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Examining the Disruptive Innovation Theory by Analysing Tesla, Inc.

Master's thesis in
International Business

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Abstract:

The shift to electrification with electric vehicles (EV) is regarded as a phenomenon that is expected to permanently revolutionize the whole automotive industry and social habits of customers along with global economies and supply chains. Coinciding with the trend in early 2000s, at a time when the electric vehicle market was not formed yet, a startup called “Tesla Inc.” entered the market with all-electric strategy. As both developer and pioneer of the EVs, the company had gained a serious position in the industry, while being a part of the market's formation and development in remarkably two decades. Similar to the company's progress, ‘Disruptive Innovation Theory’ is well-known concept in academia that focuses on how companies create market disruption through their innovations. Although having some overlapping aspects with the theory, Tesla’s contrasting strategies, such as market entry, necessitates examination in the focus of theory.

The main goal of the study was to analyze how Tesla's approach redefines the theory of disruptive innovation by comparing and contrasting the case’s strategy with theory’s framework through three different dimensions: Tesla's disruption in the automotive industry, its high-end market entry against theory’s low-end approach, and incumbent companies respond to such innovative progress. By placing Tesla as a case, the study was designed to unfold progress of both the company and its industry from framework of the theory. Thus, regarding the qualitative research design, the development of the EV phenomenon and the company was unfolded with the process study approach for observing how the status quo in the market was formed overtime. Due to inclusiveness of the focused fields, secondary data was chosen as the source and obtained from several academic and business outputs (i.e., newspapers, company/industry, and governmental outputs) that were specifically focusing on automotive industry and the case company.

Outcomes revealed that Tesla's contradictory approach did not essentially redefine the disruptive innovation theory. Although the company’s both financial and industrial growth along with its achieved position contributed to the electrification phenomenon in the industry, it instead served as an alternative business-case through following a pattern that does not comply with the theory, not only in terms of its market entry, but also in many different layers (e.g., innovation, product, marketing, organizational strategies). Additionally, the approach of the incumbents also did not fully conform to the theory: despite the governmental regulations pushing them for lowering carbon emissions, evolutionary progress (instead of revolutionary) of battery technology (in terms of performance and cost), mainstream customers preference and lack of sufficient charging infrastructure in cities were considered as the main reasons for their delay.

Despite being a popular case in academia with similar case-theory comparisons, this study was constructed on the company's past to present (and even future) strategies and presented its growth pattern using up-to-date data. Contrary to previous studies, the case was analyzed not only from a market entry perspective, but also from other aspects highlighted by the theory. In addition, considering the managerial implications, the study highlighted Tesla’s case as an alternative approach in terms of positioning and developing innovations in market and the pattern to follow for other companies in the industry.

Key words: Disruptive Innovation Theory, Disruptive Innovation, Tesla,Inc., Electric Vehicles, Electrification, Automotive Industry

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1 INTRODUCTION

This thesis is prepared for analysing the theory of disruptive innovation in the context of electric vehicles as the innovation and case company as its practitioner. The theory was presented in 1997 (formerly as disruptive technology in 1995). by Christensen for explaining the progress of innovation and domination in the market. Through the study, revisiting and reanalysing of the theory and reasons why the innovation and company were chosen, is provided. In this context, the focus is on innovation electric vehicles (EV) which was also cited by Christensen (1997, 159-171) as a potentially disruptive innovation for next decades. Tesla, Inc. is determined as a case company, which has become popular in both academic and managerial studies regarding their unique strategies and contradicting approaches with the theory (Frohman 2014; Chen & Perez 2018; Thomas & Maine 2019). Company-specific re-examination of the theory is conducted with updated data and literature related to both the automotive industry and the company. Accordingly, study primarily highlights the theory including its components and laws, also development, and transformation of the automotive market (especially in terms of EV technology) along with Tesla's progress and their strategies in comparison with the theory.

1.1 Background

In recent years, the trend of electrification in automotive industry with electric vehicles (EV) that is almost on the edge to become disruptive innovation for the market (Natter & Laing 2021; Hehl, et al. 2021; IEA 2022a). Thanks to this change, the internal combustion engine, which has dominated the market for many years, has begun to be replaced by electrical systems that also brings with it a serious disruption for the incumbent companies, which have had the largest share and power in the market for many years. Such impact of an innovation was firstly emphasized by Christensen (1997, 2015, 2018) with the term of ‘disruptive innovation’. As the theory suggests, such innovation developed by entrant (which have either just entered the market or be part of creation of the new one) with strategically appealing to a minority customer segments with a bottom-up (i.e., bottom to mainstream) approach, thus revolutionizing the market and start to threaten long-standing strong positions of the incumbents (including their method/technology) in long run (Christensen, McDonald, Altman & Palmer 2018, 1048).

However, contrary to the theory, Tesla has now established a strong foothold in the market with a top-down (i.e., top-to-mainstream) strategy with their launch of the first fully electric but a sports car, the Roadster (Q.ai 2022). Concerning this contrast, when previous studies are examined, it is necessary to look at two different aspects: theories of innovation and outputs using Tesla as a case-company. Regarding innovation theories, many studies (March 1991; Christensen 1997; Chandy & Tellis 2000; O'Reilly & Tushman 2016) already presented the impact and progress of revolutionary technologies/innovations on the market: through the approaches and contributions of companies and markets of different sizes to this development (e.g., incumbents' and/or entrant's openness and willingness to innovation concerning the industry they are in). Then again, such contrast was also previously studied (Frohman 2014; Chen & Perez 2018; Thomas & Maine 2019) with using Tesla as a case company; however, a clear response could not be reached neither due to company's long-term strategy at that time was not clear enough to reach to conclusion that the theory was either for or against, nor emphasized a direct contradiction regarding direct top-down approach. Furthermore, Christensen (1997) also offered useful insights in both the academic and business community: through his book "The Innovator's Dilemma: as he both mentioned key points of "disruptive innovation theory" and argued EVs to become one of the disruptive innovations that changes the habits of customers and current practice of the industry in near future. In line with those studies, such innovations are enabling new companies (e.g., Tesla, Inc.), which entered the market with radically EV-only focus, to accelerate, and also empowering other incumbent automotive companies in the market to invest more in the EV market/technology that they had overlooked due to its market size and profit margin. Here a contradiction arises between Tesla and the theory: does the company's strategy have a completely new approach or does it have points of overlap that seemingly opposing.

This gap necessitates a re-examination of the theory, through the case of Tesla for comparing/contrasting their journey, which was started in 2003 with the motto of producing only fully electric vehicles, when electric vehicles did not have a strong market, with the theory that defines the process of an innovation to overthrow the established one (Christensen 1997; Q.ai 2022). Nevertheless, for establishing a better understanding of the theory with opposing example, can be reached by examining the process where an example case, Tesla, with their innovation (i.e., EV) and contradicting top-down

approach, which has become disruptive for incumbents and automotive industry by unfolding the process over time. Although currently the destruction brought by the innovative breakthrough highlighted in theory is happening, the interpretation of Tesla's strategy and the approach of the previous literature show that there is still much to be learned in this area.

1.2 Introduction of the Case: Tesla, Inc.

In this study, the disruptive innovation theory is focussed on how technologies dominate the market and the role of entrants (e.g., Tesla, Inc.) in this change. Regarding theory's reflection on real-life case in the automotive industry: conventional gas-powered models are shown as the established product offered by incumbent companies, while entrants seem to be progressing by focusing on EVs. In this context, the term 'entrants,' are referred to the firms that are new in the industry by offering unique technology, product, or service (which is overlooked by established/incumbent firms at the time) at a certain point in the process of technological change and therefore generally expected to have fewer opportunities, limited investments, customers, and resources (Christensen 1997, 167-168; Christensen, Raynor & McDonald 2015, 4). Here, in line with the emerging innovation (i.e., EV), Tesla achieved a noticeable growth in parallel to the EV market which made the company appear as a new startup that boosted the electrification trend (Eisler 2016, 36-38).

As stated, development of an innovation is driven by companies that respond to needs or demands of the market, which, in the automotive context, allows firms like Tesla to stand as the salient cases in the industry. Contrary to those entrants, regardless of their intrinsic technological character or difficulty, incumbent firms are overlooking needs in their industries in terms of emerging innovations, architecture, and components, for answering them within their value network (Christensen 1997; Chandy & Tellis 2000). As a result, existing customers and established profit models of these companies restrict their investment in new innovations, where those unattractive investments offer a new opportunity for entrants who do not have many (or any) customers and take advantage of less competitive investment opportunities (Christensen, McDonald, Altman & Palmer 2018). In this regard, as an innovation, the progress of EVs, has a long history and is renewing itself with new novelties, methods and resources used day by day. This trend of continuous improvement reached its peak especially in the twenty-first century and

enabled the market to almost compete with the internal combustion engine (in fact, it is even expected to pass in the long run as of now) (Hoyer 2008, 63-65). Such period also coincides with the time when Tesla was founded and started to work on strategies for entering unestablished market.

