potential of the whole electric vehicle industry. However, a holistic business model is not enough to attract customers. Once electric vehicles will cost the same as comparable combustion engine vehicle, potential customers will be more willed to opt for an electric vehicle. The increasing attractiveness will go hand in hand with a decreasing purchase price. A competitive initial price can only be realized if the production cost, especially of the battery, decrease. Currently, the produced volume is too low to use economies of scale within production. Therefore, cooperation among car manufacturers is needed to decrease the cost of production and increase the attractiveness of electric

vehicles. Tesla has already done the first step with the construction of their battery factory. Other manufacturers have to follow to be competitive on the long term.