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Are Tesla's Gigafactory and Autonomous Driving Technology, Automotive Industry
Disruptors?

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Abstract

Tesla's rapid development in recent years has attracted enormous attention in the automotive industry as well as from many other branches. This thesis explores Tesla's competitive advantage in the automotive industry, focusing on the role of autonomous driving technology and the Gigafactories. It explores the extent to which these two factors contribute to Tesla's disruptiveness. Although Tesla's innovations have already been groundbreaking, some of them are still in the development phase. The ADT might reach its full potential soon, while the Gigafactory concept has already made its mark on the industry. To analyse the extent to which these variables influence disruptiveness, a triangulation was applied in this academic paper. Qualitative data was obtained through semi-structured interviews with experts who hold relevant positions in the automotive and consulting industries. Quantitative data was systematically obtained by conducting a survey. The research question was created and built on the literature and is grounded on the basic theories of qualitative and quantitative research. Using triangulation, we concluded with this scientific paper that both variables are the reason for Tesla's disruptive success. The tech company's innovations are important components of the rapidly developing e-mobility market. The empirical results of the study in conjunction with the existing literature, underline the correlation and relevance of the Giga concept and the ADT. The outcomes of this study go beyond Tesla's current market position and provide insights for future research and findings on the adoption of electric vehicles, autonomous driving, and the disruptive impact on the automotive and the mobility market.

(250 words)

Keywords: Disruptive Innovation, Autonomous Driving, Gigafactories, Transformation, Competitive Advantage, Strategy

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Sumário

O rápido desenvolvimento da Tesla nos últimos anos tem atraído uma enorme atenção na indústria automóvel, bem como em muitos outros ramos. Esta tese explora a vantagem competitiva da Tesla na indústria automóvel, centrando-se no papel da tecnologia de condução autónoma e das Gigafactories. Explora em que medida estes dois factores contribuem para o carácter disruptivo da Tesla. Embora as inovações da Tesla já tenham sido revolucionárias, algumas delas ainda estão em fase de desenvolvimento. Para analisar em que medida estas variáveis influenciam a disrupção, foi aplicada uma triangulação neste trabalho académico. Os dados qualitativos foram obtidos através de entrevistas semiestruturadas com peritos que ocupam cargos relevantes nas indústrias automóvel e de consultoria. Os dados quantitativos foram obtidos de forma sistemática através da realização de um inquérito. A questão de investigação foi criada com base na pesquisa bibliográfica. Utilizando a triangulação, concluímos com este artigo científico que ambas as variáveis são a razão do sucesso disruptivo da Tesla. As inovações da empresa tecnológica são componentes importantes do mercado da mobilidade eletrónica em rápido desenvolvimento. Os resultados empíricos do estudo, em conjunto com a literatura existente, sublinham a correlação e a relevância do conceito Giga e do ADT.

Os resultados deste estudo vão para além da atual posição de mercado da Tesla e fornecem informações para futuras investigações e conclusões sobre a adoção de veículos eléctricos, a condução autónoma e o impacto disruptivo no mercado automóvel e da mobilidade.

(238 palavras)

Palavras-chave: Inovação disruptiva, Condução autónoma, Gigafactories, Transformação, Vantagem competitiva, Estratégia

Título: A Gigafactory da Tesla e a tecnologia de condução autónoma são disruptores da indústria automóvel?

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List of Abbreviations

ADT	Autonomous Driving Technology
CA	Competitive Advantage
VRIO	Valuable-Rare-Impossible to copy
FSD	Full Self Driving
RBV	Resource-Based View
EV	Electric Vehicle
OEM	Original Equipment Manufacturer
USP	Unique Selling Point

1. Introduction

In the ever-evolving automotive industry, one car manufacturer has stood in the last decade relative to its peers – Tesla, Inc. Founded in 2006, Tesla is redefining industry standards and changing both customer preferences and competitors' products. (Pathak, Yadav, Pillai, 2022)

The construction of Tesla's Gigafactory in Berlin 2020 was one of the most discussed and controversial topics in Germany. Animal rights activists, environmentalists, politicians, and employee representatives engaged in heated debate about the factory. The prospect of up to 12,000 jobs and strengthening eastern Germany as an economic region were pitted against the preservation of nature and animal habitats. Only 2 years later the first vehicles produced at this factory were handed over in March 2022.

The automotive sector which is historically characterized by internal combustion engines and traditional manufacturing processes has experienced an innovative disruptor with Tesla. Regarding the Gigafactory, the German Chancellor Bundeskanzler Olaf Scholz said: "Der Osten Deutschlands ist industriell vorne mit dabei" which can be translated as "By opening the Gigafactory, East-Germany began to lead the industry". (Wirtschaft und Markt, 2020) So not only the company's CEO Elon Musk, but even the German Chancellor confirms the massive technological advantage which the factory brings. (Scholz, 2020)

Autonomous Driving Technology (ADT) is Tesla's Autopilot and Full Self-Driving (FSD) features represent an enormous advance in driving technology. Tesla's approach to software updates and data collection has positioned the company as a leader in self-driving technology. Through gathering huge volumes of data from all the cars brought to market, Tesla has a data set like no other car company. Elon Musk stated at the company's Q3 earnings presentation in San Francisco, "I think we will be better than humans by the end of the year" (Musk, 2023).

To what extent the Gigafactory and ADT position Tesla as a disruptor will be the focus of this work. In the future, a car owner could either use the vehicle completely himself, share it partially with others, or make it completely available to others and earn more money with it. This could lead to another disruption of the whole automotive industry. "The value is just tremendous," Elon Musk stated (Musk, 2023).

In Germany, carsharing models gained significance in the last years and will be even more relevant in the future. The Fraunhofer Institut states that the number of shared rides, carpooling and similar options will quadruple by 2030 (Fraunhofer, 2022).

This master's thesis attempts to answer the following question:

RQ: Are Tesla's Gigafactory and Autonomous Driving Technology sources of disruption for the automotive industry?

The dependent variable is automotive industry disruption, and the independent causal variables are the Gigafactory and Autonomous Driving Technology. We will examine to what extent these two factors may be sources of disruptiveness. There are also Moderators and Modifiers which have to be considered. Firstly, the legal and regulatory environment must be considered. Does this support or even prohibit electric mobility? Additionally, the political and geopolitical situation is a huge modifier, especially the Ukraine-War which has had a huge impact on energy prices.

2. Literature Review

2.1 What is Disruptive Innovation?

Clayton M. Christensen (Christensen 1997) discussed the importance of Dynamic Capabilities for firms seeking to bring about disruptive innovation. Dynamic capabilities refer to the firm's ability to create and reconfigure internal and external competencies to address rapidly changing environments (Teece, 1997; Baretto, 2010). Among other things, Christensen describes how (mostly) new market entrants pose major challenges to established industry players (such as incumbents and market leaders) by generating new products or entirely new markets. Disruptive innovations are characterized by technological or qualitative inferiority at the outset, which means that only a small niche customer segment is early adopters (Christensen 1997). This is also why established companies often underestimate disruptive innovations (Christensen 1997). Innovation often means for companies to respond to dynamic environments to secure continuous success (Bierwerth et al., 2015).

The Austrian economist Joseph A. Schumpeter contends that innovation entails an industrial mutation process that continuously transforms the economic system from the inside out by eradicating the old and introducing the new. He deemed this process, brought about by innovation, to be fundamental to capitalism's competitiveness and termed it "creative destruction" (Schumpeter, 1942).

Innovation can be described in various ways. The literature refers to break-through, radical, discontinuous, non-linear, paradigm-shifting and disruptive innovation, used to explain the same phenomenon of transforming or replacing established markets by creating new products or services (Lassen et al., 2006).

As previously stated, this work will rely on the definition by Christensen. In his understanding, technology is defined as the processes used by a firm which produce services and products of greater value. The improvement of technology as such is defined as innovation (Christensen, 1997). A disruptive technology in general underperforms existing products or services in mainstream markets and introduces a new performance dimension valued by new niche customers rather than by the mainstream entire market (Christensen, 1997).

Ron Adner (2002) suggested that the motivation behind adoption of a disruptive technology correlates with consumer preferences and consumers' willingness-to-pay for a product's performance enhancement. The willingness-to-pay for additional performance characteristics decreases when performance meets their expectations. If the price is low enough, consumers will accept inferior performance (Adner, 2002). The new performance dimension changes the competition in the industry as a whole because products were not previously competing with each other across the same dimensions. Incumbents make R&D investments to enhance existing technology, while new firms which enter the market mostly focus on disruptive technology. These market entrants eventually pose real threats to incumbents and settled businesses (Christensen, 1997).

2.1.1 Disruptive Innovation by Christensen

Clayton M. Christensen defines disruptive Innovation as follows:

“[...] innovations that result in worse product performance, at least in the near term [...], precipitate the leading firms' failure [...], underperform established product in mainstream markets. But they have other features that a few fringe (and generally new) customers value. Products [...] are typically cheaper, simpler, smaller, and, frequently, more convenient to use. “- (Christensen 1997)

Christensen posits that disruptive innovations take root and becoming interesting for the broader mass market due to lower cost and more convenient use (Christensen 1997). As perfect examples for these phenomena today, literature often speaks about the first digital camera, the streaming service Netflix or Amazon. (King 2015, Gans 2016). Various challenges can already be derived from the previously described chapters on the theoretical foundations of disruptive innovations. Incumbents can be outperformed and can become completely irrelevant. Firstly, there is the Risk of Failure (Christensen, 1997), disruptive innovations often have a high risk of failure, especially in the early stages. It may take time before the disruptive technology gains market acceptance and matures (Christensen, 1997).

Additionally, disruptors often face legal and regulatory challenges. This is often reasoned on the policymakers try to catch up with new technologies and being faced to situations that didn't occur before. Governments and legal institutions must grapple with emerging technologies and undertake a thorough analysis of the new challenges they bring. These legal issues will affect the market entry, compliance with evolving standards, intellectual property, and regulations (Christensen, 1997). Timing is crucial for disruptive innovations. An innovation which has the potential to succeed could completely flop if its timing is not correct. Entering the market too early or too late can lead to missed opportunities or failed investments (Swinney, 2011) One of the biggest challenge for every start up, new market entrant or disruptive business are financial constraints or obstacles.

Financial constraints limit the ability to compete with large incumbents or well-established institutions. Summarizing, one could say the securing of financial resources and funding can be significant for the success of a disruptor. (Stuck, 2013). Christensen describes in one of his works, the “Failure Framework” and in his 5 Principles of disruptive innovation, several different Impacts and Challenges for the business environment (Christensen, 1997).

Christensen introduces the concept of the “Failure Framework” and outlines, within his 5 Principles of disruptive innovation, a diverse array of impacts and challenges inherent in the business environment. The most significant takeaway is that managerial decisions in successful organizations sow the seeds of failure because of the focus on sustaining innovation (making existing products better) and not disruptive innovation (Christensen, 1997).

2.1.2 Competitive Advantage

To define competitive advantage, we refer to Christensen as well as Michael E. Porter. The latter states that a competitive advantage in an industry is attained by firm level management of five particular forces -- competition in the industry, potential of new entrants into the industry, power of suppliers, power of customers, and threat of substitute products. Firms that manage these forces more effectively gain an edge over competitors (Porter, 1985).

Furthermore, Porter separates competitive advantage in two main types. First there is comparative advantage and, second, differential advantage. A comparative advantage means a firm can produce products more efficiently and at a lower cost than its competitors, which leads to greater profit margins. (M.E. Porter 1985) Instead, a differential advantage means that a company's products are seen unique and made of higher quality, compared to those of the competitors. But what exactly determines competitive advantage? Some types of competitive advantage are based and rooted in market positions, especially those created by economies of scale (Christensen, 2001). This CA often has the side effect of high entry barriers for new competitors. Besides this, other competitive advantages have the source for their competitive advantage in their business model, their processes, or their competencies.

