

**Transition to Electric Mobility:
A Grounded Theory Analysis of the Interplay between
Government and Industry**

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1 INTRODUCTION

The transport sector is the primary contributor to air pollutants and greenhouse gas emissions, and is consequently responsible for 23% of the global carbon footprint (Biresselioglu et al. 2018; Bubeck et al. 2016). Greater demand for sustainable technologies, as evidenced by a rise in environmentally conscious consumer behaviour, and increasingly ambitious renewable energy targets, has driven innovation in the sector away from traditional fossil fuel technologies. Electric Vehicles (EVs) are amongst the leading alternative technologies in the automobile industry, and, with zero emissions, are deemed environmentally-friendly (Offer et al. 2010).

To contribute to environmental conservation, the EU Commission has set the goal of achieving emissions-free mobility by the year 2050 (Biresselioglu, 2018). As a sign of its commitment to these goals, the German Federal government has implemented supporting measures that promote the adoption of EVs through significant investments in infrastructure, research and development. In addition to the government's provision of financial support to companies willing to make the same environmental commitments, a policy has been introduced that allows cities to impose driving bans on diesel vehicles in an effort to comply with CO₂ limits. The push for sustainable technology has also been echoed by the German automobile industry, an industry that has pledged to increase the EV ratio in its product portfolio. The associated constraints for car manufacturers, primarily in improving battery driving ranges and battery lifetime, have generated substantial investments in research and development aimed at commercializing alternative fuel vehicles. Despite all endeavours, the ambitious target of 1 million EV registrations in Germany may not be achievable by 2020 (Bubeck et al. 2016).

In addition to the low EV market shares, the transition to renewable energies in Germany is still in the early stages of development. This is significant for EVs as they rely on renewable energy sources to operate and therefore meet the government's environmental and climate goals. As the demand for renewable energy increases as a result of the greater number of EVs, the energy turnaround must be further supported and the distribution grids improved. The goal of renewable energies is not only of importance to the government, but also to the automotive sector; the supply and source of a vehicle's energy has an impact on the customer's attitude and his or her consumer habits, specifically, whether or not he or she intends to purchase an EV (Degirmenci and Breitner, 2017). Accordingly, the industry must be invested in the diffusion of green, renewable energy and thus, must adopt strategic measures in cooperation with the German government.

The aim of the present study is to evaluate the evolving relationship between the government and the automobile industry in the development of strategies for the transition to e-mobility in Germany. While there is a plethora of research on government strategies for implementing EVs into the market, only limited attempts have been made to examine how useful the industry's strategies actually are. As the German government and the automobile industry pursue the mutual strategy of EV market penetration, the research question of the presented study arises:

How can the automobile industry and the German government improve their collaboration to support the market breakthrough of EVs?

The structure of this thesis is as follows: chapter 1 explains the relevance and motivation of the present work and specifies the objective with the resultant research question. To provide a fundamental basis, chapter 2 gives a basic understanding of the current trends influencing the mobility, the current status quo of the automobile industry and the fiscal measures taken by the German government. In chapter 3, an extensive literature review is performed with an overview of the most effective strategies that have been used in the transition to EVs that have been investigated to date. Chapter 4 describes the applied methodology of the qualitative research that involves 10 expert interviews with German government politicians and automobile industry specialists from Germany and China. This section further includes a conceptual framework that was developed based on the data analysis conducted for this research. In chapter 5, the core findings from the expert interviews are presented. As the findings reveal, the experts compared the interplay between the German government and automotive industry with the Chinese one. Chapter 6 combines the practical and theoretical findings of chapters 3 and 5 by discussing them on the basis of the conceptual framework. Thereby, implications for practice and research are derived and key propositions are made. Chapter 7 presents the limitations of the present work and the final chapter, chapter 8, consists of a conclusion and a summary of the main results.

8 CONCLUSION AND OUTLOOK

The study aims to draw upon expert opinions and relevant literature to formulate pragmatic recommendations that support e-mobility's breakthrough. Through an exploration of the interplay between the German government and the automobile industry, a number of potential improvements have been identified. In that sense, the contribution of the work is twofold: (1) a qualitative study based on 10 experts from the automotive industry and the German government and (2) a literature review based on Webster and Watson was performed. Based on the qualitative study, the thesis has selected the GT approach of Strauss and Corbin (1998), which represents an emerging process with no preconceived concepts.

The analysis has shown that the German government, at both the Federal and state level, currently engage with German manufacturers. An example of this is the Federal government's formation of a national platform dedicated to the representation of the economy. Established through a joint exchange, this platform functions as a resource for receiving policy advice. In addition to analysing Germany, the paper provides a comparison between Germany and China as China currently hosts the most successful EV industry, and has the second best EV market success worldwide (Mc Kinsey, 2018). The study has shown that China has the following characteristics: (1) market protectionism (2) regulative market and (3) fast implementation of policies without an industry-level exchange on strategies or outcomes. Given such conditions, China has developed faster than the majority of the countries involved in the field of e-mobility. For German purposes, however, other strategies are required as they must accommodate to a country with different values and political agenda.

Furthermore, three categories were identified in the qualitative analysis that requires the attention of both the automotive industry and the German government if the breakthrough of e-mobility is to be successful. First, both sides must contribute to the improvement of the *product's management*. On the one hand, the government needs to ensure the affordability of EVs by introducing enticing incentive programs, tax relief and incentive schemes in a TCO. On the other hand, the industry must bring affordable and attractive products to market. Second, the *infrastructure management* of charging stations must be further expanded, transmission grids must come to considerable planning accelerations and the expansion of renewable energy must be realized. This also includes legal support for the expansion of private infrastructure. Third, *disposal management* must be achieved through the industry's development of a recycling chain that is bolstered by the government's financial support.

In summation, the exchange between government and industry today is burgeoning. However, a common strategic interaction between the parties' remains absent, as the example of charging

infrastructure has shown. It is therefore important for the automobile industry and the government to focus on the three categories and fulfil their obligations in order to facilitate e-mobility's breakthrough. It can be concluded that achieving e-mobility's transition involves, on the one hand, efficient fiscal measures dedicated to promoting EVs, and, on the other hand, the adequate supply of EVs on the market. E-mobility must be put into fair competition with other alternative and conventional modes of propulsion and allowed to continue developing through further research. As the comparison to China has shown, fostering political change, establishing beneficial collaborations and providing market incentives in Germany are paramount to enabling the country to remain competitive against China's flexible and innovative start-ups and its undemocratic regime.

In the future, the energy industry and its supply will become pivotal in Germany's pursuit of the proliferation of EVs as they operated on electricity that is generated by renewable energy. Therefore, the market introduction of EVs is only reasonable if energy is produced solely from renewable sources such as solar, wind or water. In that sense, the energy industry's inclusion in the aforementioned interplay is critical and must be ensured. Future research should be dedicated to how the automobile industry and the government can create sustainable commitments to achieving their climate protection and air pollution control goals.