Although, electrification started to become a rising trend that enables companies like Tesla with the fully-electric approach to stand out in the market, the automotive industry is seen as one of the most difficult industries to enter due to the financial resources, R&D expenditures, manufacturing facilities, human resources, patents, and other capital requirements (Stringham, Miller & Clark 2015, 85-86). Accordingly, these high barriers challenge new entrants to enter the market and naturally make it difficult for innovation to take place, as Elon Musk, CEO, and co-founder of Tesla, stated: "The higher the capital requirements, the higher the barriers to entry…When there are high barriers to entry, then you do not see new entrants, and you do not see innovation. It is really that new entrants are what drives innovation." (Stringham, Miller & Clark 2015, 86). Perhaps, such barriers and mindset caused Tesla to present its first vehicle, the Roadster, in 2008, five years after its establishment, but at this point, the entry was done with a fully electric a sports car, which can be defined as high-end (Mangram 2012, 296). Moreover, in the following years, with other models developed: Model S (in 2012), Model X (in 2015) and Model 3 (in 2017), the company started to get even more closer to mainstream, in other words having a top-down approach (Thomas & Maine 2019, 660). As mentioned, such an approach contradicts the theory of disruptive innovation and makes Tesla a company worth reanalysing in the lenses of the theory again.

1.3 Introduction of the Disruptive Innovation Theory

Although previously many scholars who analysed the emergence of technological breakthroughs and their introduction to the customers through corporate strategies and market needs (Anderson, & Tushman, 1990; March 1991), the theory was first presented by Christensen (1995) as 'disruptive technologies' but afterwards was updated to 'innovation' (1997). Briefly, the theory is based on the situation where considerably smaller sized entrant (company) come up with better and innovative solution against the current product or service which are mostly provided by incumbents and state of becoming preferable in the current market over time (Christensen, 1997, 50). Here, innovation is the trump card that enables these entrants to advance, and Christensen

divided innovations into two: sustaining and disruptive. According to the theory, on one hand, sustaining refers to the innovations that incumbent companies tend to implement by improving current products or services along dimensions of performance for mainstream customers to care about (i.e., market has historically valued), in this case such innovations enable incumbents to sell more to their existing customers at higher margins and profitability (Christensen, McDonald, Altman & Palmer 2018, 1047). On the other hand, disruptive ones are the innovations that do not target this mainstream, but rather offer a unique value proposition to the overlooked customers in current markets (or even non-existing markets), (Christensen, Raynor & McDonald 2015, 5). Thus, in some cases, those disruptive ones also lead creation of their own markets and have a destructive effect on the already existing one (i.e., technology or method) in the long run (Christensen 1997). For instance, regarding the automotive market, EV market's current progress against internal combustion engine with its potential to become mainstream can be considered as real-life incident.

As mentioned by the scholars, "disruptive innovations don't catch on with mainstream customers until quality catches up to their standards" (Christensen, Raynor & McDonald 2015, 5). This "disruption" can take time for mainstream or upper-market customers to adapt the innovation and happens precisely when entrant's offering (mostly cheaper than established offer) started to be accepted in all segments and more in demand than one currently used. According to the theory, those incumbent companies primarily focus on the development of their current products or services and, progress and market their product according to the most demanding customer segment in the process and ignore the remaining segments (Bower & Christensen 1995, 50; Adner 2002). Also, it should be noted that although incumbents have the skills and resources to develop and implement these disruptive technologies themselves, they are paralyzed by market conditions which force them to stick with incremental or sustaining ones (Ho 2022, 368). In addition, those sustaining innovations of incumbents often aim to improve the product or service that companies offer to their established customers by spending less, whereas disruptive ones require a serious R&D investment and strategy difference and due to its unpredictable nature (driven from its unique value proposition) incumbents hesitate to have such radical moves (Christensen 1997, 124-125). At this point, entrant, which enters the market by targeting and gaining the preference these overlooked segments with its more suitable and advanced solutions with lower prices (Christensen 1997, 145). In contrast, incumbent

continues its profit-oriented activities for the most demanding segment until entrant enters the upmarket and offers its solution that offers required solution to incumbent's main customers, and the disruption occurs when these customers start adopting entrants offer over incumbents (Christensen, Raynor & McDonald 2015).

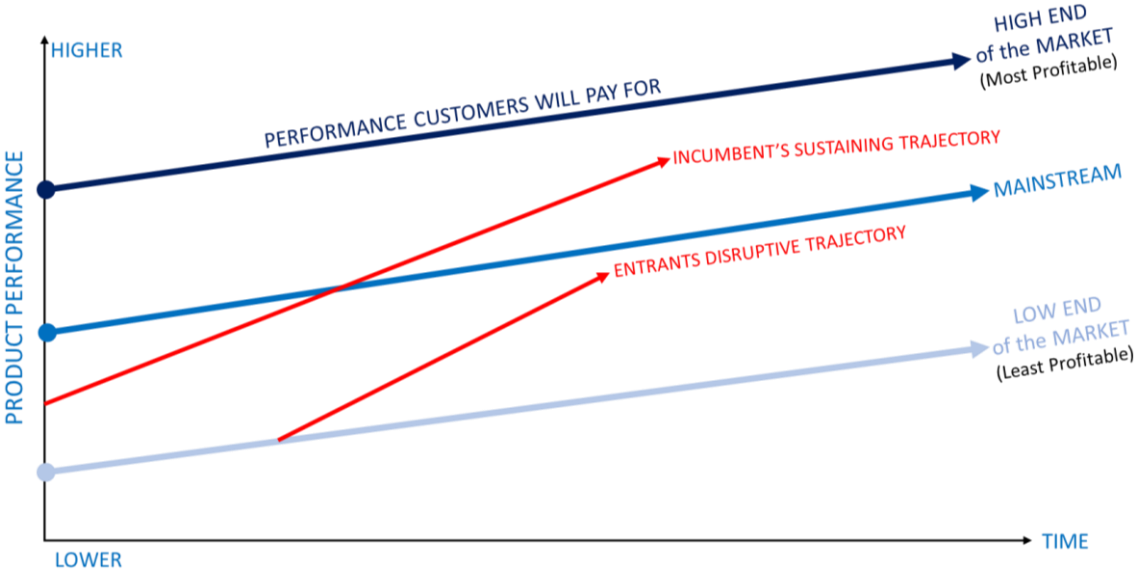


Figure 1. The Disruptive Innovation Model (Christensen, Raynor & McDonald 2015, 7)

Regarding the theory, the Figure 1 demonstrates the product performance and customer demand trajectories. Basically, disruption is a process: it handles different trajectories catching and passing each other at a certain point in time; which is why it requires evolution of the offered product or service over time (Christensen, Raynor & McDonald, 2015, 4-7). As the figure demonstrates: incumbents' aim is to reach high-end market which offers high profitability (and maintain their position with incremental innovations), as a result, the incumbent tries to satisfy the need of that segment by overshooting the low-end. This strategy creates a segment gap whose demands are not met, which later become target of the entrant. While entrants trying to reach high-end, contrary, the entrant advances by targeting these less-profitable segments and (at one point) creates a challenge for incumbents by approaching the upper segments with increasing performance of its offerings (Bower & Christensen, 1995, 45; Christensen, Raynor & McDonald, 2015, 7).

1.4 Research Questions

This study has two different ways of contribution as both theoretical and practical (or managerial). On one hand, the theoretical contribution is made in order to fill a gap, which has not been adequately explained in the researches and outputs made so far. On the other

hand, practical (or managerial) contribution, explains how this work will contribute in practice, namely its usability and applicability by managers.

The basis of the theoretical part of the study is the "disruptive innovations theory" which was presented by Christensen (1995; 1997) with a purpose to show the pattern of leading companies' failure due to market change led by new innovations. Same study (Christensen 1997) also presents electric vehicle as the case by arguing that the market would evolve to become challenger for the internal combustion engine and have a potential to be a threat to the overall structure of the industry when it becomes a viable alternative to the mainstream customer (both in terms of performance and financially). However, although EVs today has a potential to become truly disruptive via reshaping the industry and charming mainstream in many regions of the world (e.g., European market in particular), Tesla has become mainstream over time with contradictory strategy by starting from the high-end, instead of the low. This contradiction creates a gap for examining the Tesla case in comparison with the theory of disruptive innovations. Such similar approach is also encountered in previous studies regarding re-examination of theories in the case of the evolving phenomenon in international business (IB) context (Zettinig & Nummela, 2021). Here, the phenomenon was analysed by unfolding and comparing with already existed theories in the literature and outline their analysis from futures-oriented perspective of IB.