Summarizing, competitive advantage is what makes a firm's services or products more desirable to customers than the offers from any other rival (M.E. Porter, 1985). Another perspective is that competitive advantage is a relational construct and context specific. This means the CA is not something to be analysed by itself but is always comparative and needs to be put in context (Ma, 2000).

Christensen adds the following to the development of a firm's competitive advantage.

“Today's competitive advantage may become tomorrow's albatross unless strategists attune themselves to changes in underlying conditions.” – (Clayton M. Christensen 1997)

In other words, this means that what is successful today may prove to be a liability tomorrow if adjustments are not made to the changing environment. The term "albatross" in this context refers to something that acts like a burden or an obstacle and may decrease the firm's success. To be sustainably successful in the long term, a firm can't just rely on its existing CA, but must always adjust and keep transforming (Christensen, 1997).

The concept of CA faced some critiques as well. For instance, the notion has not a singular definition and therefore is not precise (Lieberman, 1988). Questions are occurring like: Is there a difference between a larger company with wider profit margins and a smaller one with smaller total profits? It could be very difficult to make the differentiation in this case.

A further scenario which is not covered by the term of CA could be: The early stages of an exponentially expanding startup like Amazon. How could be dealt with the fact that standard metrics don't tell much about its potential and its competitive advantage?

Therefore, Lieberman states a company with its CA has to be seen as a whole. (Lieberman, 1988). A company might post higher profits than its competitors, but if it realizes those profits by polluting the environment, the customers and society wouldn't agree on this company having a competitive advantage.

2.2 Theoretical Framework

In the next chapter the dissertation will examine two Frameworks. Firstly, the VRIO Model (Barney, 1997) will be used to analyse the internal atmosphere inside the corporation Tesla. Hereby the existing resources will be scaled and assessed. Secondly the external environment of Tesla within the whole automotive landscape will be examined through the framework of Porter's 5-Forces. (Porter, 1985) The author will illustrate the actual situation in this sector and seek to discover threats and opportunities in this market.

2.2.1 VRIO (Internal Tesla)

The aim of this study is to analyse the internal and external environments of Tesla regarding its role as a new leader in the global automotive industry through understanding the firm's current strategies.

The VRIO model is used to evaluate existing resources and can be used to isolate key firm variables. It was developed in 1991 by Jay Barney (Barney, 1991; Dahle & Reuther 2022). The competencies and resources of a company will be tested for four factors: Value, Rarity, Imitability, and Organization.

The four to five factors are examined one after the other with the help of the VRIO model in terms of their meaningfulness and relevance for Tesla. In the first three steps (Valuable - Rare - Impossible to copy), the focus is initially on the quality of the respective resource. The three aspects refer exclusively to disruptiveness and deliberately leave out any reference to other characteristics which could be mentioned in a business context. The VRIO model is visualized as follows.

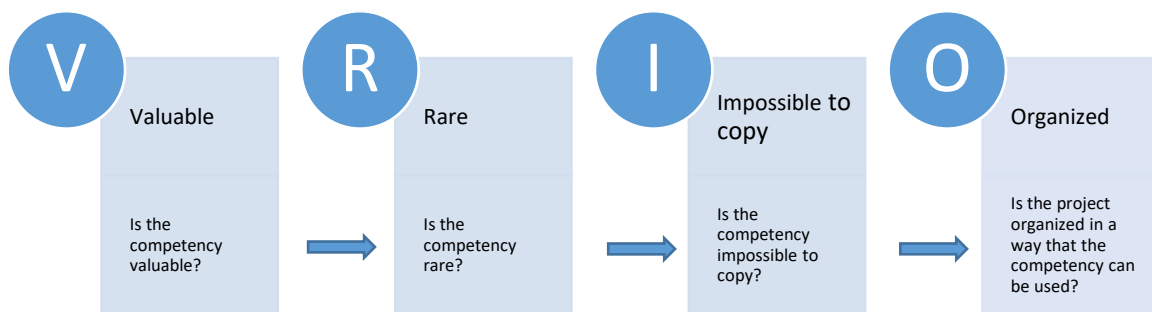


Figure 1: The VRIO-Model

Source: Own illustration based on Barney 1991

Basically, it is the core competencies (Prahalad & Hamel, 1990) and resources that make a firm unique. Firms which are aware of their core competencies can manage themselves, accordingly, strengthening them and creating benefits for their customers (Dahle und Reuther, 2022).

The VRIO model additionally narrows down the previously identified factors and enables a clear allocation to the corresponding topics.

Resource/ Capability	Valuable	Rare	Imitable	Organized	Competitive advantage
Gigafactory	Yes	Yes	Unlikely	Yes/Not Yet	Potential sustainable advantage
Robotic Automation	Yes	Yes	Long run	yes	Temporary competitive advantage
Location	Yes	Yes	No	Yes	Sustainable competitive advantage
Supply chain	Yes	Potentially No	Yes	Yes, but risk potential	Potential sustainable advantage

Table 1: The VRIO-Table

Source: Own illustration based on Han 2021

To understand the Tesla Gigafactory and ADT, an internal analysis will be conducted to ascertain core competencies based on the RBV. Utilized extensively as a foundational instrument in management research, the RBV posits that a firm's competitive advantage and economic performance are predominantly influenced by its resources. In addition, those resources must be managed in light of a fast-paced changing environment which implicated the notion of Dynamic Capabilities (Teece, 1997). They are a route to understanding how strategic management helps firms achieve competitive advantage and superior performance. Internal analyses help a firm determine if its resources and capabilities are likely sources of competitive advantage. Accordingly, strategies can be established that will exploit resources in a dynamic manner.

2.2.2 Porters 5 Forces (External in the automotive sector)

To analyse the external environment of Tesla the Framework of Porter's 5-Forces will be used in the following chapter. Hereby the whole automotive industry will be considered under the recent circumstances and the global players, which dictate the market right now.

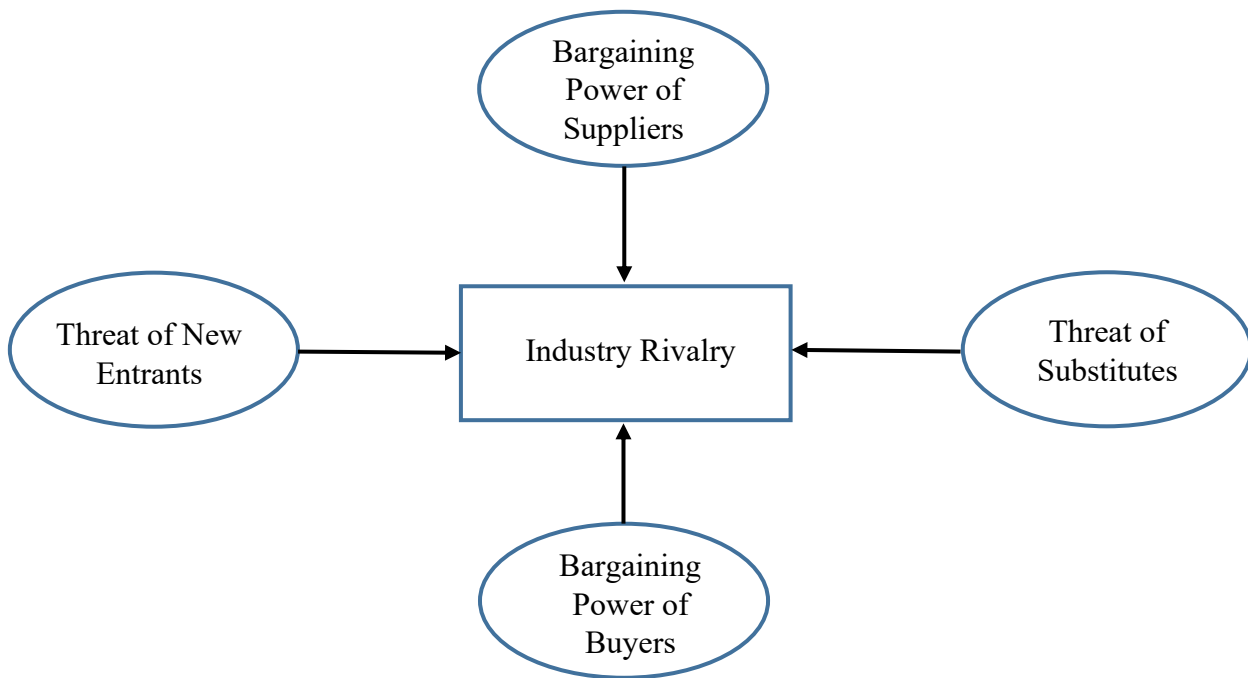


Figure 2: Porter's 5-Forces Model

Source: Own illustration based on Porter, 1985.

The external analysis allows a firm to discover threats, challenges, and opportunities (Porter, 1985). Moreover, a company can then see if high profit margins are likely in this industry, better understand the nature of competition and make more informed and sustainable strategic choices (M. E. Porter, M. R. Kramer, 2011)

The first dimension is the threat of new entrants.

If firms can easily enter the industry, any high profit margins or above normal profits will be vanished quickly. New entrants or firms, especially from Asian Countries, like BYD, NIO and Geely have an impact on the automotive industry and are forcing Tesla to act or adjust its strategy. (Han, 2021)

This aspect of the Five Forces analysis identifies the force of threat of new market entries, as follows:

- High cost of running business, due to Salaries and Material (weak force)
- High economies of scale (weak force)

Second, there is the high-level threat of rivalry. High rivalry means that firms within the industry compete strongly against each other. The automotive sector in which Tesla is participating is a highly competitive market. (Konrad, 2018) This is based in several factors, e.g., the small number of firms, and big players like Volkswagen which own several brands and have high financial resources. Furthermore, there are low switching costs for customers, as customers simply need to buy a new car or maybe sell their old one. There is nearly no mechanism which rises the switching costs between the different car manufacturers.

This aspect of the Five Forces Analysis underlines the influence of competition in the automotive industry (Han, 2021). The intensity of the external factors responsible for the strong force of competitive rivalry are defined by following factors:

- Small number of firms (weak force)
- High aggressiveness of firms (strong force)
- Low switching costs (strong force)

Thirdly, the threat posed by buyers is considered. This risk materializes when customers exert pressure on firms to reduce prices, either by seeking higher quality or lower costs. The impact of customers on Tesla and the broader automotive industry landscape serves as the pivotal factor in this dimension of the Five Forces Analysis. Tesla's customers are a direct factor that determines the revenues and trough that also the profit of the company (Han, 2021). The acceptance of the brand in the broad customer world is crucial and up to this date still risky as well as threatened by the reluctance against electric mobility (Ziefle et.al, 2014).

The majority of the population remains hesitant to make a switch from combustion engine towards an EV. (Ziefle et.al, 2014)

- Low switching costs (strong force)
- Moderate substitute availability (low force)
- Low volume of purchases (weak force)

Forth, there is the high level of threat of suppliers. Dominant suppliers can exert pressure and diminish the profits of a firm. The success of a business, including Tesla, relies among other things on the dependability of its suppliers (Han, 2021). This aspect of the Five Forces evaluates how suppliers can shape the business environment by controlling the speed and the availability of materials that are needed. Tesla tries to reduce this threat to a minimum by starting to build parts by their own and stop buying them from suppliers. This vertical integration decreases the dependency on suppliers and strengthens the business of the firm. (Perry, 1989)

Suppliers have certain power in this branch, which can be seen in cases like the Strike of the supplier “ES Guss” in 2018. In this year the automotive supplier was conducting a strike together with other suppliers and forced VW to lower its pressure in terms of price and delivery time. This example underlines the power which suppliers own in the automotive industry (Schmidt, 2018).

