

# Strategic Perspectives of Electric Mobility—Steps Towards the Slope of Enlightenment

Richard Colmorn and Michael Hülsmann

**Abstract** In the idea contest for technological solutions, cost-efficient processes and customer-oriented mobility services for the usage of electric mobility the phase of a realistic estimation concerning the threats and opportunities can be identified with the help of the hype cycle. Therefore, the research question arises about the steps which lead towards the slope of enlightenment. In this regard, the paper intends to discuss the questions in the following categories for getting an extensive overview: How did the market structures change? How did the business models change? How will the service strategies change? As a result, the paper contributes to the research about future concepts of mobility by providing an overview of different strategic perspectives.

**Keywords** Electric mobility • Market structures • Business models

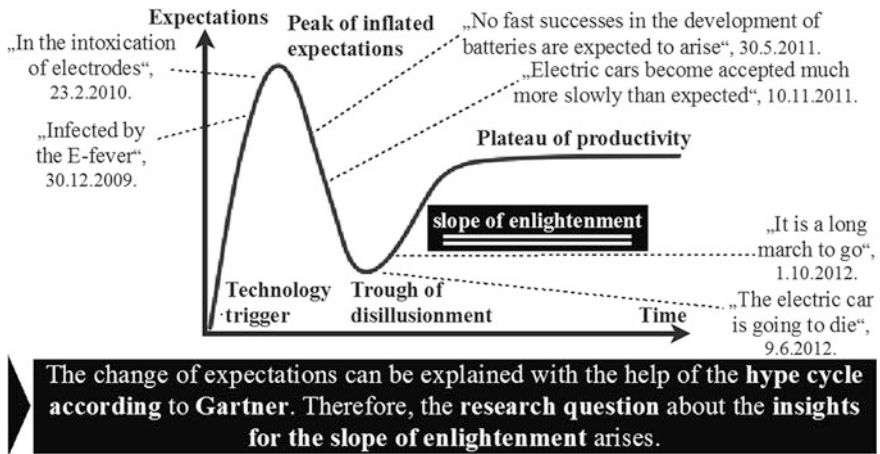
## 1 The Slope of Enlightenment

In the headings of German online newspapers a change in the expectations about the success of electric mobility can be observed in the course of time. For example, optimistic headlines in 2009 and 2010 such as “Infected by the electric fever” (Pander 2009) and “In the intoxication of electrodes” (Rother 2010) can be distinguished from sceptical ones in 2011 such as “No fast successes in the development of batteries are expected to arise” (Handelsblatt Online 2011) and “Electric cars become accepted more slowly than expected” (Eckl-Dorna 2011) and pessimistic ones, e.g. “The electric car is going to die” (Höltmann 2012) and “It is a long march” (Süddeutsche 2012). This development of expectations or opinions about the success

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**Fig. 1** Illustration of the change of expectations over time with the help of the hype cycle according to Gartner (cf. N.N. 2014)

of electric mobility can be approached in a first step with the help of the hype cycle according to Gartner (cf. N.N. 2014). The hype cycle according to Gartner is a graphical tool from the advisory firm Gartner Inc. for illustrating the typical phase of the expectations and acceptances of new technologies. According to that, a technology trigger such as the development of electric mobility appears, when no usable concepts are available at the market. A peak of inflated expectations follows because the media jumps on the topic with stories about the potential outcomes. Due to the fact that the efforts in research and development and first applications fail to deliver, negative headlines come more to the front. This is followed by the phase of the slope of enlightenment in which the opportunities and threats as well as the strengths and weaknesses of the new technology have been understood so that a more realistic estimation becomes possible towards the plateau of productivity in which a market penetration due to the fulfilment of the customer needs arises. By assigning the above-mentioned exemplary headlines to the typical curve of a hype cycle, the development of the change of opinions and expectations about electric mobility can be explained. Therefore, the **research question** can be derived about the insights for the slope of enlightenment so that the preconditions for the market penetration can be acknowledged (Fig. 1).