For many years the automotive sector is known to be a sector that has a significant number of incumbents and prefers relatively incremental innovations instead of disruptive or radical in many fields, and thus, has the market and its customers have a more orthodox point of view in this context. This study focuses on a manufacturer company and its market entry and development process through EVs, which are expected to be the new mainstream of the market soon.

In this context, research questions are used to address the gap consisting of both theoretical and practical (managerial) aspects. In this study there is a main question - more generally indicates the objectives of the study and three sub-questions – for highlighting details and inclusivity. So, the main question is:

- How did Tesla's approach redefine the theory of disruptive innovation?

In the light of this main question, the sub-questions that the research aims to answer are:

- How has Tesla's EV disrupted the automotive industry?
- How did Tesla's high-end market entrance reshape the disruptive low-end approach?
- Why did incumbents respond slowly, causing Tesla to gain their position?

Since the basis of the work is the unfolding of the development, formation (and perhaps conclusion) of an occurring phenomenon, it can basically be called as process study. Such studies are empirically focus on evolving phenomena, and it is based on theorizing that explicitly combines temporal progressions of activities as elements of understanding and explanation, and from this perspective, the targeted process question should be about how and why things emerge, evolve, grow, or cease over time (Langley et al., 2013).

Regarding the first two sub-questions, Christensen's theory (1997) underlines the fact that new entrants are mostly prefers the low-end, however contradicting the theory Tesla preferred the high-end (i.e., sport car market) with their Roadster full electric BEV (battery electric vehicle) sport model. Such contradiction creates a gap for re-examining the dynamics of the disruptive innovation theory in current automotive market. For the third sub-question, although it has a history of nearly a decade, Tesla is currently at the top of the EV global market with the largest share, moreover, it is positioned as the brand with the highest sales (Patton, 2022). Then again, companies defined as incumbent are trying to adapt themselves in the face of disruption and currently attempting to reach a level where they can compete with Tesla. Finally, guided by the research questions that address gaps in the literature, the study emphases on analysing the similarities and differences determined by the framework of innovation theories by comparing how the case in question (Tesla, Inc., which has risen using EV innovation) has been historically progressed over time. All in all, thanks to those points this study also has a potential to lead business world and academia to reconsider implication of the theory, forecasts, and upgrade approach of Christensen (1997, 159-171; 2015, 11). For practical or managerial contribution, the study is also focusing on the formation of the effects of those innovations and pattern it follows in a particular sector.

2 LITERATURE REVIEW

Literature review includes examination of previous studies on a subject and perspectives to better understand and describe theories or situations of the study field. The main purpose of this review is to search for deeper knowledge and perspectives for answering the research question, and in this way, approaches that have been tried before are used and the facts that are already known about the subject are documented. In this study, considering research angle via phenomenon and research questions the literature review is concentrated primarily on the term “innovation” and “disruptive innovation”– by trying to understand its meanings, scopes, difference and usage in academia and business perspectives; and then the "disruptive innovation theory" - for observing the development of the theory via its position in the literature, and the approaches both inspired the theory and influenced by the theory.

2.1 Innovation &Change

Even if the term “innovation” has different explanations across a broad spectrum in different fields/professions, it is basically the way that allows an entrepreneur (which does not have to be a venture in a business perspective) to either create a new wealth-generating resources or endow existing resources with wealth-creation potential (Drucker 2002, 5). Besides, it is a specific function of entrepreneurship that can be implemented by different stages of businesses (i.e., from an existing business to a start-up) and different sizes (i.e., from large organisations to an individual). Furthermore, such innovations and their types are mainly focused through the outcome feature of innovation, but in this section, the factors that cause change and the cycles they create are also examined through the process aspect of innovation.

2.1.1 Features of Innovation

As the basis of this study examines innovation from a business perspective, developing technological knowledge and innovations are defined as the most important factor contributing to long-term productivity and economic growth and are seen as part of a sustainability in modern business approach (Greenacre, Gross & Speirs 2012, 3-4). In this respect, innovations partly include improvements in cost and performance caused by experience gained by either individuals working in organisations or the whole systems, and thus a better offering to the customer in this respect (Grubler, Nakicenovic & Victor

1999, 548). Since business-wise definition of innovation is so inclusive, it is necessary to emphasize the triggering situations/sources of it, along with different types of innovations (including disruptive innovation) and reasons for such formation.

When it comes to sources of innovation, it may come to mind that it is formed with a glimmer of genius, but in fact most innovations, particularly those that provide sustainable success, are the result of a conscious, purposeful search for opportunities (Drucker 2002, 6). In this context, unexpected occurrences, incongruities, process needs, and industry and market changes are such areas that exist within a company or industry, whereas demographic changes, changes in perception, and new knowledge are places outside the organization (e.g., in either social or intellectual environment) (March 1991, 72-73; Drucker 2002, 6). Regarding those innovation efforts within the organization, the exploration of new possibilities and exploitation of old practices through organizational learning are emerged as two underlying concepts. Here, exploration concept concerns search, risk taking, variation, experimentation, flexibility, discovery and of course innovation as driving force in which organization make its financial, time and resource investment in return of more uncertain, more remote in time, and organizationally far from the focus of action and adaptation (March 1991, 72-74). Exploitation includes refinement, production, choice, efficiency, selection, implementation, effectiveness, and application both in terms of inner organizational practices and overall industrial norms with less ambiguity and risks. Nonetheless, while this uncertainty explains the innovation created by unexpected occurrences and incongruities, through the exploitation concept, process needs, and industry and market changes form rest of the sources of organizations (March 1991, 72-74; Drucker 2002, 6-7). On the other hand, as for outer sources: demographic changes – industry- or market-based trend of change caused by politically-based factors, changes in perception – change of perception does not alter facts, but it could change certain habits of people (i.e., customers for businesses) sometimes for a while or sometimes completely, and new knowledge – cases of history-making or game changing discoveries that can lead a disruption that pushes whole system for inevitable revolutions (Drucker 2002, 7-8).

As can be seen through sources, innovation is a continuous process: since it is not only dependent on the internal dynamics of organizations or industries, but also can be triggered by external factors. Although innovations differ, the most basic feature of all is requirement of certain time, human, and financial resources for their formation;

managements execute their own type of innovation to answer the occurring need in the market by providing organizational alignment in line with their opportunities, strategies, and philosophy (O'Reilly & Tushman 2016, 22-24). In this context, the figure (Figure 2 - Types of Innovations) shows the classification of innovations in 2 different dimensions: newness and its impact on the market. Here, while newness defines the dependence of an innovation on developing or proven technologies, the impact on the market shows both the destructiveness it creates and the difficulty in implementation: although it has high value creation potential, such developments tend to be more costly, risky, and difficult to come up with (Adner 2006; Satell 2017, 3-5; Zaman 2022).

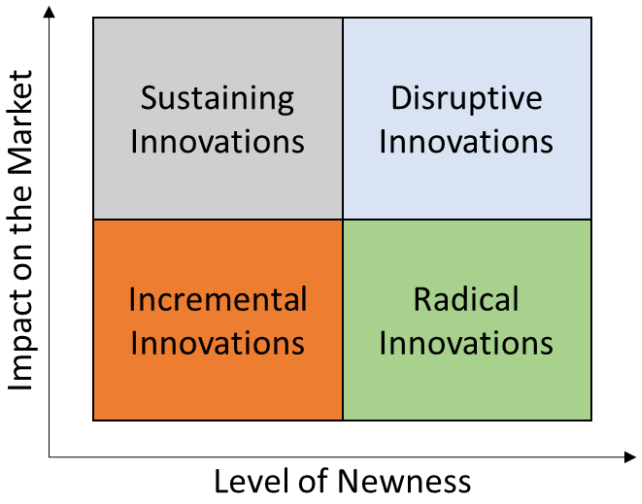


Figure 2. Types of Innovations (cf. Galvez 2022, 14)

First, incremental innovations are the ones that gradual and continuous improvements on existing products or services: besides being less costly and faster to implement than others, it can reduce the company's stagnation in the market and grow its share steadily against competition (O'Reilly & Tushman 2016, 24-26). Secondly, radical ones are new products or services that incorporate a significantly different core technology/approach and deliver customer benefits that are significantly higher than existing offerings in the industry: they often take advantage of the breakthrough to transform industries and sometimes create new markets, thus in addition of being risky and costly, their success is also related to the organization's ability to commercialize (Chandy & Tellis 2000, 2-3; Satell 2017, 4). Thirdly, sustaining innovations involve larger-scale changes than incremental ones; are often practiced by already successful companies in the industry for either gaining or maintaining a market-leader position, and that is why they are also known as profit-motivated innovations as achieving higher profit margins by creating

better products for existing customers (Satell 2017, 3; Cote 2022). Finally, disruptive innovations are the type in which they are most effective due to the level of novelty and the impact they have on the market. Disruption is achieved through targeting overlooked segments in the market by offering more affordable, convenient, and simpler solutions than incumbents: it manages to become a mainstream offering by completely dominating the market during process (Christensen 1997, 11; Satell 2017, 3).