Another great example therefore is the production of batteries which before were bought by Tesla from several suppliers and since 2013 built by themselves and a joint venture with Panasonic (Cooke, 2020). How intense this external factor, which creates the high force of threat for Tesla can be, is shown in the next points:

- Moderate forward integration (moderate force)
- Moderate size of suppliers with high bargaining power (high force)
- High need of high demanded supply e.g. Lithium (high force)

Finally, there exists a moderate threat of substitutes. The company may experience the impact of substitutes like other players in the automotive industry.

The following external factors moderate the force of threat of substitution against Tesla. (Han, 2021)

- Low switching costs (highly strong force)
- Moderate substitute availability (strong force)
- Moderate performance of substitutes (moderate force)

Substitutes are offered for example by other electric car manufacturers like BYD, Nio or Geely which mainly come from China and try to target the same market as Tesla in terms of price range, geographical market, and target group. (Han, 2021) After this step, in addition to the already recognized strengths and weaknesses, explicitly relevant core competencies for the strategic challenge have been identified and described, the results of the internal and external analysis can now finally be combined. Through this combination, new conclusions will be derived.

2.3 Innovation from Tesla in the Automotive Industry

Tesla holds 203 patents with an additional 280 patents pending, primarily focusing on battery and electric powertrain components — integral elements of the vehicle (Hill, 2016). The battery pack stands out as Tesla's core competence, designed for flexibility in terms of battery cell chemistry, form, and vendor selection, ensuring adaptability to future advancements.

So, Tesla is not only to be understood as a car manufacturer but an Energy/IT/Mobility Company which offers also a varies of solutions regarding solar panels and charging capabilities. This innovative power is transferred on the automotive sector and shaped it completely for the last decade (Konrad, 2018). Tesla's charging network stands out as a distinctive competitive advantage in the electric vehicle sector. Tesla provides customers with complimentary charging at its Supercharger stations, enabling a full vehicle charge in just 30 minutes. This unique selling proposition (USP) is particularly valuable for customers, especially considering the elevated fuel prices in the recent years. Beyond the physical innovations, Tesla's disruption is evident in its foray into the fiercely competitive automotive

industry without any pre-established collaborations, showcasing the project's strategic acumen from its inception (Konrad, 2018). The company needed less than 2 decades to become the most valuable brand within the automotive sector worldwide in the year 2023 (Statista, 2023). This is a success story which has never happened before in the automotive history, and which shows the innovative power and uniqueness of Tesla.

The following chapters examine the two factors which we propose are driving innovation and disruptiveness at Tesla. -- ADT and the Gigafactories. To what extent these two factors contributed to the success as a disruptor is the research question of this thesis and will be analysed throughout the interviews and the research.

2.3.1 Autonomous Driving Technology

Once merely an idea in science fiction, autonomous driving or self-driving cars, are becoming more prevalent (Maurer, et.al. 2016). The regulatory environment has not kept up with rapid technological advances, even though these are not yet commercially available. Tesla is pushing into the field of ADT and wants to offer cars with this technology by end of the year 2024 (Handelsblatt, 2023).

Elon Musk even has plans to make a licensing deal with other OEMs to sell them the ADT Technology from Tesla. Until 2023 the company bought their computer chips from Nvidia but switched in 2023 to self-produced Dojo-Chips, tailored to the needs of Tesla (Handelsblatt, 2023). Furthermore, this strategic move gives the company advantages of vertical integration. ADT are known as complex robotic systems and function in unpredictable environments. As a result, there are numerous situations with unresolved problems. The high-level difficulties associated with driving automation will be covered in this section. Recent advances in computing technologies (such as sensors, computer vision and machine learning) and widespread adoption of communication infrastructure (e.g 5G) have expanded the possibilities for autonomous driving, which uses data from numerous sensors to automate decision-making and control of moving vehicles. The ability of these autonomous systems to make fast trustworthy decisions is essential to their success (Liu, et.al. 2020). There are many voices against Tesla and its ADT. For example, many people are convinced by the argument that the real traffic environment is too complicated with too many variables for current autonomous driving technology to understand and handle (Liu, et.al. 2020). This is countered by Tesla's aggressive forward push, where the company spends 4% of its revenue (about \$3.1 billion) on

Research and Development. One of the biggest R&D projects is ADT with the goal of creating completely autonomous cars (Statista, 2022). But beyond allowing people to be driven from point A to B, the technology will also permit car owners to rideshare their vehicles when not in use. Comparable to Airbnb, the Tesla App, would create value by offering mobility-as-a-service. Public transportation would be relieved, and fewer people would have to buy cars. Efficiency of city mobility would be increased immensely (Pakusch, 2017).

2.3.2 The Gigafactory - what makes it Giga?

Tesla's Gigafactories distinguish themselves from traditional automotive plants through several notable characteristics that set them apart from traditional automotive manufacturers. Located in 5 countries, Tesla is still planning to build new ones (Tesla, 2023). The Gigafactory in Berlin, for instance, specializes exclusively in the production of the Model Y. This is built nearly autonomously by advanced robotics technology (Tesla, 2023).

What is initially visible, is the enormous scale in which Tesla is producing in its Gigafactories. These massive manufacturing facilities are designed to produce EVs at a larger scale than traditional facilities. Covering millions of square feet, the factories produce a single model in huge amounts. Through this strategy Tesla strives to cover the growing demand for electric vehicles.

What else is unique is the aim for vertical integration with the goal of producing as many components and materials inhouse as possible. This reduces dependency on suppliers and diminishes supplier bargaining power. This approach includes producing Tesla's own batteries and motors, which also gives the firm greater control over the quality and costs of essential components. Producing these parts in the Gigafactories generates competitive advantages for Tesla compared to rivals in the automotive industry (Cooke, 2020).

Tesla also designed its Gigafactories with sustainability in mind (Tesla, 2023). Renewable energy sources, such as solar panels and wind turbines are used to power these facilities. Waste reduction methods and water recycling are also employed by many of the subsidiaries to make them more environmentally friendly than traditional manufacturing plants (Tesla, 2023). The strategic locations of the Gigafactories are another important factor for Tesla. Each factory is located near critical resources, such as lithium deposits or established infrastructure like railways, to minimize transportation costs and problems in the supply chain.

Another factor that makes the Gigafactories unique in the automotive landscape is the advanced robotics technology (Cooke, 2020). The company uses the automation technology extensively in their production process which not only increases efficiency but also allows Tesla to implement improvements and new advancements easily. The production line has a high flexibility and scalability due to its digitalization (Cooke, 2020).

A further aspect that makes the Giga disruptive is the high product diversification on a large scale. The Gigafactories produce not only EVs but also energy storage products like the Powerwall, the Powerpack and its own batteries. This diversification helps Tesla capture various market opportunities. The facilities produce a large number of lithium-ion batteries, helping to reduce the cost of one EV. Tesla also formed a joint venture with the electronics group Panasonic Corp. in Nevada to produce these on a large scale (Cooke, 2020). Lastly the Gigafactories serve as centres of innovation, where the company experiments with new technology, production techniques, designs, and materials, which often results in significant advancements regarding EV and autonomous driving. (Cooke, 2020)

To substantiate this argument, we compared VW and Tesla. The synergy of the previous mentioned factors lets Tesla produce one electric vehicle in 10h, whereas Volkswagen needs 30h for one EV. It has to be mentioned that Tesla delivers 2 million cars per year and VW about 100.000. We can see the CAs clearly on Tesla's side. (Tesla, 2023), (Statista, 2023).

3. Methodology

The methodology employed in this thesis is a triangulation using qualitative data, gained through expert interviews, industry data, and published reports, found through literature research and contacts of Tesla through the occupation of the author as working student at Tesla Inc. Different articles, websites and reports were studied and analysed in the context of the previously stated Research Question. Additionally, a survey with over 100 participants from various nationalities and occupations was conducted.

3.1 Research Design

This dissertation used qualitative data in form of expert interviews with relevant people in the automotive sector as well as the automotive consulting sector. Additional data was found through research of public news etc. The third type of data was quantitative material, gained through a survey. Standardized online interviews were conducted to assess whether Tesla is perceived as a disruptive company,

The experts were chosen carefully and included competitors like Mercedes and VW, internal opinions from employees of Tesla and shareholders from the consulting sector, who could be seen as neutral parties. These three different perspectives provided a holistic picture for answering the Research Question. An inductive category formation following a specific concept was applied (Mayring & Fenzl, 2019). The research methodology was inductive, and categories were derived from the answers and results.

3.2 Data Collection

Data were collected from three main sources: Primary Research Data, Articles and Websites and finally published reports and industry data. All the Data were collected between September and December in the year 2023. The interviews were conducted via Microsoft MS Teams and lasted between 40 min and 1h each. Through the record-function of MS teams, the interviews have been transcribed. The guiding question consistently employed throughout the interviews was: “Are Tesla’s Gigafactory and Autonomous Driving Technology automotive industry disruptors?” It was paid attention to the selection bias, that most of the participants come from the automotive industry and maybe can have a certain prevailing opinion on Tesla already.

The framework used in this Thesis is Grounded Theory which is a qualitative research method with the goal to develop theories by oneself instead of testing predetermined hypotheses (Glaser & Anselm 1960). This is well suited to the exploration of social phenomena where little is known about the underlying structures or processes.

The rigorous applying of this qualitative semi-structured interview guide contributes to the trustworthiness and reliability of studies and makes the results more plausible (Kallio et. al, 2016). This is the reason and justification about the decision which was made about the structure and the framework.

3.2.1 Primary Data Collection

Expert Interviews

This chapter presents the methodological approach which was conducted to gather original data for the research. This phase involved the design, execution, and analysis of the primary data collection. Interviews were carefully structured to follow the research objectives and to gain valuable findings.

The search for relevant experts was difficult in the beginning. A holistic picture can only be generated through different perspectives. That’s why we wanted to get the view from Tesla employees as well as from competitors, to avoid selection bias (Winship, 1992). Through our network built over years of work in the automotive sector, the author was able to reach out to several contacts at Mercedes, Volkswagen, and Lamborghini. Our focus was on persons in strategic positions related to Tesla, ADT, Gigafactories or Electric Mobility.

Another perspective was gained from automotive consultants not bound to one OEM. The Tesla employees we interviewed all worked in the Gigafactory. We also cold called via LinkedIn and reached out to experts globally who could contribute to this dissertation.

The set-up of the interviews was semi-structured and held via Microsoft Teams to save time and have a record and transcript afterwards.

Interview ID	Role of Interviewee	Type of company	Justification for this Interview
A	IT Project Management Lead Global	OEM	Immense Knowledge and Experience in the automotive sector, PhD
B	ESG and New Markets Specialist	OEM	Immense Knowledge and Experience in the automotive sector specialized in EV markets
C	Contract Growth and Strategy Manager	OEM	Immense Knowledge and Experience in the automotive sector
D	Senior Consultant Automotive	Consulting	Focused on automotive customer and managing global projects
E	Strategy Consultant Automotive	Strategy Consulting	Focused on automotive customer
F	Development Engineer of the autonomous driving department	OEM	PhD about autonomous driving at Mercedes and now occupied in the development dep. on this field
G	Project Manager	OEM	Knowledge and Experience in the automotive sector, Project Manager at Lamborghini

H	SSD Lead Europe	OEM	Executive with perfect insights regarding future strategy and ADT, Tech-Branche knowledge & experience through previous occupation in the management of Amazon
I	Lead Engineering Germany	OEM	Lead Engineer in the Development of the EQ Series
J	Director	OEM	Over 30 years of experience in the automotive industry and several managing positions

Table 2: Interviewees for the semi structured Interviews

The primary data was gathered in form of semi-structured interviews to collect the first round of data. Semi-structured interviews were the most feasible and value adding way of gaining access to inside information from the automotive industry and Tesla itself.