The research question refers to the scientific discipline of Strategic Management because it deals with the question—inter alia—about how to be successful on the market in the long run (Reisinger et al. 2013). For doing so, it is important to identify the opportunities and threats in the business environment that is becoming more and more complex and dynamic. For this, the paper shall help to get the “big picture” when talking about electric mobility so that the following considerations orientate themselves to the typical proceeding of a strategic analysis. For example, Reisinger et al. (2013) distinguish between an internal (comprising the structure,

culture and strategies) and an external strategic triangular (comprising the positioning and the distribution and strategies) so that they are connected through the sets of strategies for doing a strategic analysis. By considering the constraints of this paper, Sect. 2 will consider the question about the changes in the market structures for the external triangular because this allows to identify findings in the company's environment, while Sect. 3 will focus on changes of the business models for the internal triangular because of their focus on the configurations of the value creation of a company. Section 4 will consider the question about changes in the service strategies for combining the external and internal perspective before Sect. 5 can conclude with a summary towards the main findings for the slope of enlightenment.

## 2 How Did the Market Structures Change?

Starting point for the investigation of the strategic perspectives was the question about the relevant external influences for the development of electric mobility because insights about these influential factors allow to derive conclusions of so-called enabling or disabling interrelations from the environment. For this purpose, a database that had been started in a previous project was continued. In this context, online-articles were identified, systematically saved and analysed with regard to the keyword of "Elektromobilität" (German for electric mobility). The systematic approach for saving the articles from Spiegel-Online (including Manager Magazin), Wirtschaftswoche, Süddeutsche and the Zeit was the result of the date in the type of "yyyy-mm-tt-" plus the automatically suggested name for the pdf by saving the article. For the analysis of these articles, different categories were used. The first category examined, if a positive, neutral or negative impression could be identified, of course, from a subjective point of view. For indicating these trends, the first category was indicated through "+1", "0" or "-1". Thus, it became possible to graphically and statistically investigate the opinions about the electric mobility over time because the dates could be transformed to a time scale, while the values could be scaled in a mathematically cumulative way. The following four categories corresponded to political-legal, economic, socio-cultural and technological factors of a so-called PEST-analysis. In general, it is aim of a PEST-analysis to identify influential factors in the four above-mentioned categories that can directly or indirectly affect the organisation so the potentials of success are supported or weakened (cf. e.g. Kerth et al. 2009). With the help of this database and the statistical analysis of the cumulative values in the "trend-category", the hypothesis about a hype cycle of the expectation about electric mobility could be further supported. Doing so, the advantages and disadvantages of this technology are more realistically integrated. Additionally, the identified influential factors could also be clustered with regard to their statement of being an opportunity or a threat for the development of Electric Mobility. While a more detailed publication of this extensive analysis is in preparation, at this stage the general conclusion can be drawn that opportunities and threats can be identified in equal measure. Therefore, a

final conclusion cannot be drawn so that the environment becomes more complex and dynamic but the dominating trends are hard to determine.

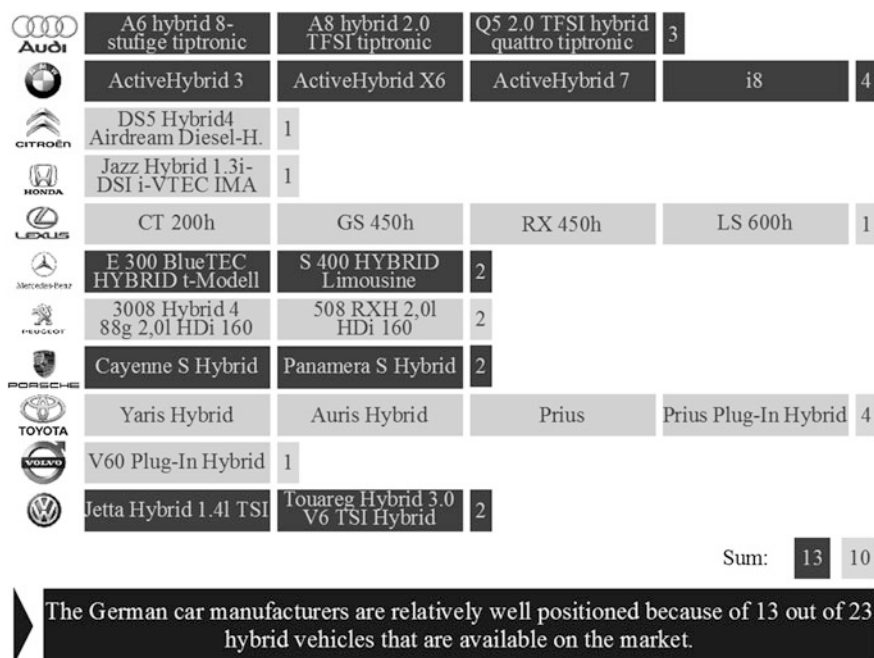
As another important aspect for figuring out the changes in the market structures, the question—inter alia—about the competing forces can be addressed. The reason for this is that changes in the industry-wide competition are generally connected with changes in the market shares and companies successes (Kerth et al. 2009). Porter's Five Forces are a well-established approach for analysing the external competing situation of an industry (Porter and Brandt 2009). It is based on the idea that the market attractiveness is the result of the intensity of the competitive rivalry, i.e. the barriers to market entry. This intensity of competitive rivalry is the result of the bargaining power of suppliers and customers as well as the threats of potential customers and of substitute products.