2.1.2 Models of Change

Organizations use innovation as an important source in achieving competitive advantage for emerging needs, development, change, exploration, and renewal both in the market and within themselves over time: that is why it is considered as both an outcome and a process (Tushman & O'Reilly 1996, 11; Crossan & Apaydin 2010, 1154-1155). Regarding factors and environments that cause the change (i.e., innovation), Van De Ven and Poole (1995) put forward four basic theories, which served as building blocks for explaining processes of change in organizations. Those four theories are: life-cycle, dialectics, evolution, and teleology and the Figure 3 represents them in a metatheoretical scheme illustration, for addressing application of those entities to explain development in organizational: with parameters to distinguish each of those characteristics (i.e., cycles and motors of change, unit of change, and mode of change) (Van De Ven & Poole 1995, 519-520).

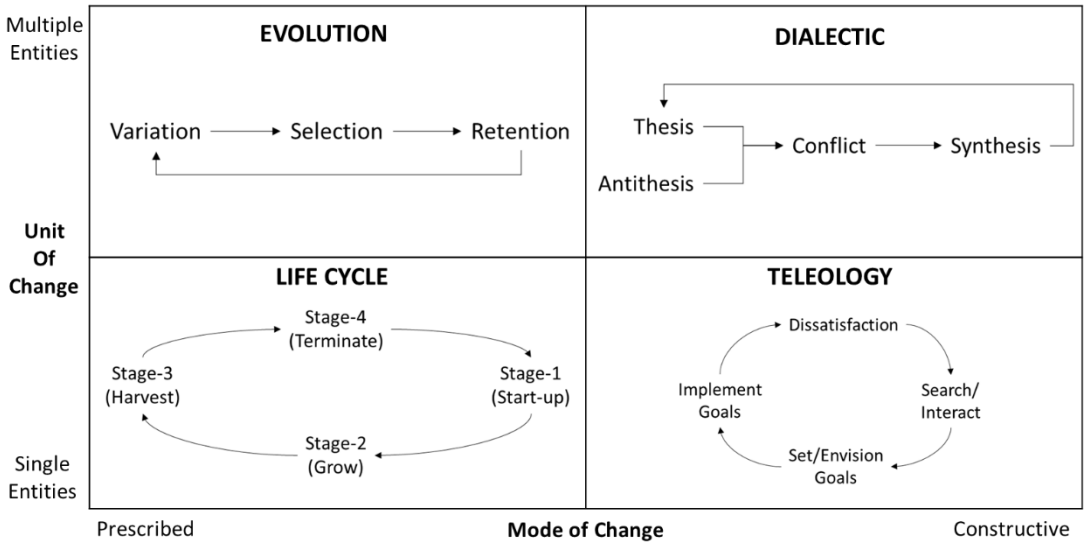


Figure 3. Process Theories of Organizational Development and Change (Van De Ven & Poole 1995, 520)

The first approach is the life-cycle theory, which has been presented with the metaphor of organic in many studies with grounds of growth as a heuristic tool to explain development in the organizational entity from birth to death in a way (Van de Ven 1992, 177; Van De Ven & Poole 1995, 521). Here, the change is imminent in which the evolving entity has a basic form, logic, program, or code within which organizes the process of change and moves an entity from a certain point of departure to the next predetermined end in the present state (Van De Ven & Poole 1995, 520-522; Weick & Quinn 1999, 364). Although external environmental events and processes influence them, such process are always mediated by the logic, rules or programs that govern the development of the being as a result, "life-cycle" metaphor has been used due to its organic analogy's similarity to development of an organism in nature (Van De Ven & Poole 1995, 519). The progression of change events in the model has a unitary sequence and a cumulative approach, following a single sequence of phases/phases: such that traits gained in previous phases are retained afterward and eventually all converge to derive from a common underlying process (i.e., each stage of development is believed to be a necessary precursor to later stages) (Van De Ven & Poole 1995, 522).

Secondly, teleological theory is relied on teleological perspective that sees purpose or target as the reason for guiding the movement of an entity: so, the organizational entity is assumed to progress towards a goal or an end state, which is purposeful and adaptable either on its own or in interaction with others, and the progress finalizes with occurrence of predicted end state (Van de Ven 1992, 178; Van De Ven & Poole 1995, 515-517). Here, progress is learned as an iterative set of goal formulations, implementations, evaluations, and changes by the organization with a purpose: thus, encouraging creativity by nature as it has the freedom to achieve an aim (i.e., unlike the life cycle, cannot predict the sequence of events or indicate which trajectory the entity will follow; instead, it describes the change in its movement towards its ultimate goal) (Van De Ven & Poole 1995, 521-522; Weick & Quinn 1999, 364-365).

Thirdly, dialectical theory underlines the existence of organizational entity in a pluralistic world of conflicting events, forces, or conflicting values that compete for domination and control: here, such antagonisms can be both internal or external entity, and it follows aspects that conflict with those of competing interest groups/organizations for contradictory goals/priorities and in both cases, requires two or more different entities that embody these oppositions to conflict with each (Van de Ven 1992, 178-179;Van De

Ven & Poole 1995, 522). Change is explained by the balance of power between opposing entities and occurs when opposing values, forces, or events gain enough strength to challenge a status quo: on the other hand, these conflicts need not produce creative syntheses because the status quo can change when the opposition provides the necessary strength (Van De Ven & Poole 1995, 517; Weick & Quinn 1999, 364-365).

Finally, evolution theory focuses on the cumulative changes in structural forms of populations of organizational entities across communities, industries, or society through triggered changes by a constant variation, selection, and retention progresses with continuous cycles (Van de Ven 1992, 179; Van De Ven & Poole 1995, 518-522; Weick & Quinn 1999, 364-365). Here, selection occurs primarily through competition for scarce resources and happens when an environmental niche selects the most suitable assets for its resource base. Such approach examines global changes in organizational and management practices, and expects to observe the results identical to biological evolution (Van De Ven & Poole 1995, 518).

2.2 Disruptive Innovation

Content of competition for primacy is the basis of the question why companies apply different types of innovation: organizations compete in conditions where relative position is important, and contribution of knowledge and competitive advantage is the essence which forces them to arrange a balance between both exploration and exploitation (March 1991, 71-72). This balance depends on many resources of the companies, primarily financial: while the preference for high risk such as exploration affects the radicality of strategies; exploitation tends to maintain sustainability and status quo of them (March 1991, 72-73).

For differentiating ‘disruptive innovation’ marvel, many literatures constantly address the difference of sustainable innovations with disruptive ones throughout formation of the theory (Christensen 1995; 1997; Schmidt & Druehl 2008; Utterback & Acee 2020). Like the incremental, sustainable innovation is to improve the performance of established products across performance dimensions that are historically valued (i.e., of proven interest) by mainstream customers in the large market (in some cases it can also have a discontinuous or radical character but in most cases, it has an incremental nature) (Christensen 1997, 11; Utterback & Acee 2020, 8-9). At the core of sustaining innovations is the potential of improving established products to move faster than market

demands as measured by traditional performance characteristics and ultimately overshoot market requirements which time to time considered as the reason for failure. Thus, those established or traditional products are forced to retreat to the higher end of the market for becoming even more elaborate, feature laden and complex (Christensen, McDonald, Altman & Palmer 2018, 1047-1048; Utterback & Acee 2020, 9). By comparison to previous innovation concepts, disruptives are the ones that generally underperform established products in mainstream markets, but then again have a few marginal and often valued features that make them unique (Utterback & Acee 2020, 8-9).

In this concept, disruptive innovations bring a very different value proposition to the market than previously available, while products offered for this purpose indeed prove to be cheaper, simpler, smaller, and often more convenient to use (Christensen 1997, 11). Here, for reaching the superiority in the market: with lack of sources (i.e., financial, human, material etc.) entrants need to take risks with much radical moves, at which point the theory of disruptive innovation needs to be defined.