After the interviews, which were recorded and transcribed, a summary was built and can be found in the Appendices. Initial contact with interview participants occurred through multiple channels: within Tesla, meetings were arranged via MS Teams or conducted in person; externally, LinkedIn served as a platform for outreach. Potential participants were screened for interest, suitability based on their background, and availability for an interview. It turned out that LinkedIn outreach proved less effective compared to the in-person approach. Notably, engaging with individuals at the Tesla office in Berlin yielded the highest success rates in securing interview partners.

Survey

To gain insights into the perspective of possible users and customers, a survey was conducted. The distribution of this survey happened online via various platforms, like Instagram, WhatsApp, Facebook and LinkedIn. This achieved a low-cost data collection and potentially fast replies (Fowler Jr, 2013). The survey was split into six parts and consisted of 16 questions. Some basic information regarding disruption by Christensen was provided in the beginning of the survey. More details regarding the structure can be found in the Appendix A. In total, over 100 respondents finished the survey. To guarantee a successful evaluation, the survey was designed and analysed with Microsoft Forms. SPSS was chosen to analyse the data.

3.2.2 Secondary Data Collection

To gain as much relevant information as possible, sources were spread widely and included: company's websites (especially Tesla.com), newspaper articles, annual reports, interviews, and press releases (Hancock & Algozzine, 2017). While selecting secondary data sources, only reliable and authentic sources were chosen, to give a valuable outcome of the research (Hancock & Algozzine, 2017). A complete summary of the literature used can be found in the Bibliography. Academic journals were sourced mostly via Google Scholar. Additionally, consulting reports which are also academically backed were analysed.

3.3 Data Analysis

An Excel coding sheet was developed for processing the data. Through the different research methods, a synergy was built, and the outcomes discussed and compared with the literature. The last section of the thesis summarizes the research, shows the limitation of the discussed dimensions, and shows implications for the future. As the semi-structured interviews are standardized along with unstructured elements, a hybrid version of analysis was chosen according to (Adams, 2015). All the responses to the open-ended questions were analysed with content analysis (Mayring, 2004) and processed in the Excel Spreadsheet. Subcategories were built, the number of mentions were displayed and proven with examples. The transcribed interviews were abstracted to a certain level which was preferred (Mayring & Fenzl, 2019). The Interview analysis can be found in the Appendix C.

The structure of the interviews were based on the interview guide and framework from Kallio et al. (2016) which consists of the following five phases: (1) identifying whether semi structured interviews are a suitable research method, (2) accessing previous knowledge, (3) formulating a first version of the interview guide, (4) testing the guide and finally (5) presenting the final semi-structured interview guide. It turned out that semi structured interviews were most suitable. Secondly previous knowledge was accessed with the first question. The questions can be seen in the table in Appendix A.

4. Empirical results

4.1 Results of the Interviews

Ten interviews were conducted which gave rise to certain patterns. The author clustered the interviews in four groups: Tesla internals, Competitors, Consultants, and others. The participants come from 4 different nationalities, Italy, Netherlands, India, and Germany. The interviews were coded and clustered according to the methodology previously described. This led to four categories: 1) Personal Background and general data; 2) Disruptiveness in the automotive industry; 3) Competitive Advantage based on ADT and Gigafactories; 4) Future Prospect.

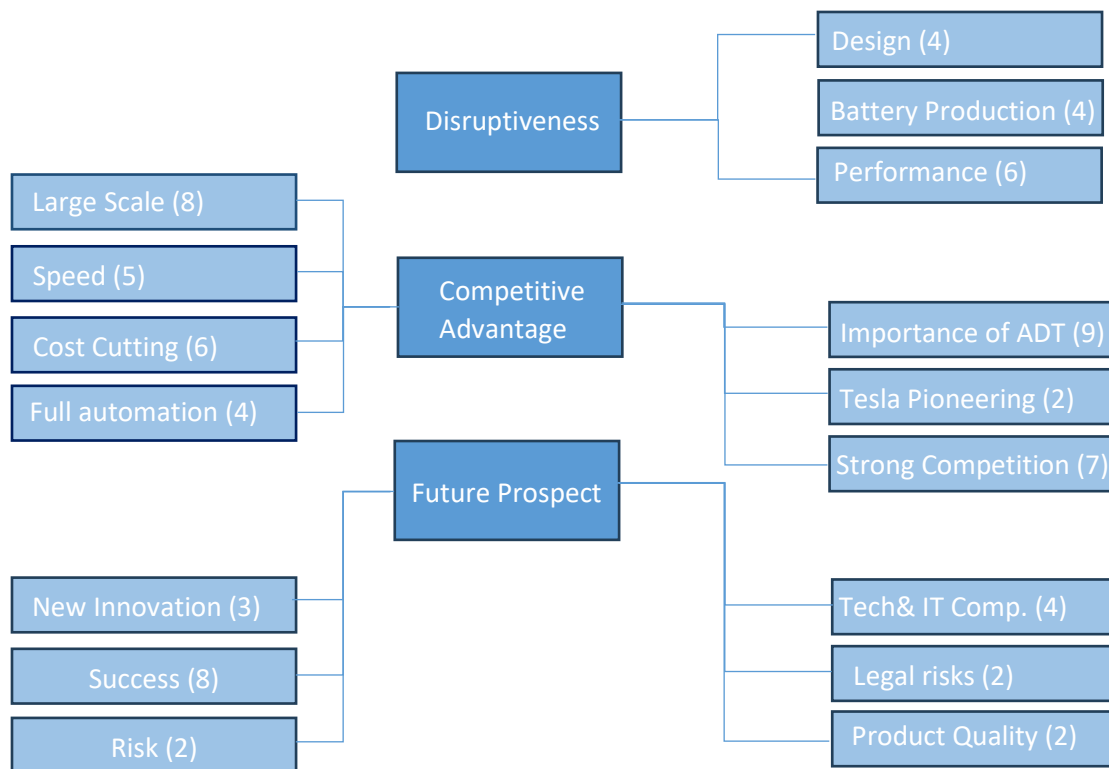


Figure 3: The Two Top Levels of the Code Framework

Chapter Nr. 1 Personal Background and Expertise

The interview was only held with people who worked in significant positions at Tesla, in the automotive industry or in a related consulting company. All their positions *partly* contributed either to the EV or the ADT topic.

Chapter Nr. 2 Disruptiveness in the automotive industry

While questioning, 4 categories were built and arose, Design (n=4), battery production and performance. These categories were mentioned by the interviewees in different wordings.

And a consensus arose that the performance and the growth of Tesla has shaped the automotive industry in a disruptive way. Furthermore, according to the majority of the respondents, Tesla specific design elements are a source of Tesla being a disruptor in the industry in the last decade. The interviewee F (2023) pointed out: *“Tesla has revolutionised the industry with its futuristic approach, uniqueness and individual design.”*

The respondents agreed that the large scale at which the Gigafactory makes production possible is significant for having a competitive advantage. Eight out ten participants gave answers that can be allocated to the category: Large Scale or Scale Effects. This was accompanied by the fact that (n=6) participants mentioned that cost cutting in the Gigafactory was an edge compared to traditional factories. For example, Respondent C explained that: *“[...] economies of scale and vertical integration for key components allows Tesla to drive down production costs [...]”*.

Chapter Nr. 3 Competitive Advantage based on ADT and Gigafactories

Surprisingly, the majority (n=6) of respondents stated that they saw Tesla as being behind the competition in the field of ADT. Waymo (a tech company specifically focused on autonomous driving) has more autonomous driven kilometres in its data base and a larger network of datapoints. Further, the missing Lidar Technology in the EV of Tesla was mentioned twice as one of the reasons for Tesla “being second”. Tesla’s ADT was viewed critically because there are competitors further along with their technology and the amount of driven autonomous kilometres.

The respond of the automotive industry and its players to Tesla’s Success Story.

(N=6) Interviewees stated that they saw Tesla as shaping the competition over the last several years. Competitors are using strategies to copy Tesla’s ideas, strategies, and processes (n=2). Also, two participants viewed Tesla as the reason why other OEM started to build EVs as well.

Interviewee R stated: *“OEMs recognized the shift to EVs, investing heavily in technology and R&D”*. Another participant, Interviewee N (2023) emphasized that: *“Traditional OEMs also started setting up new electric vehicle product ranges [...]”*

Key Challenges and Risks

The biggest risk seems to be the growing competition from the Tech & IT Industry. Traditional OEMs are threatening Tesla’s market position, but companies like Apple, Amazon are also planning on entering the ADT and EV market. Interviewee M (2023) pointed out that:

“Tesla has the challenge to battle not only competitors in the automotive sector but also in the disruptive and fast paced tech-branch in the Silicon Valley.”

These companies possess a lot of financial resources and even larger databases. (N=4) respondents supported this view. Legal aspects, especially about the responsibility in case of accidents, were seen as a further challenge for Tesla according to respondents (n=2). Political decisionmakers have a large impact on this challenge and therefore constitute a risk. According to (n=2) interviewees, the product quality of cars will be a key challenge for the upcoming years. Interviewee M (2023) continued: *“The speed at which Tesla produces is also dangerous. Quality must not suffer as a result of speed!”*

Chapter Nr. 4 Future Prospect

Almost all participants predicted that Tesla will be successful in the future (n=8). Two of the participants believed Tesla will become the leader in the field of electromobility. The belief and expectation that Tesla will continue to innovate was also expressed by (n=3) participants. Interviewee N expressed the position of most of the experts in his statement: *“I think Tesla will take its place as one of the biggest automobiles manufactures in the world.”* While the majority were convinced of Tesla’s continued success, there were also critical voices like Interviewee D: *“The competition will be harder, a lot of new players are entering the markets.”*

Tesla employees obviously saw the future of Tesla very positively. But 3 out of 4 competitors stated that they see Tesla as being under the top EV producers in the next years. Of particular note was to what factors people most attributed Tesla’s success. Some saw the company as an Electric Vehicle Producer but two of the interviewees considered Tesla in terms of it being a whole IT & energy company that offers car sharing platform, electric storage, battery packs, solar panels, and payment methods. According to one interviewee, Tesla could become the top EV producer and naturally absorb competitors by buying and owning more than 50% of rivals.

A table summarizing the structure of the interviews, categories and the questions can be found in the Appendix B. (Table 2: Questions and Structure of Interviews)

4.2 Results of the Survey


Participants were sampled according to pre-defined criteria. One qualifying question was conducted to identify invalid responses and to test respondents' attention. A difficulty could be that many participants were part of the author's student network and work-related persons. Therefore, there could be an imbalance of academic and European persons. The limitations of the survey are outlined in Chapter 7 "Limitations".

Overall, 112 respondents began the survey and 105 completed it. 3 of those did not pass the qualifying question, which led to excluding their answers.

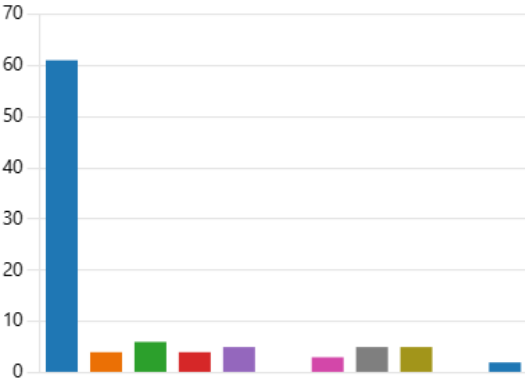
The survey consisted of 16 questions across six areas: (1) Demographics, (2) Disruptiveness, (3) The notion of the Gigafactory, (4) Autonomous Driving Technology, (5) Outlook in the future of ADT and Gigafactory, and lastly (6) Outlook on Tesla's disruptive role. It was conducted online without researcher interference, except for providing one information box about the notion of disruption in the beginning of the survey. Participants were a wide range of international persons between 18 and 61. Most of the respondents were located in Germany (60%), while 6% had Austrian origins, and further 5% were from Netherlands, France, the US and Italy.

What is your nationality?