The **threat of substitute products** expresses the idea that the customer needs or requirements can generally be fulfilled by another product or service, too, so that the product or service is substituted. In the context of electric mobility a threat of substitution exists because different driving technologies exist respectively are being developed such as traditional cars on the basis of fossil fuels, fuel cell vehicles or hybrid vehicles such as Plug-In-Hybrids or Range Extenders (cf. Bundesregierung 2009). Therefore, an increasing competition can be assumed but considering the amount of e.g. hybrid vehicles that are currently available on the German market it can be seen that the German car manufacturers as one major player for the development of electric mobility are well positioned (Fig. 2).

These considerations are quite similar to the ones about the **threat of new competitors** dealing with the market entry of new companies. In this regard it can be observed that most of the car manufacturers extend their product portfolio by developing electric vehicles. Hence, only an increase of the competition is expected to arise in the short run because new companies such as Stromos E Cars, Think or Move About have already gone bankrupt so that only Tesla Motors and BYD promise to have a successful market position in the long run (Table 1).

With regard to the bargaining powers it can be argued that the **bargaining power of customers** will further increase because the customer preferences and their expectations will further increase such as e.g. with respect to the greenness or IT-based functionalities of the car. At the same time, the willingness to pay decreases while only certain customer segments concentrate on the brand image. The **bargaining power of the suppliers** has increased, too, because the trend of a shift of the value creation towards the supplier will further continue due to increasing requirements of research and development of high-technology products. In addition to these competencies, the availability of resources plays an essential part. For example, for the production of e-motors the materials of iron, neodymium, chopper and noble earths are essential that are only produced in certain—often politically instable—regions. Besides a price increase of these raw materials due to an increase of demand a stronger dependence on few suppliers arises. Finally, the removal of existing and the adding of new components will support this trend.

In consequence, it can be summarized that the competing forces within the industry have increased and it is expected that they will continue to increase in the



**Fig. 2** Illustration of the threat of potential substitutes through e.g. hybrid vehicles

**Table 1** Battery electric vehicles available on the German market (as per April 2014)

Brand and model	List price (€)	Range (km)
BMW i3	34.950	171
Chevrolet Volt	42.950	95
Citroen C-Zero	29.393	119
Ford Focus Electric	39.990	149
German E-Cars Stromos	25.950	101
Mercedes-Benz SLS	416.500	250
Mia Electric	25.504	64
Mitsubishi iMiEV	23.790	119
Nissan Leaf	29.690	160
Peugeot iOn	23.393	119
Renault ZOE	21.700	151
Smart Fortwo	23.680	132
Tesla Model S	76.740	500
Volkswagen e-Golf	34.900	147
Volkswagen eUp	26.900	160
15 models including six German ones	Ø 32.824 <sup>a</sup>	Ø 156 <sup>a</sup>