2.3 Disruptive Innovation Theory

Although the theory's founder, Christensen, originated the theory by primarily focusing on radical innovations and technologies used by entrants to gain advantage in the market over incumbents (Rosenbloom & Christensen 1994). The beginning of studies focusing on technological breakthroughs and innovations were mainly focusing on the formation of processes over time for answering when do these breakthroughs happen and why do these technological discontinuities occur (Anderson, & Tushman 1990; Rosenbloom & Christensen 1994). In this aspect, the model of evolutionary technological change highlighted: the "ferment period" is process in which such incremental innovations were implemented after each emerging dominant design and occurring of intense technical diversity and selection and its length (through the formation of technological breakthroughs or discontinuities) was interrelated with type of firm/industry that initiated the standard (dominant design) (Anderson, & Tushman 1990, 604-605). Further studies (March 1991; Rosenbloom & Christensen 1994; Bower & Christensen 1995) were mostly trying to discover the concepts of companies' exploring innovations or technologies and thus gaining competitive advantage in the market. In this context, previous studies examined with a perspective that triggered such exploration of innovation, revealed that: competitive ecology, limited environmental resources and lack of opportunities for

gaining supremacy fosters competition between organizations, thus became a feature of the organizational learning effort (March 1991, 71).

Later, such efforts were presented for the first time as the term “disruptive technologies” which offer unique attributes with some shortcomings, in comparison with the trending mainstream product, thus creates reluctancy to be valued by mass market and therefore lack the attention of incumbents (Bower & Christensen 1995, 44). Such unwillingness, leads new markets to emerge for those technologies as they appealed to only small customer groups, but higher pace of development compared to the established products allows them to approach the mainstream and dominate the market over time, (disruption is used for the established structure of the market, its products, and companies) (Bower & Christensen, 1995 49-51). In the literature, the theory was presented for the first time later with the transition from the technology approach to the term “innovation” took place since: while the innovation approach completely covers business contents (i.e., product, company strategy, structure, and market entry) that effects established market, technology only highlights the product that realizes this disruption (Christensen 1997, 40). Here, while theory attempts to present the phenomenon of disruptive innovations with frequent corporate moves, the theoretical drivers underlying technological disruption have been relatively underemphasized and the impact of the customer perspective has been lacking. From this frame, different studies (Chandy & Tellis 2000; Adner 2002) examine how consumers evaluate technology and how this evaluation changes as performance increases, explain the demand conditions that allow destructive dynamics and offer new theoretical views on the impact of the structure of the demand environment on competitive dynamics. In this context, while presenting the preferences of different segments (via using preference overlaps and symmetries) which has connections that guides emergence of different competitive regimes (i.e., products, services, features etc.), the conclusion had been reached that recognizing these threats and moves (of customers/segments) impact the dynamics of disruptive technologies and shape their success in such markets (Adner 2002, 686).

In line with the theory of disruptive innovations, further studies also tried to evaluate the replacement of incumbents (along with their products) with disruptive wave/trend created by radical innovations developed by small firms, entrants, or outsiders (Chandy & Tellis 2000). Here, while discussing the term "incumbent's curse", there was a shift in approach to radical innovations from entrant’s perspective to incumbents through examining the

continuity of their failures (i.e., reality of the curse) and the reasons behind them . As a result of the analysis of the reality of the "curse" on cross-sectional innovations on a global scale: while entrants or small-sized firms are more prone to developing radical products, it has been revealed that over time, large-sized and incumbents introduce counter-radical products (thanks to their dynamic organizational structures and strong technological capabilities) even more that dominates the market, thus it questioned the validity of the curse (Chandy & Tellis 2000, 12-14). In contrast, further studies highlighted that the most distinguishing feature that differentiates entrants from established companies is its unique idea and their breakthrough offering along with the market or situation where it offered (Bower & Christensen 1995; Gans & Stern 2003; O'Reilly & Tushman 2016). Such studies highlighted competitive interaction between innovators (i.e., entrants) and incumbents depends on the existence of a "market of ideas" and its dependency on different scenarios: advantages situations such as attackers' advantage; and disadvantages such as the lack of reputation returns of start-ups like established ones (Gans & Stern 2003, 341).

Nonetheless, a new perspective on the market entry, which is one of the cornerstones of the theory, had also emerged in the changing business conjuncture over time. Contrary to disruptive innovation theory's low end entry approach, the evolving literature (with new examples) has added a new depth by comparing the performance attributes of the products and presenting the differences in market entries (e.g., offering with moderate attribute can approach to a market with either fringe low-end or new attribute high end etc.) (Schmidt & Van Der Rhee 2014, 18). Recently, new studies (Christensen, Raynor & McDonald 2015; O'Reilly & Tushman 2016; Christensen, McDonald, Altman & Palmer 2018) examining such approaches in the light of these new examples for trying to figure out why well-known/established companies failed in the face of innovations, as underlined by the disruptive innovation theory. In this aspect, the managerial and structural advantages that make companies successful also tend to make them resistant to change, which inevitably leads to failure (Christensen 1997; O'Reilly & Tushman 2016). New studies, with the internal aspect, underlined those companies to use their assets and talents for enabling long-lasting and sustainable success: presented the need to steer towards new areas, which they called the "exploration" phase (March 1991, 72; O'Reilly & Tushman 2016, 11). Here, they emphasized that, unlike previous studies, in order to solve the dilemma highlighted in theory (big companies' tendency to oppose radical innovation),

they should be able to generate new ideas (i.e., innovations) and apply them through experimentation, and eventually grow by bringing them to a market (O'Reilly & Tushman 2016, 44-46).

Regarding those new depths and perspectives in the emerging literature, created the necessity for the theory to be updated and revisited again for overcoming those shortcomings and misconceptions or wrong implementations (Christensen, Raynor & McDonald 2015; Christensen, McDonald, Altman & Palmer 2018). One of the corrections and depths offered was in the context of market entrances: the new market formation and the destruction of the entrant occur with completely new value networks that it targets customers who would otherwise receive any product/service and therefore established companies mostly could not detect or tend to ignore (Christensen, McDonald, Altman & Palmer 2018, 1049). Another regarding the existing market, it was highlighted that there is a tendency of incumbent companies to turn radical innovations into a sustainable ones by neutralizing its potential destructiveness with "cram" as a new defence mechanism and ensures such neutral presentation that is easier for customers to adapt (Christensen, McDonald, Altman & Palmer 2018, 1049-1050). Yet, as even stated by developers of the disruption theory, purpose of this revisiting the theory is due to its potential to become a victim of its own success, and despite having broad definition and explanation, the basic concepts of the theory are greatly misunderstood and its core principles are frequently misapplied (Christensen, Raynor & McDonald 2015, 4). For this reason, it is necessary to examine the basic core components and rules of the theory, through re-visiting of the main study (along with similar or inspired approaches), in which the foundation of the theory was laid and presented with its full name for the first time.

2.3.1 Core Components of the Theory

Before defining the core values that underpins the theory, for better understanding the actors (i.e., firms), it is time to answer the questions of who are the implementers of these innovations and in what situations are they motivated to bring these innovations to the market. The theory divides firms into two: incumbent/established and entrant. In this context, established firms are firms that were founded in the sector before the emergence of the disruptive technology or innovation, and that applied previous technology, and the term incumbent, which is repeatedly mentioned in this thesis, usually use to describe a company that has the largest market share in a particular industry and/or (just like

established) has been around for a long time (Christensen 1997, 24). As for entrants, the term describes firms that were new to the industry at that point of technology change or disruption and therefore, a particular firm would be considered as an entrant at a particular point in industry's historical timeline (Christensen 1997, 24; O'Reilly & Tushman 2016, 244). Through that classification, it provides clues not only about the size and position of the companies in the market, but also about their mission and vision.

The core components, which protect themselves over time, first emerged with the disc-drive industry analysis and formed the supporting columns of the theory with containing reasons of strategic approaches/decisions of incumbents versus entrants and their perspectives on innovation for progress in the market (Rosenbloom & Christensen 1994; Christensen 1997). First, the pace of technological progress in many markets is outpacing customers' demand for higher-performing technologies, which allows incumbent companies to serve the market by producing more advanced, feature-rich products than customers need (Christensen, Raynor & McDonald 2015, 7). Incumbents may not always use this opportunity, but since the basis of business is to make profits, they try to move towards the upper market with these continuous developments and performance improvements. Thus, as can be seen in the figure (Figure 4 - Model of disruptive Innovation), it creates a gap at the bottom of the market between the needs of customers and the performance provided by firms, a gap that provides an opening for new entrants to utilize.