[Weitere Details](#)

 Einblicke

Germany	61
United Kingdom	4
Austria	6
France	4
Netherlands	5
Spain	0
Portugal	3
United States	5
Italy	5
Russia	0
Other	2



The survey exhibited a balanced gender distribution, with an equitable representation of both males and females. Most of the interviewees identified as male (58%) and the rest identified as female (42%). The age distribution tended to be mostly skewed towards younger and middle-aged groups, with an average age of 31.12 years.

What is your gender?

[Weitere Details](#)

[Einblicke](#)

● Male	58
● Female	42
● Other	0

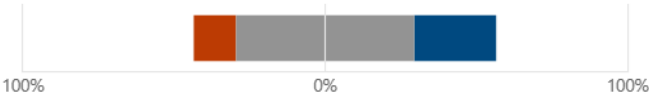


At the outset, we tested if the participants were familiar with the term Disruptiveness. To create a common basis between all respondents, a short information text with explanations was given after this question. 58% stated having basic knowledge, 27% rated their knowledge as profound and only 14% had never heard the term before.

. How familiar are you with the term disruptiveness?

[Weitere Details](#)

■ Never heard before ■ Basic knowledge ■ Profund knowledge

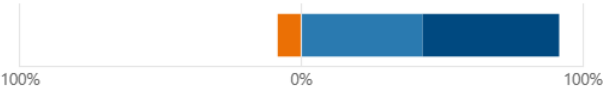


The question about the perception of Tesla’s disruptiveness gave a clear picture whereas, none of the participants disagreed on Tesla being disruptive. 48% described the Tech-Company as extremely and 43% as very disruptive in its industry.

How disruptive would you describe Tesla in the automotive industry?

[Weitere Details](#)

■ Not at all ■ Not much ■ Very ■ Extremely

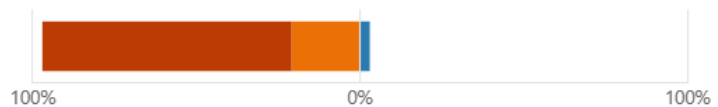


Nearly all respondents predicted higher relevance for autonomous driving in the future. Only 2% disagreed and none of the participants strongly disagreed.

11. Will the autonomous driving be relevant in the future?

[Weitere Details](#)

■ Strongly agree ■ Agree ■ Disagree ■ Strongly disagree



Furthermore, 38% of the participants predicted ADT to be in daily usage in the next 2-5 years. The second largest group at 28% saw ADT coming up in the next 5-7 years and only 11% predicted the technology would take 10-15 years to come become used daily. This shows how urgent it is for companies to act as soon as possible and implement ADT technologies.

12. In which Time Horizon would you see Autonomous Driving to be in daily usage?

[Weitere Details](#)

Einblicke

● 2-5 Years	38
● 5-7 Years	28
● 7-10 Years	17
● 10-15 Years	11
● >15 Years	2

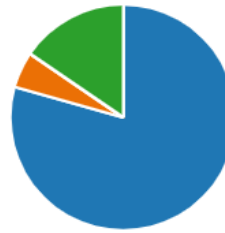


Examining these three findings leads to the conclusion that there is substantial market potential for Autonomous Driving Technology (ADT) in the near future.

13. Would you use a car that drives autonomous if you book it through a platform like Uber or a Tesla specific platform?

[Weitere Details](#)

● Yes	77
● No	5
● Maybe	15



14. Would you own an autonomous car and monetize it through ridesharing when you are not using it?

[Weitere Details](#)

[Einblicke](#)

● Yes	66
● No	13
● Maybe	16



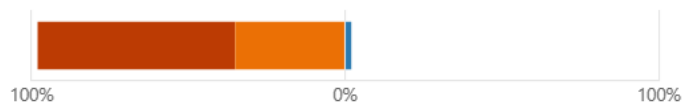
The chart Nr. 13. shows that 77% of respondents would use an autonomous car via a booking platform like Uber or a Tesla specific platform. This implies a large potential customer base. Individuals on the supply side appear somewhat more reserved. Although 77 % expressed willingness to utilize the service, only 66% indicated willingness to use their own vehicles. Uncertainty was expressed by the similar number of individuals on both sides, with 15% and 16% of people being unsure about their participation in this business. This is an interesting finding, which suggests that marketing is needed to convince the 15% on both sides to participate. It would also be prudent to subsidise the service, to make it more attractive to the people still hesitant.

Both findings emphasize the significant market potential for Autonomous Driving Technology (ADT), which Tesla aims to pioneer. Investing in this segment strategically seems to be logical, as the survey reaffirms its growing relevance in the future.

15. Does the ADT (Autonomous Driving Technology) have an impact on the disruptiveness of Tesla?

[Weitere Details](#)

■ Strongly agree
 ■ Agree
 ■ Disagree
 ■ Strongly disagree



Furthermore, ADT was proven to be a source of Tesla being disruptive. Nearly no one (4%) saw a reason to disagree, with 61.5% strongly claiming that it is impactful and additionally, 35% concurring with this sentiment. This is leading us the conclusion that ADT has an impact on the perception of Tesla being a source of industry disruption.

16. Where do you see Tesla in the future?

[Weitere Details](#)

[Einblicke](#)

● The top EV Producer	54
● Under the 5 biggest players in t...	41
● As a small niche player	4
● Becoming irrelevant	2



When asked about the whole future of Tesla, the survey gave a clear picture of Tesla being successful. Over 50% of the respondents viewed Tesla as the number 1 brand of electric vehicles. Additionally, 41% saw the company as one of top 5 players in the automotive industry. There were only 2% of outliers who predicted that Tesla would become irrelevant in the future.

To further investigate the dataset and since this scenario contained two independent variables, a multiple regression model was used. To prove the reliability and statistical significance of the dataset, the first step was to conduct an ANOVA-Test. As previously stated, the independent variables were: 1) ADT and 2) Gigafactory. The dependant variable to which a correlation was being tested was the disruptiveness of Tesla. Further factors like moderators were respected as well.

It is important to underline here that a moderator is a third, independent variable that enhances or mitigates the correlation. In contrast, a modifier changes the path dependency between the variables: “automotive industry disruption and ADT/Gigafactory.”

Regression analysis was used to determine the extent to which the respondents rated the importance of

- a) the Gigafactories
- b) the ADT

for whether Tesla fulfils the characteristics of being a disruptive company. Likert scales were used to classify these two independent variables. The upcoming chapter is organized as follows: single regression (Gigafactories), single regression (ADT) and finally the multiple regression involving both independent variables.

1) Linear regression with the independent variable Gigafactories

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Gigafactories are a crucial factor for Tesla's success ^b	.	Enter

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

b. All requested variables entered.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3,577	1	3,577	9,541	,003 ^b
	Residual	37,116	99	,375		
	Total	40,693	100			

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

b. Predictors: (Constant), Gigafactories are a crucial factor for Tesla's success

It can be seen that the effect of the independent variable on the dependant variable was highly statistically significant. The ANOVA-Test resulted in a high significance level of .003. Therefore, the probability of obtaining a T of 3.089 or greater can almost be ruled out.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,626	,266		9,872	<,001
	Gigafactories are a crucial factor for Tesla's success	,194	,063	,296	3,089	,003

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

```
REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT howDisruptiveTesla
/METHOD=ENTER ADTimpactDisruptivnes.
```

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,296 ^a	,088	,079	.6123000479

a. Predictors: (Constant), Gigafactories are a crucial factor for Tesla's success

Using the constant and the regression coefficient B, the influence of the characteristic Gigafactories on the dependant variable could be predicted with high probability using the following regression equation: $Y(\text{dep.V}) = 2.626 + 0.194x(\text{ind.V})$

The model summary showed a correlation coefficient of $R = .269$, a weak positive correlation with the dependant variable. This meant that Gigafactories promoted Tesla as a disruptor. Just below 9% of the variance that occurred in the assessment could be explained by it (coefficient of determination $R\text{-squared} = .088$)

The significance of the regression model was tested using the analysis of variance (ANOVA). The probability that the regression coefficient assumes the value 0 and is based on chance could be virtually ruled out with a value of $p=.003$. The F-value is 9.541 with a small p value, this meant the model was statistically significant.

The t-value assessed the statistical significance of the coefficient. In this case, a t-value of 9.872 suggested that the coefficient for Gigafactory was statistically significant.

2) Linear Regression with the independent variable ADT

Now the same procedure was conducted with the independent variable ADT instead of the independent variable Gigafactories.

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Does the ADT have an impact on the disruptivnes of Tesla? ^b	.	Enter

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

b. All requested variables entered.

The model summary with a correlation coefficient of $R = .444$ indicated a moderate positive correlation with the dependant variable. About 19% of the variance that occurred in the assessments could be explained by it (coefficient of determination $R\text{-squared} = .189$)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,613	1	7,613	24,045	<,001 ^b
	Residual	31,027	98	,317		
	Total	38,640	99			

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

b. Predictors: (Constant), Does the ADT have an impact on the disruptivnes of Tesla?

As with the previous regression, the ANOVA-Test was conducted to prove the significance of the model. The ANOVA-Test showed that the explanatory causal nature of the independent variable on the dependant variable was also statistically significant. This resulted in a high significance level of ($p < 0.001$). The probability of obtaining a T of 4.904 or greater could almost be ruled out.

This indicated strong evidence against the null hypothesis (H_0 =ADT is not a Source for Tesla's Disruptiveness) suggesting that the independent variable significantly influenced the dependent variable. In summary, the ANOVA results suggested that the regression model as a whole was statistically significant.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,563	,387		4,039	<,001
	Does the ADT have an impact on the disruptivnes of Tesla?	,521	,106	,444	4,904	<,001

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,444 ^a	,197	,189	.5626753047

a. Predictors: (Constant), Does the ADT have an impact on the disruptivnes of Tesla?

Using the constant and the regression coefficient B, the influence of the characteristic Gigafactories on the dependant variable could be predicted with high probability using the following regression equation: $Y(\text{dep.V}) = 1.563 + 0.521 (\text{ind.V})$.

The model showed that the standard error of the estimate has a value of 0.5626. The probability that the regression coefficient assumes the value 0 could be virtually ruled out with a value of $p < 0.001$. The probability that the F-value of 24.045 is reached, was less than 1%.

3) Multiple regression with both independent variables:

The third and final regression contained two independent variables.

Model	Variables Entered	Variables Removed	Method
1	Gigafactories are a crucial factor for Tesla's success, Does the ADT have an impact on the disruptivnes of Tesla? ^b	.	Enter

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?
 b. All requested variables entered.

In this chart both independent variables were entered. The following model summary shows the R-Value, R²-Value, adjusted R² and the Standard Error of the Estimate.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,598	2	4,299	13,881	<,001 ^b
	Residual	30,042	97	,310		
	Total	38,640	99			

- a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?
 b. Predictors: (Constant), Gigafactories are a crucial factor for Tesla's success, Does the ADT have an impact on the disruptivnes of Tesla?

As in the previous regressions, the ANOVA-Test was conducted first, to prove the significance of the model.

The effect of the explanatory independent variables on the dependant variable were also statistically significant. The ANOVA-Test results in a significance level of <0.001. The probability of obtaining a T of 3.255 or greater could almost be ruled out.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,321	,406		3,255	,002
	Does the ADT have an impact on the disruptivnes of Tesla?	,466	,110	,396	4,246	<,001
	Gigafactories are a crucial factor for Tesla's success	,107	,060	,167	1,783	,078

a. Dependent Variable: how disruptive would you describe Tesla in the automotive industry?

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,472 ^a	,223	,206	.5565174644

a. Predictors: (Constant), Gigafactories are a crucial factor for Tesla's success, Does the ADT have an impact on the disruptivnes of Tesla?