<sup>a</sup>Without Mercedes-Benz because of its high deviation

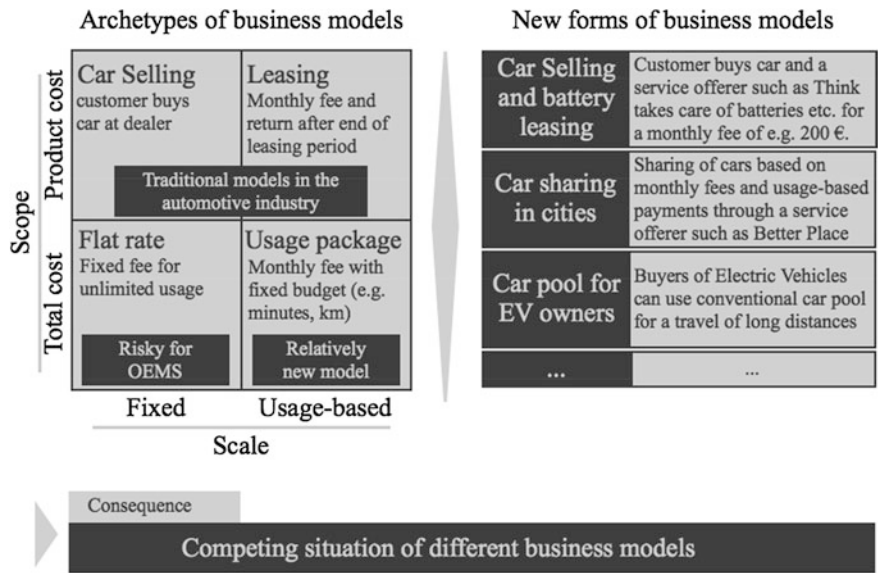
mid- and long-term (cf. Colmorn and Hülsmann 2013). Nevertheless, it could also be shown that the competitiveness of the German automotive industry is quite promising, which also has positive implications for the development of electric mobility.

### 3 What Are the Changes of the Business Models?

In order to answer the overarching question about the changes of the business models, the terminology of a business model should be clarified first. The terminology of a business model can be assigned to the field of business informatics because it was developed in the time of the New Economy to show how a business functions in an abstract way. In this regard, different definitions can be defined e.g. by highlighting customers, offerings, activities and organisations, resources, supply of factors, production inputs or the scope of management, while for example Wallentowitz et al. (2009, 2010) mention the three core areas of the customer proposition, the architecture of the value creation and the revenue generation models. Nevertheless, it can be assumed that independent of the exact definition a business model generally tries to determine how a company can configure its resources and competencies for addressing the value of the end customer so that the questions about their changes seem important because of internal changes in a company.

In the scientific literature and the daily news, new forms of business models are discussed. Therefore, it becomes possible to categorize business models, considering whether they constitute archetypes of business models or new forms. While traditional forms can generally be distinguished from each other with regard to their scope of costs (total costs vs. product costs) and their scales of usage (fixed vs. usage-dependent), new forms of business models cannot clearly be identified (Fig. 3).

To what extent these business models are competitive for electric mobility has been investigated in Colmorn and Hülsmann (2014). In that paper, a Total Cost of Ownership-approach (cf. e.g. Carr and Ittner 1992) was used for determining the customer value with regard to the Total Costs in dependence on the price development and the yearly driving performance. An empirical database was collected containing information about prices as well as usage-dependent and usage-independent costs e.g. for the Volkswagen Golf VII 1.4 TSI and the eGolf so that the two driving technologies could be compared with each other. As a result, it could be shown that independent of the different price developments for electric energy and fossil fuels it is assumed that battery electric vehicles will not be competitive in the middle term due to the high purchase costs for the battery. Therefore, it can be derived that business models for the IT-based services might be a more promising approach in the context of future mobility concepts because they can be used independently of the driving technologies that will be successful on the market in the long run.



**Fig. 3** Traditional and new forms of business models (from Colmorn 2014 with reference to McKinsey 2010)

4 How Will the Service Strategies Change?

Service strategies help to realize the value proposition for the end-customer so that the diffusion of electric mobility is supported and the risk of market failure can be reduced. Thus, service strategies can be understood as a goal-oriented end-means-combination to be successful on the market by integrating the results of the internal and external perspective. In order to do so, this section intends to investigate the market positioning and the respective observable customer benefit as one option for answering the question about the service strategies.