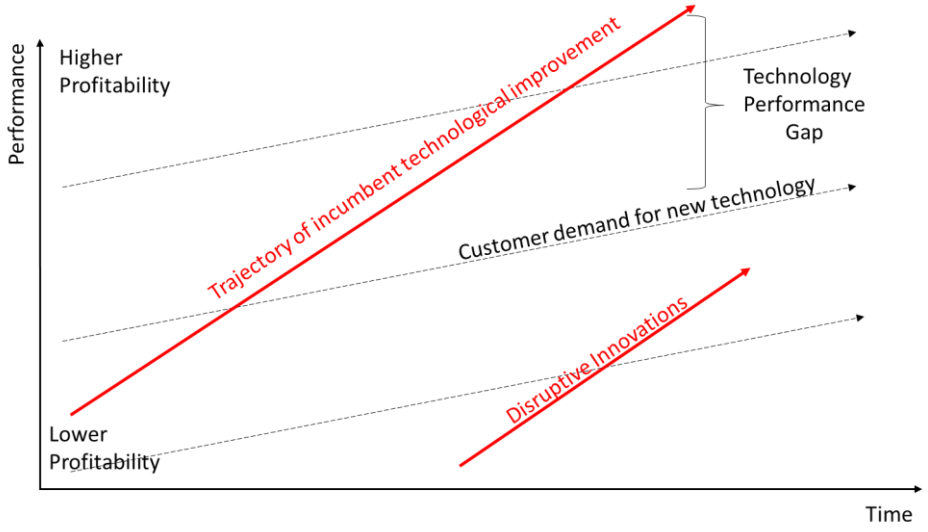


Figure 4. Model of Disruptive Innovation (Christensen, McDonald, Altman & Palmer, 2018, 1048)

Secondly, the orientation of firms between different types of innovation that influence their technology and business model, is leading strategically crucial divide in the industry (O'Reilly & Tushman 2016, 45). Unlike the traditional managerial approach, the disruptive innovations are firstly commercialized in emerging or insignificant markets which are mostly considered by established firms as non-well-profitable (Christensen, Raynor & McDonald 2015, 5). Nevertheless, it is also managerially-accepted fact that the mainstream and upper-market are the segments with the most customers also the most profitable, therefore the lower or newly emerging markets are mostly considered insignificant in the rational managerial approach (Gans & Stern 2003, 336). As a result, those most profitable customers of leading companies often tend not to want, or even initially use, products based on disruptive technologies: overall, most companies in the market strategize to listen to their customers and identify new products that promise greater profitability and growth, so there is rarely a reason for them to invest in disruptive technologies (which also cause the reason for late action as well), and in this case such technology/innovation is initially adopted by the least profitable customers in a market (Christensen, McDonald, Altman & Palmer 2018, 1047-1048).

Finally, the third component of the model (associating it with customer preferences, also seen in the second component) is that existing customers and established profit models restrict or even prevent incumbents/established firms' investments in new innovations (Christensen, McDonald, Altman & Palmer 2018, 1048). Hence, investment opportunities that are unattractive for incumbents can become attractive to new entrants who have few or no customers (i.e., ones that are in the markets that do not yet exist) and benefit from this less competitive investment opportunities. Conversely, unlike entrants, incumbents are often reluctant to develop disruptive innovations that promise lower margins, target smaller markets (or even emerging markets), and offer initially lower quality products and services that their existing customers would not prefer to use (O'Reilly & Tushman 2016, 98). Over those components, strategies, and methods by which companies position themselves against innovations are explained and the theoretical foundations of the chain of events that make innovations disruptive are emphasized.

2.3.2 Laws of the Theory

One of the research questions is "Why did incumbents respond slowly, causing Tesla to gain their position?" in line with that many studies (March 1991; Christensen 1997;

Chandy & Tellis 2000; O'Reilly & Tushman 2016) examined why the good managerial practices of successful companies fail when faced with disruptive technological change by presenting the principles that works in theory but not in practice. Hence, the following question arises: in these well-established organizations, how are these successful methods/strategies failed (or even overlooked, or misapplied) in the face of disruptive innovations? Regarding that, Christensen (1997, 14) exemplified the ways humans progressed to fly as: flight became possible only after people understood the laws and principles of nature, in which they came up with a solution by establishing the law of gravity, Bernoulli's principle, and the concepts of resistance etc. Therefore, just like fundamental physics and laws of nature, through the agency of laws, it is possible to highlight both the situation been in and mistakes made by those organizations.

The first principle is the fact that companies are customer- and investor-affiliated organizations. As mentioned in the resource dependence theory (Pfeffer & Salancik 2003), although companies seem to be shaped in the light of many internal factors, customers, and investors, who are external factors, directly affect the main decision. In this context, companies have an obligation to satisfy those two groups, and it is even impossible to compete or even survive without their support in different markets. In fact, the top-performing companies are often the most successful in markets, mainly because they have systems developed to overlook ideas that their customers do not prefer. Thus, companies cannot invest enough resources in disruptive technologies until their customers want them, which also means it is too late to try. Regarding Christensen's case analysis (1997, 89-100), for overcoming source dependence: managers of some mainstream firms set up an autonomous organization with a new and independent business model with a focus on disruptive technology. In these cases, companies have succeeded in solving the inflexible situation of resource dependency, thanks to such organizations that are set up independently (i.e., without invertor and customer dependency), this way, they can communicate with customers who want the products of disruptive innovation (Christensen 1997, 89-100). In other words, since business models of their organizations aim high profit-margins and high-end markets, it is unlikely to expect executives of incumbents to freely allocate their both financial and human resources to low-end market where the disruption begins. Still, it was also emphasized that this situation can be overcome with sub-organizations of those firms which are targeting low profit margins and low-end market.

Second law is the difficulty of analysing non-existed markets. Good market research is one of the foundations of successful management practice: in which used regularly by the established firms for providing significant advantages in the market, especially in the development and execution of sustaining innovations (O'Reilly & Tushman 2016, 134). Since the size of the markets and their growth rates are known, and the dimensions of technological progress are researched explicitly for the needs of the target customers, it is fitting for such type of innovations to be applied. However, when examined with disruptive technologies (that often lead to new markets), it is not suitable for implement accurate market research due to its uncertainty to predict such technologies that do not match customer expectations or even that are not currently used (Christensen 1997, 117-119). Hence, the first-mover's advantage reappears where less information about the market is known or obtained and on the other hand, it was also emphasised that discovery-based planning, against the common managerial approach that the right markets and the right strategies for exploiting cannot be known in advance (Christensen 1997, 117-127). Such approach, assumes most forecasts are wrong, and strategies that managers have chosen to pursue may in the same way be wrong, as a result, it led those executives to develop plans for learning what needs to be known in more effective way to confront such disruptive innovations.

Thirdly, capabilities of organizations also display their shortcomings, those capabilities of the organizations exist in two places: its organizational processes and values (Christensen 1997 129; O'Reilly & Tushman 2016, 81). These processes are the ways in which employees learn to transform inputs of effort, resources, knowledge, cash, and technology into higher-value outputs (O'Reilly & Tushman 2016, 181). Such values of the organization are the criteria that stakeholders in the structure (i.e., managers and employees) use when making decisions. However, unlike individuals, these capabilities are: processes and values are inflexible (Christensen 1997, 129-130). That is, while employees can adapt to companies operating with different processes and values in a short time, for companies, their values, which tend to develop products with high margins, prevent them from prioritizing products with low margins at the same time. As the processes and values that make up the organization's capabilities also demonstrates its inadequacies: as a result, companies can face the destruction of an innovation by creating a flexible structure through discovering their shortcomings as well as knowing their own capabilities (Christensen 1997, 129-142).

Finally, the last principle is the imbalances between technology supply and market demand (Christensen 1997, 17). As stated in the core components of the theory, the basis for the phenomenon of disruptive innovation is that the pace of innovation often exceeds the rate of performance improvement that mainstream customers' demands or products they receive (Christensen, McDonald, Altman & Palmer 2018, 1048). In these cases, innovations focused on meeting today's demands often overshoot the demands of tomorrow's mainstream markets, but products that are relatively underperforming expectations of today's mainstream customer, will become the direct performance competitors of tomorrow (Christensen 1997, 17; Christensen, McDonald, Altman & Palmer 2018). Here, the law was argued that when performance of competing products exceeds what the market demands, customers do not directly base their choice on the higher-performing product since the basis of customer choice mostly evolves from functionality to reliability, then convenience, and eventually price (Christensen 1997, 144). So, for race of the competition towards higher-margin markets, in order to stay ahead, while companies are usually developing competitively superior products, they do not notice their speed that led them to moving up-market by over-satisfying the needs of their original customers. As the theory highlights, this creates a gap in the lower price points that competitors using disruptive technologies can enter, however, only companies that carefully measure these customer trends can catch the points where the basis of competition in their targeted markets will change (Christensen 1997, 156-169; Christensen, Raynor & McDonald 2015).