The second variable did not exhibit statistical significance, as indicated by a p-value of 0.078. The expected Betas are 0.396 for the first variable and 0.167 for the second variable. The model revealed a standard error of the estimate with a value of 0.5565, which showed that the variable “Gigafactories” was not significant.

Correlation became stronger, which can be seen with R = 0.472. The corrected R-squared must be used for the proportion of variance explained by the two independent variables. As much as 22% of the differences in the expression of the dependent variable could be explained with this model.

So, we can derive that the ADT and Gigafactory have an influence on the disruptiveness of Tesla, even when the one variable showed only a small significance. Both were positive which means that if the value of the Gigafactories increased, the Disruptiveness would also increase. Also, if the value of the ADT increased, the Disruptiveness would increase with a slightly less strong effect.

5. Discussion

This chapter delves into the impact of Tesla's Autonomous Driving Technology and their Gigafactories on the automotive market examining both, their disruptive and non-disruptive effects. The analysis is grounded in findings from expert interviews and the survey conducted, complemented by relevant theoretical frameworks. Additionally, the chapter explores the significance of the moderating variables in influencing these effects.

The dependant variable in this scenario is Tesla's Disruptiveness, whereas one independent variable is the Gigafactory, and the second independent variable is the Autonomous Driving Technology. There is a positive correlation in the regression, which proves that both factors are reasons for Tesla being disruptive. This aligns with the results of the interviews. The results of the survey are statistically significant, which proves the statement. Based on the literature, the first perception about Tesla's Disruptiveness was confirmed by conducting the triangulation.

5.1 Disruptiveness in the automotive industry

When examining Tesla's disruptiveness in the automotive industry, a consensus was evident. The findings through the interviews and survey were congruent with the literature. 48% of participants even stated viewing Tesla as extremely disruptive in the automotive industry. Further 43% declared Tesla as being very disruptive. The literature implied the same outcome, considering sources positing that Tesla has sharpened the entire industry, starting with a niche new product, which created new customer demand (Cooke, 2020). According to the interviews we can derive the same result. Automotive Expert and Consultant N (2023) gave the following statement: *“Tesla has revolutionised the industry with its futuristic approach, uniqueness and individual design.”*

Speaking of revolutionising an industry is a clear term for being disruptive. Another Expert A (2023) spoke of a new business model which Tesla has invented: *“New Business Model: [...] Introduction of already available BEVs to the masses [...]”* The experts unanimously considered Tesla to be in a disruptive role over the last several years.

5.2 ADT contributing to Disruption

The literature implied that ADT could be a new disruptive technology (Liangkai Liu, 2020). In the survey people were also convinced with 61.5% strongly agreeing that the ADT is a reason for Tesla being disruptive. Further 35% agreed with the statement and only 4% disagreed and did not see ADT as impactful for Tesla's disruptive role. The graph can be seen in chapter 4.2 Results of the survey on page 27.

In this case another alignment appeared, as the findings are congruent with the literature review.

The ADT literature is mainly sceptical because of technical obstacles and legal reasons (Markus Maurer, 2016). Nearly all players in the automotive market are fighting to become market leaders in this field, seeking to be first movers offering autonomous driving to the mass market. There will be "crucial" moments in the short-term future which will distinguish market leaders from the rest. Whether this arises from an automotive firm like Mercedes, BMW, Tesla or from a tech enterprise like Waymo, Cruise or Apple, will be seen over the next few years.

Experts R (2023) was convinced of the disruptiveness and the importance of ADT and remarked: *"Tesla's emphasis on autonomous driving technology has not only positioned the company as a technological frontrunner in the automotive industry but has also contributed significantly to its competitive advantage, brand differentiation, and market positioning."*

The diverse opinions on Tesla's ADT business show a wide range of viewpoints. One of the experts D (2023) mentioned: *"[...] driven by our evolution as human to the next phase, as this is the logical next step to let the car drive you"*.

One could argue that the experts are convinced of the importance of ADT but in the same breath are sceptical of Tesla being the pioneer on this field. Some stated that other competitors are further along in their development cycle of ADT or saw Tesla as having a disadvantage through setting the wrong priorities. Interviewee J (2023) asserted: *"Waymo or Cruise are developing their own autonomous driving systems. At the moment they seem to be more successful than Tesla in that pursuit."*

The next few years will determine the future of Tesla and of ADT, which is crucial for being a frontrunner in the automotive industry.

5.3 Gigafactory Contributing to Disruption

Surprisingly, compared to the variable ADT, where the experts interviewed and survey respondents had matching opinions, the perceptions of the Gigafactory were more diverse. Even though 58% strongly agreed on the Gigafactories being a crucial factor for Tesla's success, there were 13% neutral voices and even 6% of people disagreeing and strongly disagreeing. The trend towards the majority being convinced about the important role of the Gigafactories on disruptiveness was obvious, but there were still outliers with strong opinions. Most of the results gave grounds for seeing them contributing to Tesla's disruptiveness. For instance, the first factory with complete robotic automation and many processes being autonomous is setting new standards to the industry. Every decade has had its pioneers in the automotive industry, like Ford and mass production, VW with platform systems and the newest incumbent, Tesla, with its Gigafactories. Production on a huge scale was confirmed in all the literature to be enormously important and reasons for having competitive advantages. Thus, economies of scale can be realised.

The third research source in form of expert interviews gave a coherent picture. Expert O (2023) was convinced stating: *"Gigafactory productions was a wake-up call for most OEMs"* This is a clear signal about the disruptive power of the Giga concept, which leads competitors to adjust their production strategies.

Expert N (2023) a manager of a well-known German premium car brand added: *"The competitive advantage that these Gigafactories provide to Tesla lies in their ability to produce electric vehicles at a large scale with better cost-efficiency, tighter quality control, and continuous technological advancements."*

Even a competitor admitted and underlined the competitive advantage of Tesla which can be interpreted as clear signal and emphasizes the importance of the Gigafactory to Tesla's Disruptiveness. The interviews also suggested the VRIO-Model (Examined in chapter 2.2.1) that Tesla has a CA which is created through the Gigafactories. Competitors are trying to follow Tesla's innovation in manufacturing, further pointing to the conclusion one could draw about the Gigafactories being one of the sources for Tesla's Disruptiveness.

6. Limitations

The expert interviews were carried out with professionals employed by companies in the automotive industry or closely associated with it. This situation raises the potential for selection bias (Cachia, et.al., (2011). Tesla is a force that has significantly influenced the industry and frequently gets attention in the media. Elon Musk is also a highly public figure, all of which influence the perception of Tesla being disruptive.

The survey might face limitations if the sample was not representative of the broad population. If the participants of the survey were disproportionately from a specific demographic or professional background, the findings would not accurately reflect actual opinions from which one can generalize (Adida, Gottlieb, et. Al., 2019).

Another phenomenon which could possibly occur is the Response Bias in Survey, whereby participants in the survey may be inclined to respond in a manner they perceive as favourable. Participants in this case want to align with popular opinions, especially considering the high-profile nature of Tesla and its presence in the media. This response bias could affect the reliability and objectivity of the survey results (Adida, Gottlieb, et. Al., 2019).

There might be other important factors - which were not considered in this study - that led to Tesla becoming a disruptor on the automotive market. This could be the subject of further research.

Addressing these limitations through the methodology, picking the participants carefully, and reporting transparently enhances the robustness of this thesis (Hancock, D. R., & Algozzine, B., 2006).

7. Conclusion

Based on the literature review, the survey and the expert interviews, the main reason for Tesla being a disruptor in the automotive industry is the combination of developing autonomous driving technology and the Gigafactories. Both variables on their own, do not have a large causal relationship to disruptiveness, but a stronger correlation can be seen with the two phenomena acting in combination.

The qualitative research (Appendix A and Chapter 4.2) showed that previous knowledge and awareness about the notion of Disruptiveness increased the perception of Tesla being

disruptive. Whereas people with a lack of prior knowledge classified Tesla as less disruptive. Nonetheless 48% of the survey participants described Tesla as extremely disruptive in the automotive industry.

Building a synergy between the literature review and analyses of the two models: VRIO and 5F, we can compare the results with Christensen's Theory and conclude that Tesla has a competitive advantage. The VRIO Model implies that the following characteristics are applicable to the Gigafactories: The concept is valuable, as it creates shareholder value and maximizes invested resources. It is rare, as Tesla is currently the only company to own comparable production facilities and therefore only 5 Gigafactories exist worldwide. The third characteristic: "impossible to copy" is not applicable, as competitors are trying to follow the strategy and build their own Gigafactories. The last characteristic "organized" is suitable due to the well-planned roll-out of the Gigafactories on different continents. 3 of the 4 characteristics are applicable so the model implies that the Giga-concept is a competitive advantage for Tesla.

The results of the survey gave a congruent picture with 58% of all participants strongly concurring with the hypothesis: "*The Gigafactories are a crucial factor for Tesla's Success*". Aligning the primary empirical data (chapter 4.2) and the literature (chapter 2.1), the research question: "*Are Tesla's Gigafactory and Autonomous Driving Technology automotive industry disruptors?*" could be answered as follows:

Tesla's Disruptiveness was proven through the interviews conducted and the survey. With the literature review confirming these results, the Disruptiveness of ADT and Gigafactories are relatively certain. To examine the reasons behind this, both variables were tested in a triangulated way. Looking at the automotive landscape, movements can be seen where competitors orientate themselves to Tesla's Giga strategy and follow in its footsteps in the development of EVs. There are specific tipping points in the setting up of a Gigafactory: robotic automation, strategic location, large-scale production, and disruptive R&D.

The ADT is at a critical moment right now, which will gain clarity in the upcoming decades. The literature, as well as the survey and the interview results, imply that ADT is close to a breakthrough moment. The Interviews concluded that ADT will be a major CA in the future and state of the art in a few years. Whomever is the technology leader will dominate the competition for many years, according to the experts. Notwithstanding, there are certain obstacles that Tesla needs to overcome to allow ADT to become a source of disruptiveness in the future as well. Acceptance of ADT is still not mainstream and every company in this field

is facing several challenges. The biggest hurdles are technical, in terms of feasibility to let a car drive without accidents and legal in the form of regulations through policymakers, e.g. regarding responsibility in case of an accident. A further obstacle is psychological impediments to adoption of the technology by the mass consumer. Many individuals remain reluctant to relinquish control while driving in an autonomous vehicle.

Throughout the interviews and the analysis, different opinions were discussed. Upfront, it is important to divide the interviewees into different groups. There was an internal group from Tesla, a group of competitors, a group of consulting stakeholders, and others. It turned out to be interesting that in each group, there was a certain prevailing opinion, which can be seen in the chapter (4. Empirical results). Gigafactories themselves are seen as disruptive according to the survey results and the statements of the expert majority who were interviewed. ADT is most likely in the early-stage development phase which was the consensus from triangulation. It should be in daily usage in the near future. It is one of the main factors for Tesla being disruptive. The results of the survey confirmed the results of the interviews. The majority agreed that Tesla is indeed disruptive, and the major drivers for this disruptiveness are the Gigafactories and developing ADT. It was important to conduct both independent research models to confirm the proposed theory.

In conclusion, one may infer that Tesla will continue its disruptive strategy and push further into ADT. Possibly, the company could shape this market as well, just as it has shaped the EV-market over the last decade. All three research sources predicted a successful future for the company and the EV mobility market in general. Furthermore, the three sources shared the same view about the Gigafactories. They congruently characterized them as sources of disruptiveness and predicted that competitors would follow and copy Tesla's strategy in this regard. Regarding ADT, the qualitative expert interviews showed a divergent result, as some of the respondents viewed Tesla critically and as not being disruptive enough in this field. The literature implied heavy competition and uncertainty in this field in the near future.

7.1 Theoretical Contribution

This dissertation addresses a topic relevant for two of the biggest industries: mobility and the automotive sector. It contributes to the study of disruption and how a firm gains a competitive edge through certain technologies or strategic decisions. This can serve as a basis for deeper and more detailed further research.