This approach is based on the assumption that the technology of electric mobility does not focus on the ownership of a special product any longer; instead of this the offering of a mobility service becomes more and more important. In consequence, it seems prudent to specify the potential markets for electric mobility because of this change to a more service-oriented character for mobility. Thus, this problem can be directly traced back to the result of the PEST-analysis because the functionalities for the usage as well as the increased customer requirements were identified as a significant change in the market structures. In combination with the results of the economic as well as technological factors, the following markets and their corresponding market segments can be identified:

- The market for the electric cars is the result of the three segments of the chassis, the electric motor/powertrain and the battery/storage system.

**Table 2** Illustration of the market segments

Market for...	Electric cars	Energy	Car-2-X-communications
Assumption for the content-based criteria for separating the markets	Electric cars fulfil the customer requirements for reliable, secure and clean mean of transport at the payable price-benefit-ratio	Energy fulfils the customer requirements for climate-saving and easy charging of the battery at a payable price-benefit-ratio	Car-2-X-communications fulfil the customer requirements for extended opportunities of IT-based services for increasing the efficiency of mobility at a payable price-benefit-ratio

- The market for energy comprises the segment of electric energy and charging technologies.
- The third market for “car-2-x-communications” is more service-oriented by focussing on the interfaces with other cars, the infrastructure, mobile devices, internet, home/office and enterprises.

Based on potential growth strategies that focus on the product-market-combinations to figure out which products or services should be offered on which market, assumptions for content-based criteria for separating the markets could be derived with the help of the results of the changes in the markets structures as summarized in Table 2.

Despite of the fact that further criteria for separating the markets from each other can be found in the scientific literature of marketing research, a positioning problem can be generally derived because different options exist about how to strategically behave. This points to the theoretical approaches for realising competitive advantages because by considering the strengths of the company and the situation of the competitors a competitive advantage is defined respectively perceived by the end-customer pointing to the concept of the customer value. Thus, it becomes possible to use the analytical approaches of the generic strategies according to Porter and Brandt (2009). These generic strategies constitute that companies generally have two options for addressing the customer value, i.e. the selection of the strategy and the selection of the place of competition. Based on this, four option for the competitive positioning can be derived.

- Cost leader—core market
- Cost leader—niche market
- Differentiation—core market
- Differentiation—niche market

With the help of secondary literature from the discipline of Strategic Management a setting of success factors could be identified for realizing the strategy of cost leadership (e.g. size-dependent cost degressions, learning effects, degree of capacity utilisation, cross-functional interrelations and integrations, cooperation,...) and for the strategy of differentiation (e.g. special product-characteristics, dealer network, potentials for innovation, marketing activities,...)



so that potentials of success for the market positioning can be derived. Doing so, our research discussed the contributions and limitations of the strategies for the positioning on the markets that can only be represented in a compressed form (Table 3).

With the help of these generic competitive strategies according to Porter and Brandt (2009) different models for positioning on the market can be derived. For example, the capability to adapt to special customer requirements and the capability to generally solve problems opens up possibilities for positioning as exemplary illustrated using the example of the changes in the market structures.

**Table 3** Discussion of the types of strategies for the different markets

	Car market	Energy market	Market for Car-2-X communications
Niche versus core market (contributions)	Market culmination in the beginning—later niche is possible	Electric service provider: core market	Core markets for systems requiring new developments
		Offerer of charging stations: core and niche markets are possible	Potential niche strategies for completely new functionalities
Cost leadership (contributions)	Taking advantage of available capacities and resources for lowering the prices	Realization of low costs for the customers	Better production utilisations for established systems
			Adaption to sourcing strategies (cost focus)
Cost leadership (limitations)	<ul style="list-style-type: none"> <li>• Price competition</li> <li>• Neglecting necessary efforts for research and development</li> </ul>	<ul style="list-style-type: none"> <li>• Price competition</li> <li>• In case of external procurement of electric energy—no economies of scope</li> </ul>	<ul style="list-style-type: none"> <li>• Price competition</li> <li>• High investment costs at the beginning</li> </ul>
Differentiation (contributions)	Price competition can be reduced with the help of special service/product characteristics	Offer of additional services becomes possible for electricity companies	For systems that have to be newly developed, differentiations become possible due to new functionalities or value added
Differentiation (limitations)	<ul style="list-style-type: none"> <li>• Basic price is already high so that costs for development can be hardly factored into the price</li> <li>• Exact customer preferences are unknown; fail developments are possible</li> </ul>	Additional services can be easily copied through the competitors	<ul style="list-style-type: none"> <li>• High investments costs at the beginning</li> <li>• Exact customer preferences are unknown; fail developments are possible</li> </ul>