2.4 Synthesis of the Literature

Overall, a literature review helps to understand the current practice and perception towards the phenomenon of this thesis interest and provides guidance to answer: in which areas there are the resources to use and gaps to focus on, how to answer the research questions and which method should be used. Here, the review begins with an understanding of innovation and its types for distinguishing disruptive from others, later, the theory is emphasized by focusing on how the theory was developed as a concept, and the step-by-step evolution of the theory till its latest version with current retrospective analyses. Through its core components and its laws from the perspective of managerial practice: a basic answer to the research questions was sought by examining the multidimensional analysis of the theory and its different aspects encountered in practice.

First, for the main research question “How did Tesla's approach redefine the theory of disruptive innovation?”, while some studies were concentrating on the contrast between the company and the theory, through its market entry. Thus, in those studies, they either came to conclusions that Tesla did not fit the definition of "entrant" in the theory, or were unable to observe company’s market strategy in the long term due to insufficient data as their study was made early on its first EV models (Frohman 2014; Chen & Perez 2018; Thomas & Maine 2019). However, these studies are especially guiding in terms of the formation of secondary data and highlighting certain time spans of the company's large period to be examined in this study.

For the first sub question which focuses on Tesla's disruption in the automotive industry: most of the business theories have been recently examined and presented theories radical or disruptive innovations along with their causes and impacts and how entrants use them in practice for market disruption to achieve competitive advantage over incumbents (March 1991; Christensen 1997; Christensen, Raynor & McDonald 2015; O’Reilly & Tushman 2016). In particular, the core components of the disruptive innovation theory, which is also mentioned in the literature review, discuss the causes and consequences of this situation in detail (Christensen 1997, Christensen, McDonald, Altman & Palmer 2018). The second sub-question addresses market entry strategy of Tesla: although the low-end entry of the entrant seems to form the basis of the disruptive innovation theory, scholars who have examined both theory and similar approaches over time have revealed that entrants that aimed to make a similar destruction in the market do not always follow a similar path (Christensen 1997; Schmidt & Van Der Rhee 2014; O’Reilly & Tushman 2016). In the light of the market segment addressed by the new product offerings, it was stated that entrants enter from different positions, hence it may not be directly opposite to the theory. Finally, last sub question discusses incumbents’ response to disruptive innovation: many scholars highlighted the unresponsiveness of incumbents against change by discussing both reasons and logic underneath their strategy (Christensen 1997; Chandy & Tellis 2000; O'Reilly & Tushman 2016). While some studies argue that this is an obsolete curse that has become old fashioned, others examine the profit-oriented structures of such incumbent companies overlooking strategy of radical and disruptive innovations innovation by problem-solving practices. To conclude, while the literature review serves as the basis for answering the research questions in this study, it is also used to reveal gaps in the literature along with deficiencies that needed to be addressed.

3 RESEARCH DESIGN

The research design chapter presents the roadmap followed by the study and focuses on methods to be used to conduct research, and for this purpose it presents methods of choice and reasons for the study. In this context, the section outlines steps and objectives required to collect, analyse, evaluate, and reach a conclusion in a particular setting for research question to be answered. The research approach section provides necessary information to define the basic structure of the research by including: aim of choosing a case study and reasons for applying it in a case-company, required data sources, ways for performing the analysis and evaluation those findings. Next, for the data collection and empirical research section presents the methods to be chosen for the empirical research and ensures that the collection and use of data is in accordance with this scientific framework.

3.1 Research Approach

Research approach presents the setting and methods use for answering the research question, through the framework of: which type of empirical data should be obtained, how it should be evaluated along with its the adequacy for reaching reliable output(s)/solution(s). Basic research approaches are divided into two: qualitative and quantitative (or mixed in some cases), which in this study aims to evaluate the case through the qualitative approach since the focus of study is to understand the realization of a real-life phenomenon with its progress, in other words, how and why such events evolve over time in a certain environment.

Regarding research approaches, qualitative research uses a naturalistic approach that seeks to understand phenomena in context-specific settings such as the "real world", where the researcher does not try to manipulate the interested phenomenon but rather observe and investigate it (Patton 2002, 39). Compared to quantitative, qualitative produces findings that are not obtained through statistical procedures or other quantification tools, but instead reach findings from real-world settings in which the phenomenon occurs naturally and unlike quantitative research, which aims to causally identify, predict, and generalize the findings, also qualitative pursues to illuminate, understand, and predict those cases (Hoepfl 1997, 48). In line with the approach, research questions also differ: quantitative questions have broader style to understand the reasons why and how the interested case occurred but can be specific as well regarding the context

which makes it more flexible to evolve in response to the setting, data, and its analysis, unlike the quantitative approaches specific questions or hypothesis testing for reaching an explicit result (Fossey et al. 2002, 723-726). In this context, this study is more in line with the qualitative research approach since the focus is on the emerging phenomenon of Tesla's EVs (as disruptive innovation) though understanding how and why company achieve such success in the market in a way that might redefine the theory of disruptive innovation.

Nevertheless, in line with qualitative research approach, this study aims to unfold not only the causes of the phenomenon, but also the process that enables it. In this context, process thinking involves thinking about phenomena dynamically: in terms of movement, activity, events, change, and temporal evolution, as oppose to the traditional cross-sectional models, which provide a partial picture of the world that evacuates the role of time and assumes an equilibrium state, (Langley 2007, 272). Additionally, through the strategies associated with process thinking, the following sections present the types and ways of analysing of data and unfolding of the process in a meaningful way.

3.2 Case Study - Tesla, Inc.

Qualitative research focuses on examining a wide spectrum of real-life phenomena and tries to explain the cause-effect relationship of it and conducting a case study is one of the common research methods used for social sciences. The method has both pros and cons depending on three conditions: type of research question, influence of the investigator(s)/researcher(s) on actual behavioural events and focus on contemporary as opposed to historical event, nonetheless, those conditions distinguishes case study for other approaches such as: research needs to ask "how" and "why" questions, investigator/researcher's (almost non-existent) control over the events, and focus on contemporary phenomenon in the real-life context (Yin 2009, 2).

The main usage reasons of case analysis can be listed as follows: motivating the research question - in which comparison or real-life sampling can provide proof or falsification of a phenomenon that can also be presented only theoretically; inspiring new ideas - in which new emerging facts in the examined data can be used as a guide for studies, and illustration - in which actual equivalent of theory in real life fosters more effective transfer of the idea to the reader (Siggelkow 2007, 21-22). Consequently, the persuasiveness of the research is an important factor in which the number of cases is inversely proportional

to this situation, in other words, single but unique case makes it more remarkable for the reader which are presented with the example of "talking pig" (Siggelkow 2007, 20). Here, regarding the disruptive innovation theory (Christensen 1997), to better examine such innovations' reflection in real environment (i.e., automotive industry), the study needs to explore real innovation cases with unique settings in other words "talking pig(s)".

The chosen case for study is Tesla, Inc., as they quickly reached a noticeable size by being fully-electric vehicle manufacturer with around 3% global market and almost 70% in US and Canada's EV market share, which enables the company to be the current biggest player in the EV market and a competitive one in the global automotive market (Lambert 2022; Kane 2022). However, the important feature, that distinguishes the company from other companies and makes it the "talking pig" of this study, is its first business plan: contradicting the disruptive innovation theory, as they aimed to target high-end buyers with a top-of-the-line battery electric spots car called the Roadster (Thomas & Maine 2019, 657).

When the automotive industry is examined from the market of EVs, Tesla Inc., which did not enter the market as an incumbent (but rather as a start-up), given its current position in the market (in other words dominance) due to its progress (in line with the theory) over time, makes it a perfect fit for becoming a case company. As stated by Musk, the chairman, product architect and CEO of the Tesla, the company was founded with a goal of sustainable transport through bringing compelling electric cars to the mass market and vanishing the need to compromise usage of EVs, since they can be better, faster, and more affordable than gasoline alternatives (Musk 2013).