As the concept of disruptiveness continues to be of interest, here we see an example of how an individual player can wield significant influence in an entire industry.

7.2 Practical Contribution

The overall findings are potentially valuable for startups, managers, and stakeholders in the mobility sector. The positive future perception of Tesla as well as high acceptance of ADT, in combination with a huge growing market, can serve decision makers in various business fields. The dissertation found that the autonomous driving market is still in a nascent stage and is not yet well developed. The growth potential is immense, which is a finding that can serve numerous stakeholders from wide-ranging businesses. If a company wants to succeed in a traditional market, or even be disruptive, it is crucial to be positioned in new or advanced technologies.

7.3 Further Research

To gain further understanding of Tesla's disruptiveness, it would be interesting to examine other parts of Tesla and its connected companies, such as Space X and the Supercomputer x.AI. This research provides some insight concerning Tesla's ADT strategy and the impact it possibly will have. The experts stated that ADT is evolving and could come to being used daily in the near future. Potential research could also focus on competitors and how far along they are with ADT and what their strategy and goals are. Furthermore, research could investigate Tesla's disruptiveness regarding solar panels, charging networks and energy storage. This is a sector gaining relevance through the general importance of sustainable energy. Future research could also investigate a bigger and more demographically diverse group of respondents, to find out about the perception of ADT and the disruptiveness of Tesla.

Additional stakeholder groups, such as governmental and legal institutions, should also be interviewed as they play a major role for the roll out of ADT, considering market entry, cartel law and further factors like Data Storage or the Charging facilities on common ground, which are crucial for Tesla.

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Appendices

Appendix A:

Survey

Category	Question	Answers	Source
Demographics	What is your gender?	Female/Male/Others	
	How old are you?	Open Questions	
	What is your nationality?	List of Nations	
Personal Knowledge	How familiar are you with the term disruptiveness?	Likert-Scale 1-3	
Basic information regarding disruptiveness by Christensen was provided.			
Disruptiveness	How disruptive would you describe Tesla in the automotive industry?	Likert-Scale 1-4	
Variable1 Gigafactory	Are you familiar with the notion of Tesla's Gigafactories?	Yes/No	
	Please state your opinion to the following sentence: "The Gigafactories are a crucial factor for Tesla's Success"	Likert-Scale 1-4	
	Which would you rank the most important features of the Gigafactories? In regard to being the source of success	Ranking	(Gebauer et al., 2016)
Disruptiveness	Which of the following internal factors of Tesla would you describe as being disruptive?	"Tick the Box if you think this is fitting"	(Gebauer et al., 2016)
Test Question/Blind question	This is a Test-Question, to prove you read the Questions carefully. Just tick the third box!		
Variable 2 Autonomous Driving	Will the autonomous driving be relevant in the future?	Likert-Scale 1-4	
	In which Time Horizon would you see Autonomous Driving to be in daily usage?	Multiple choice (multiple selection possible)	(Gebauer et al., 2016)
Personal Usage	Would you use a car that drives autonomous if you book it through a platform like Uber or a Tesla specific platform?	Yes/No/Maybe	
	Would you own an autonomous car and monetize it through ridesharing when you are not using it	Yes/No/Maybe	
Disruptiveness and ADT	Does the ADT (Autonomous Driving Technology) have an impact on the disruptiveness of Tesla?	Likert-Scale 1-4	
Future Prospect	Where do you see Tesla in the future?	Multiple choice (multiple selection possible)	Gebauer et al., 2016)

Table 3: Questions of the Survey

Appendix B:

The following pages display the expert's summarized responses. For the purpose of anonymity and concision, the first question—which asked about the expert's experience, employment history, and position within the company—has been omitted.

Chapter	Developed Question
Personal Background and general data	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
Disruptiveness in the automotive industry	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	How did Tesla disrupt the automotive industry in the last decade?
Competitive Advantage based on ADT and Gigafactories	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
Future Prospect	What are the key challenges and risks regarding with Tesla’s disruptive strategy?
	What is your view on Tesla’s future? Where do you see Tesla in the next 3-5 and or even 10 years?

Table 4: Questions and Structure of the Interview

Interview 1:

Age: 37

Occupation: IT Projects Manager EMS Global

Country of Origin: Germany

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	I have been working for almost 9 years in the German automotive industry, taking care of international and multi-Brand digitalization projects within production and logistics facilities.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	To me it means that a company successfully introduces a new product, technology or process in such a way that it fulfils or even creates customer demands.
HS	How did Tesla disrupt the automotive industry in the last decade?
	<ol style="list-style-type: none">1. Tesla successfully introduced and sold electric vehicles in a large scale to customers.2. Tesla introduced new production processes that reduce the production time of electric vehicles dramatically.3. Tesla developed the electro vehicle as a software product with a central OS.
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	<p>By developing and producing battery cells and packs large scale, Tesla can offer cheaper cars with a longer range than competitors. The development of Tesla's electric vehicle OS the company further reduces its production costs and shoves a higher margin.</p> <p>The large scale and the focus on battery cells with the joint venture with Panasonic in Nevada gives Tesla CA in terms of price and technology.</p>
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	<p>So far Tesla's Autonomous driving system is not successful. As it only uses cameras and not Lidar/Radar sensors like competitor such as Cruise or Waymo it is inferior. I have great doubts that the current solution will be successful on the market.</p> <p>The technology might be mass suitable in 2026-2028. Waymo and Cruise are further in the development. Waymo has the most and Cruise the secon most driven kilometres by autonoums technology. They use a sensor fusion technology, while tesla only uses cameras to save costs.</p>
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	<p>Start Ups such as Waymo or Cruise are developing their own autonomous driving systems. At the moment they seem to be more successful than Tesla in that pursuit.</p> <p>Traditional automotive manufacturers are trying to implement new production processes to decrease their production time of electric vehicles like Tesla already successfully did.</p>

	Stragglers are not always performing less. E.g., VW plans to launch a full electric car the ID2 in 2026 for the affordable price of 25k. This could be dangerous as well for Tesla.
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	<ol style="list-style-type: none"> 1. Traditional automotive manufacturer such as VW are also building large scale pure electric vehicle factories and new start-ups like Rivian are doing the same thereby closing the gap to Tesla's initial advantage. VW starts building Gigafactories and will build cell technology inhouse. 2. External suppliers like LG Chem, Samsung SDI and CATL are offering high performance battery cells and packs to Tesla's competitors. 3. New Start Ups and Traditional automotive manufacturers with the help of external suppliers are also building their own Car OS. (Operating System) BMW builds this with Nvidia, Tesla as for now by itself. <p>All in all, Tesla is in danger of losing its competitive advantage if not coming up with more disruptive strategies leading to new advantages or strengthen the existing ones! Tesla has the challenge to battle not only competitors in the automotive sector but also in the disruptive and fast paced tech-branch in the silicon valley.</p>
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	I think Tesla will continue to grow strong between 30-50%pa in the next 3-5 years becoming one of the five biggest automotive manufacturers.

Interview 2:

Age: 25

Occupation: Sustainability and Growth Manager

Country of Origin: Germany

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	I studied at the University of Applied Sciences for Environment and Business and quickly developed a passion for sustainability because I believe that sustainability has become a very important competitive factor these days, I focused on sustainability in my master's degree and after that embarked a career with Mercedes-Benz, focusing on ESG reporting. In this role, I actively contribute to the preparation of our annual sustainability report.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	Being a disruptor in the automotive industry means fundamentally reshaping the sector through innovation and forward-thinking strategies. In the case of Mercedes-Benz, for example, the company demonstrates a relentless commitment to electric vehicle (EV) leadership by consistently introducing innovative EV models. Also challenging the old own combustion engine technology and departments. In addition, redefining the future of the automotive industry by prioritizing sustainable mobility solutions. This includes investing in eco-friendly materials, promoting the circular economy and pioneering carbon-neutral production.

HS	How did Tesla disrupt the automotive industry in the last decade?
	Innovative and high-performance electric cars, sustainable transportation, reshaping consumer perceptions! Integrating technology, such as autonomous driving features and over-the-air software updates! New Driving experiences. The introduction of advanced driver-assistance systems and the development of self-driving capabilities This was setting new industry standards in the last decade.
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	The competitive advantage that these Gigafactories give Tesla lies in their ability to produce electric vehicles on a large scale with better cost efficiency, tighter quality control and continuous technological advances. This allows Tesla to offer a wider range of electric car models at competitive prices.
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	Tesla became a technological frontrunner in the automotive industry, besides other because of the ADT Topic. Still Tesla has to do a lot of work on that field to compete with other OEM!
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	The reaction of conventional OEMs to Tesla's Gigafactory output and developments in autonomous driving highlight a more general trend in the industry toward electrification, technological innovation, and software integration, as well as the recognition of Tesla's impact on reshaping the automotive landscape in the future.
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	The company faces challenges related to production scalability, technological reliability, market competition, regulatory dynamics, and charging infrastructure. Overcoming these obstacles will be critical for Tesla to continue its success story and be sustainable.
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	Tesla's trajectory appears promising based on its current market position and strategic initiatives. Over the next three to five years, it is likely that Tesla will continue expanding the range of products it offers, focusing on improving autonomous driving capabilities and creating sustainable energy solutions. The company may continue expanding its manufacturing and charging system infrastructure. Tesla's success over the next ten years may depend on its ability to overcome major challenges like efficiently scaling production, ensuring technological dependability and safety, and navigating market competition. Moreover, the success of the company may also depend on its capacity to adopt disruptive technologies.

Interview 3:

Age: 38

Occupation: Product Manager

Country of Origin: Germany

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	Currently, I work as a Service Contract Product Manager. In this role, I have several responsibilities. These include overseeing the Service Contract performance management for the Overseas and China regions, where actions are taken based on the dynamic market and competitive situation to boost the Service Contract business or enhance vehicle sales through service contract initiatives. Another crucial aspect of my role involves utilizing service contract-specific data to monitor the service contract based on defined KPIs, allowing for flexible intervention and optimization of the service contract.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	1. Environmentally conscious and sustainable practices 2. Technological Innovation (Especially, advanced technologies that revolutionize the way vehicles are designed/powerd/etc.) 3. New Business Models
HS	How did Tesla disrupt the automotive industry in the last decade?
	Through the introduction of innovative EVs, creative technology and a new approach to marketing & sales
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	Tesla's Gigafactories facilitate large-scale EV manufacturing, providing advantages such as economies of scale and vertical integration for key components. This allows Tesla to drive down production costs, ultimately making their EVs more affordable.
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	Tesla's autonomous driving technology stands as a cornerstone of their competitive edge in the automotive industry. As early pioneers in this field, Tesla was among the first to invest significantly in autonomous driving, setting them apart from traditional automakers. This trailblazing approach has solidified their image as a forward-thinking and technologically advanced company. It not only distinguishes them within the automotive landscape but also positions them to appeal to a broader customer base, potentially drawing in new customers.
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	Traditional OEMs initially doubted Tesla's potential in the mainstream EV market, underestimating the impact of Gigafactories and autonomous tech. As Tesla's success grew, OEMs recognized the shift to EVs, investing heavily in technology and R&D. They introduced electric models to compete, leading to a strong focus on alternative powertrains and autonomous research in today's industry.
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?