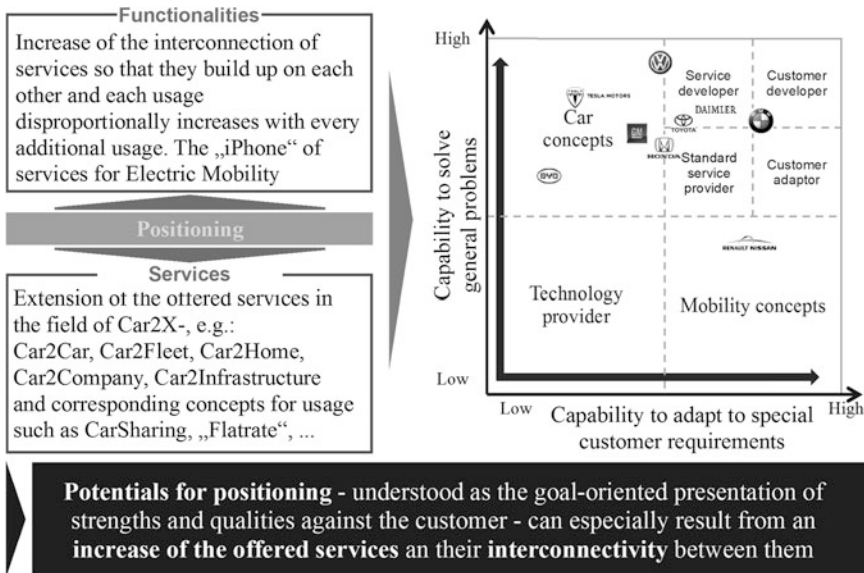


Fig. 4 Illustration of promising models for positioning on the market

Consequently, with regard to the question about the changes in the service strategies two key insights can be derived: On the one side, new strategic groups for the positioning on the market will arise due to new service-based markets, e.g. in the segment of the Car-2-X-communication. Therefore, from a practical perspective the strategic behaviour will further change and adapt to new characteristics of electric mobility. On the other side, the “rules of the game” stay the same because the framework these strategies had been derived from originate from Porter’s generic competitive strategies. Thus, from a theoretical perspective the analytic frameworks to talk about electric mobility keep their validity (Fig. 4).

## 5 Concluding Remarks

The paper contributed to the research about findings towards the slope of enlightenment for the development of electric mobility by following the three different perspectives of the Strategic Management of the external and internal strategic triangular as well as strategies as the connecting element between them.

With regard to the question how the market structures have changed, it can be concluded that the complexity and dynamic of the environmental influences have increased and will increase further. By considering this complex set of influencing factors they could be assigned to the categories of opportunities and threats for the

development of electric mobility. Nevertheless, a reliable statement about which trend is going to occur cannot be drawn at this stage.

With respect to the question about the changes in and of the business models, it was shown that the traditional forms will further exist but that new forms of business models are expected to arise. Hence, it was argued that it is still unclear which of the new forms are the most promising ones or how they should be modified. Due to the fact that the traditional forms are not competitive because of high purchase costs—for the battery—it can be assumed that future potential lies in the development of special forms for IT-based services.

Finally, with respect to the strategy services it could be shown that the German car manufacturers are well positioned and that future potentials exist with regard to the development of new services and their interconnection with each other so that each additional usage of one further service increases the economies of scope for the end customer.

As a result, an increase of the strategic complexity can be concluded because of the higher diversity of influencing factors and potential business models or IT-based service strategies. Hence, it is assumed that this increased complexity will result in limited changes in the form of strategic behaviour because the “rules of the games” stays the same (cf. Colmorn and Hülsmann 2013). Therefore, with regard to the question about insights for the slope of enlightenment it can be summarized in a very generalized way that the “big picture” about the chances of success of electric mobility is still unclear so that it is a long march till the plateau of productivity.

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