	<ol style="list-style-type: none"> 1. Regulatory compliance and legal aspects 2. Battery technology 3. Intensified EV competition 4. Rapid pace of technological innovation (Especially in China) 5. Consumer adoption/market acceptance of EVs 6. Geopolitical/Economic uncertainties 7- Maintaining Brand/Image reputation
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	<p>Considering current events and the emphasis on sustainability, I anticipate a very positive trajectory for Tesla. This is particularly due to the increasing promotion of electric vehicles, where Tesla stands out prominently with its innovative technologies, including autonomous driving. Tesla's strong focus on sustainability also plays a pivotal role. Furthermore, compared to traditional automakers, Tesla can offer electric vehicles at a much more competitive price.</p> <p>Another significant factor is Tesla's global expansion and the construction of Gigafactories in various countries, demonstrating substantial international growth potential. However, it is crucial to note that the Chinese market, in particular, is witnessing the emergence of numerous EV manufacturers with outstanding electric vehicles. Therefore, a critical aspect will be how Tesla advances its battery technology and maintains its reputation as an EV pioneer in the face of increasing competition.</p>

Interview 4:

Age: 26

Occupation: Senior Mgmt. Consultant

Country of Origin: Netherlands

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	I work as a senior consultant in Amsterdam, with customers in the automotive industry.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	Innovativeness, Transformative brand design, Emphasis on sustainability
HS	How did Tesla disrupt the automotive industry in the last decade?
	Tesla has revolutionised the industry with its futuristic approach, uniqueness and individual design.
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?

	This means fast production, which saves on transport costs and reduces the need for storage. In addition, the cost per kilowatt hour of the batteries makes the cars much more affordable. This leads to a competitive advantage through lower costs.
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	Autonomous driving will not be a major competitive advantage, as other automotive companies are rapidly catching up in this area.
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	The started to built bigger factories to produce in a big scale, invented more automation technology and offer EV. More and more OEMs are launching electric models.
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	<ul style="list-style-type: none"> - Other companies are also investing in the same technologies. - Tesla is synonymous with luxury and sustainability, but other companies such as BMW, Mercedes and Lexus are also taking the same approach and threaten the brand
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	I think Tesla will continue to introduce new innovations and new approaches to differentiate itself from the competition and grow rapidly over the next few years.

Interview 5:

Age: 56

Occupation: Strategy Consultant with focus on automotive customers

Country of Origin: Germany

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	The current automotive market is in a transition phase from moving from a fossil fuel powered engines to battery or hydrogen powered ones. Many new players like Tesla, BYD, Polestar etc. started to enter the market and put pressure on existing brands.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	<ul style="list-style-type: none"> - Focus on innovation: New products with better features than existing ones - Automation: Full self-functional assembly line, by using robotics - Sustainability: Following the trend of being more sustainable
HS	How did Tesla disrupt the automotive industry in the last decade?

	<ul style="list-style-type: none"> - Full automatic and highly efficient assembly lines in his giga factories - New electric cars at an affordable price (Tesla Model 3) - Setting benchmarks in terms of speed and distance - Own Battery production, vertically integrated
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	<ul style="list-style-type: none"> - Due to full automation in the production lines, Tesla is able to produce at costs below of the competitors and therefore has a competitive advantage in Terms of price.
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	<ul style="list-style-type: none"> - The automotive driving technology is the next big thing in the automotive industry. The company which successfully receives a breakthrough in the technology will be able to sustain its competitive advantage.
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	<ul style="list-style-type: none"> - Traditional OEM also started setting up new electric vehicle product ranges to compete with tesla. In comparison to tesla this new product lines are not profitable since the existing manufacturers need to build-up everything from scratch. Regarding autonomous driving the traditional OEM partner-up with tech companies like google or Nvidia.
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	<ul style="list-style-type: none"> - A big bet that electric vehicles will be the future of the automobile industry. Through aggressive pricing drive competition out of the market.
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	<ul style="list-style-type: none"> - I think tesla will take its place as one of the biggest automobiles manufactures in the world. Nevertheless, I think competition is arising and also existing brands like BMW, Mercedes and Porsche will defend their position in the market. - From a disruptive perspective Tesla will reach autonomous driving but might not be the first one

Interview 6:

Age: 37

Occupation: Engineer at OEM in the ADT field

Country of Origin: Germany

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	I studied Computer Science for my Bachelor and my Master and specialized in automated systems. I am currently employed in the automotive industry as an engineer and worked for automotive projects in different companies in my past. I did my PhD about autonomous driving technology at Mercedes.

HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	<ul style="list-style-type: none"> - The company needs a leading edge position - Is not afraid to try something completely new - Costs should not play a primary role in every business decision
HS	How did Tesla disrupt the automotive industry in the last decade?
	With electric cars and a significant range. Also the current Beta for the automated driving in the US looks very promising.
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	The time to produce a car is cut down by standardized processes and huge factories that facilitate an easier and faster way to produce the cars. It also scales the product which makes it easier to make it available for customers.
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	The Autonomous Driving is important for Tesla however it is not that important right now. Tesla prioritizes make their cars available for everyone. Tesla is not advertising its automated ("autonomous") driving functions for example like its automated competitors Waymo, BMW, Mercedes-Benz ...
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	Gigafactory productions was a wake up call for most OEMs I don't know how traditional OEMs respond to Teslas automated driving functions since its not available to most of the world
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	<ul style="list-style-type: none"> - There is always the chance of failure in the next disruptive cycle - Completely new products/ functions first have to convince the customers. New products are often not very well accepted by traditional customers. (See electric vehicles/ future: automated driving)
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	Tesla will expand their portfolio and make their products more available. They will also use their supercomputer to assess most of difficult situations to improve their current ADAS (Advanced Driving Assistance Systems) instead of rolling out complete automated driving. The combination of the assessment of their supercomputer combined with vehicles collecting real life scenarios can make driving safer for everyone preparing the cars for a more automated future (Level 3 / 4) until a fully autonomous mode Level 5 is possible.

Interview 7:

Age: 25

Occupation: Automotive Project Manager

Country of Origin: Italy

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	Internship + Working Student @AUDI Project Manager @Lamborghini
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	New technologies New business Models Focus on Sustainability
HS	How did Tesla disrupt the automotive industry in the last decade?
	New Business Model: Introduction of (already available) BEVs to the masses Ecofriendly approach in production and supply chain Highly automated production lines
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	Cost reduction (Economies of Scale) Reducing Environmental Impact The competitive advantage could be that all important production steps are integrated in one facility. Reduction carbon footprint and dependencies (Battery production) [if they produce the batteries in the GF as well...]
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	They don't have any competitive advantage with their autopilot system. Many other car manufacturers are ahead in this regard
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	Increased focus on ADAS systems and fully autonomous driving technologies Shift to the production of BEVs
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	Challenges in production: The highly automated approach comes with a lot of difficulties and bottlenecks that have led to delays

HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	<p>Tesla will definitely play a huge role in the automotive industry for a while now. Gaining market shares all over the world and shape the production of the sector</p> <p>The competition will be harder, a lot of new players are entering the markets, long players will release fully BEVs and so on...</p> <p>The manufacturers will have to find a way to set themselves apart from the others (for example by providing the necessary infrastructure etc...)</p> <p>A lot of people have much faith in Tesla, they have to show if they can manage to live up to it</p>

Interview 8:

Age: 34

Occupation: SSD Lead Europe

Country of Origin: DE

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	Worked as apprentice, focussing afterwards HR projects and also as HR Manager leading a plant for car supplier before.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	<p>Realistic action plan to grow the ambitious transfer to EV</p> <p>10x potential</p> <p>Driving major change in self automotive driving technology</p>
HS	How did Tesla disrupt the automotive industry in the last decade?
	<p>Reducing massive construction steps for hypergrowth.</p> <p>Perform the masterplan parts vs. ~90% no-sayers from bigger consultant groups expectation</p>
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	I like the simplicity around the options for your car like buying an Iphone in different colours. The pressing technic, where you could press a whole car
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	This is more important as EV itself, driven by our evolution as human to the next phase, as this is the logical next step to let the car drive you
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?

	Too slow an with too much trust in the outdated brandings
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	Lobbyism against Elon Musk
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	<p>Tesla will logical absorb other big car brands by investings in them >50% share. We will see massive increase in the automotive driving technic, self driving taxis by Tesla all over the world. I expect extreme low prices of the given and new models, combined with advertising in the cars (what we know for example from free apps) Tesla will expand the other divisions on Tesla bots, energy storage so massive, that prices for their EVs will be further reduced. Tesla will build and sale 20MIO cars per year with 2029 onwards which Sales&Service network all over the world</p>

Interview 9:

Age: 34 Years

Occupation: Research and Development

Country of Origin: India

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	<ul style="list-style-type: none"> • Worked in Quality Management at Supplier • Worked in Supplier Management during development at OEM • Work in R&D of Charging System at OEM
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	<ul style="list-style-type: none"> • Generate simple solutions with a big effect • Seamless integration of software features in the vehicle into our daily life • An image that portrays technical prowess
HS	How did Tesla disrupt the automotive industry in the last decade?
	<ul style="list-style-type: none"> • By making the overall vehicle design of EVs more mainstream • By giving its own charging infrastructure to its customers • By making software over the air an automotive feature
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?

	<ul style="list-style-type: none"> • Image • Higher vertical integration
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	<ul style="list-style-type: none"> • Image • Technically the rest of the automotive industry is at par with autonomous technology – just marked differently #Automomous driving (Tesla) = Driver Assistance systems (traditional OEMs)
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	<ul style="list-style-type: none"> • Giga Factory – Integrated Battery Production into the inhouse production network • Autonomous Driving – More data driven engineering
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	<ul style="list-style-type: none"> • Keeping the competitive advantage • Continue to offer innovations • Challenge traditional OEMs in traditional areas – Build Quality, Service, Brand Image
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	<ul style="list-style-type: none"> • Tesla will become an established manufacturer of economy cars

Interview 10:

Age: 60

Occupation: Director

Country of Origin: Germany

HS	Can you provide a brief overview of your background and expertise in the automotive industry or electric mobility sector?
	I have been working many years in the automotive industry. Over 30 years of experience as a manager in the IT and service industry.
HS	In your opinion, what does it mean for a company to be a disruptor in the automotive industry? (name 3 main factors)
	Questioning the tried and tested, introducing new technology, taking completely different paths, abandoning the familiar and introducing the unusual. Replace old technology with completely new technology. Questioning customer habits and creating new needs
HS	How did Tesla disrupt the automotive industry in the last decade?

	Introduction of new technologies and new designs. Technology leader in e-mobility. Focus on new sales channels and customers. Creating unique customer experiences
HS	What is the significance of Tesla's Gigafactories in terms of manufacturing electric vehicles? What competitive advantage do you think is it adding the company?
	Making consistent use of scaling effects; automation and digitalization. Producing in large quantities
HS	How important is the Autonomous Driving Technology to Tesla's competitive advantage in the automotive industry?
	Will be a major competitive advantage in the future. Autonomous driving will be state of the art in a few years' time. Whoever is the technology leader here will dominate the competition for many years to come. So it is absolutely important!
HS	How did the traditional OEM respond to Tesla's Gigafactory production and autonomous driving advancements?
	I assume that the OEMs are getting more pressure and more speed is coming into the market
HS	What are the key challenges and risks regarding with Tesla's disruptive strategy?
	Tesla is focusing ruthlessly on e-mobility - the question remains whether this technology will continue to dominate in the future. It would be advisable for Tesla to open up to alternative drive concepts (hydrogen cars). The design components should also be constantly scrutinized to see whether they satisfy customer needs. The model range is somewhat monotonous and not always appealing. Model diversity should be reconsidered here. The speed at which Tesla produces is also dangerous. Quality must not suffer as a result of speed!
HS	What is your view on Tesla's future? Where do you see Tesla in the next 3-5 and or even 10 years?
	That is a very exciting question. The other car manufacturers are catching up and are open to other drive technologies, among other things. The question is whether e-mobility will prove itself as a drive technology in the next 10 years and whether it can be developed further. Tesla should definitely remain "open", constantly question itself and not fall into arrogance and also pursue other technologies. If the model range is not developed further, I also see difficulties and other car brands such as VW, BMW etc. will dominate. Models should be offered for different target groups (small cars, SUVs) with different price segments. Otherwise, I think Tesla will lose market share