Entering the market in 2003 with the mission of producing all-electric vehicles, Tesla, Inc. (then known as Tesla Motors, Inc.) was founded in Palo Alto, California and a year later, Elon Musk, who adopted and supported this mission, became the controlling investor, head of product design and chairman of the company with his initial investment of $6.3 million (Davis 2010; Frohman 2014, 42-43). However, inconsistent with the theory of disruptive innovation, their first vehicle, the Roadster was released in 2008 which was considered as new way of market disruption with competing against high-performance vehicles (and appealing only to a small but wealthy minority) along with brand new attributes (i.e., being fully electric) for the market (Frohman 2014, 43; Schmidt & Van Der Rhee 2014, 17). After the high-end entry, the company started to invest more

on manufacturing much affordable models and include infinitely scalable clean energy generation and storage products in its production portfolio in which such expansion and investments was done for supporting the inevitable transition from fossil fuels to greener and zero-emission solutions with creation of a brand image for themselves (Musk 2016). As a result, their next move was to launch the Model S-a luxury sedan by targeting the premium segment in 2012, followed by the Model X-the battery-electric SUV in 2015, then the Model 3 in 2016 by targeting middle- and upper-middle-class families, and finally, in 2019, they presented the Model Y (the crossover SUV that is seen as a more advanced version of the Model 3) (Thomas & Maine 2019, 658; Dans 2018). Despite the rise of EVs, almost all incumbent companies have invested and developed models in this market (which still does not exceed the gasoline market), Tesla's stock market value has exceeded $ 100 billion (which makes it more valuable than many well-established incumbent companies) thanks to its investment and success only in the electric vehicle market (The Editorial Board 2020). Nevertheless, such strategy also leads Tesla, as the first electric vehicle brand, to have a valuation of roughly $206.5 billion and being world's most valuable automaker by surpassing Toyota (one of the largest incumbents as manufacturer of both gasolines, electric and along with, combination of both, hybrid models in the industry) in 2020 (Stevens 2020).

Considering the vehicle segment and target customer base of the new models, it is observed that Tesla has gradually approached the mainstream with a top-down approach over the years, along with its sales and recognition had increased accordingly. This contrast with the theory, makes the company convenient to be analysed through examining its strategy along with its role (i.e., disruption) in triggering the current electrification transformation. Such factors also increase Tesla’s popularity in both academia and industry outputs, and eventually made the company to become a "talking pig". Thus, those factors also facilitate for obtaining data for the purpose of applying the theory and unfolding of company’s progress.

3.3 Data Collection

In social sciences, qualitative research approach focuses on the social and cultural (i.e., sense making of structure and lives of ourselves and others) phenomena, which can be analysed through, two different data sources as primary and secondary in which for the primary, original data is collected for a specific research goal and for secondary, original

data is gained for different research purpose: as for reusing in order to answer another research question (Hox & Boeije 2005, 593-595). Regarding the secondary data, as a source, it should be suitable and useful and relevant for answering the research question and quality of data should meet standards of current study along with its methodological criteria for appropriate scientific practice (Hox & Boeije 2005, 596).

The main reasons for using secondary data in qualitative studies are: asking a new question to existing dataset, linking current primary research or data with existing data sources, asking unasked questions of additional datasets which had no role in producing, or bring different datasets into conversation with each other, or developing insight into hard-to-reach populations (i.e., data sources) or critical topics (Irwin 2013, 296). Accordingly, reasons for using secondary data in this study are: primarily difficulty of collecting data as the phenomenon, took place over a wide period and in a large market as experienced on a global scale; secondly, in environments such as the automotive industry, companies must share some of its data publicly for their shareholders, which allows such information to be easily obtained and reviewed by the academic and business community; and contrary to similar studies (Frohman 2014; Chen & Perez 2018; Thomas & Maine 2019), to close the gap in the literature by asking questions to this data set from different perspectives.

Concerning the modes of secondary data analysis which introduces the ways to reach to data: formal data sharing – in which researcher access the data through public and institutional archives and studies, informal data sharing – in which researcher access the data either directly from primary researcher (i.e., from academical or other researches) or through participation of primary researcher for the study, and finally, re-usage of self-collected data – in which researcher uses his/her previous primary data for re-examining it with different goals (i.e. research question) (Heaton 2008, 35-36). In this context, this study primarily uses formal data that is collected via media reports, publicly listed automotive manufacturers' annual reports, industry associations, and consulting firms' reports that provide annual industry outputs and uses some academic researches/outputs in the same field that have different research intentions.

Furthermore, regarding the process thinking (as mentioned in the research approach), longitudinal data is essential to observe how processes evolve over time and mostly it is obtained from archival, historical, or real-time field observations (Langley et al. 2013, 6).

In line with this study's real life context, such data used in process/longitudinal work consists of specific sequences of events, requires multiple unit and level analysis (as some events made up of a continuum due to their interdependency), has variable temporal embeddedness (between the events) and are eclectic (since data is not only composed of descriptions of discrete events but instead it incorporates a variety of other interrelated and nonlinear types of both qualitative and quantitative information) (Langley 1999, 692-695). All in all, usage of both secondary data along with its formal and longitudinal aspect allows study to answer the research question for examining and comparing the emerging phenomenon and the theory.

In general, while some of the secondary sources used in this study consisted of previous academic studies and the analyses they used/came up with, others include online newspapers (which provide direct comparative information about the case and its environment), companies' and industry's official press releases, periodic analyses of consulting companies (which interprets and reflects insight information and investigations collected from markets and companies about both present and future of the industry), and official outputs by governments and international organizations (especially in the financial and automotive context). For ensuring successful evaluation of those data, sources are intended to be examined comparatively, in other words, for example, by comparing articles from online newspapers from a different source (e.g., official government or company output).

3.4 Data Analysis

Examining the phenomenon using the collected secondary data, thus drawing a meaningful and scientific conclusion, depends on the methods and approaches used for data analysis. Here, the analysis is practiced as data is organized and subjected to systematic study, either manually or electronically, to identify patterns in research data for reaching a meaningful output, thus, throughout this section, the questions of how to analyse these data with which methods and theories are answered.

Since the foundation of the study is revealing the disruption of the phenomenon in the market through: unfolding period where factors lead to formation of the phenomenon, its impact when it occurred and revolution it created afterwards, process research is used to reveal such progress. In this context, it can be either on outcome-driven research or event-driven research in which: outcome-driven explanations are built backward as starting

from an observed outcome(s) and goes through to prior causally significant events; conversely in event-driven (as can be seen in Figure 5); explanations are built forward: starting from observed or recorded events and reaches to the ultimate outcome(s) (Aldrich 2001, 119; Van De Ven & Engleman 2004, 344-345).

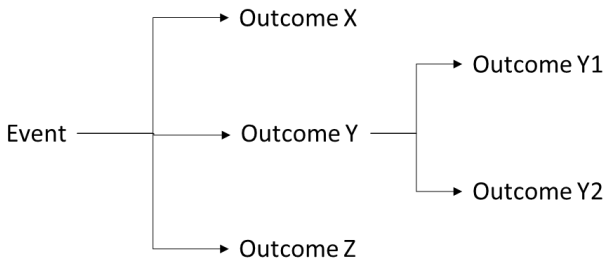


Figure 5. Event-Driven Explanations (Aldrich 2001, 119)

In this regard event-driven approach narrates how things develop and how it changes the current status quo, thus, concerning progress of innovation, the topic of "how change unfolds" can be addressed by describing the temporal sequence of events that occur in an institutional setting (i.e., specific market or industry) (Van De Ven & Engleman 2004, 345). As this approach is associated with process theory, through using narrative descriptions to note the impact of actions and events on a particular outcome along with task of structuring those pieces into an entire episode: enables the researcher to describe and explain both the development, change, and outcome of the phenomenon (Van De Ven & Engleman 2004, 345-346). Accordingly, such strategy can be used to examine how disruptive innovation occurs in the industry and to describe and explain the temporal sequences of events that occur throughout each stage.

For overcoming messiness and complexity of the data, the question arises of how to turn it into meaningful, useful, and understandable output. In response to this issue, the literature proposes "sensemaking" strategies which implies emergence of variety of "senses" or theoretical understandings, and stands for closing a gap between the data and theory, in this regard, there are several strategies with different strengths and weaknesses that depends on the context and data (Langley 1999, 694). Narrative Strategy is one of the sensemaking strategy used to extract a meaningful and detailed story from raw data. Here, although time tends to play an important role due to the structure of the narrative, it avoids commitment to any specific anchor point and thus, gives the best results in one or a few cases by focusing on specific contextual details in the analysis of the process (Langley 1999, 695-697). The strategy has a generic pattern that constructs with a

beginning, middle and end for accomplishing, and streaming the process (also unfolding of the process in the form of a narrative is thus ensured) and easily accommodates variable temporal embeddedness and eclectic data which demonstrates compatibility with the process thinking philosophy as well (Langley 1999, 695; Weick 2015). Although this type of strategy does not provide or guide the formation of either general or basic theory, it is aimed to make a theoretical contribution by comparing the existing theory with the storytelling of the emerging phenomenon, just as it aims in this study (Langley 1999, 697; Langley et al., 2013, 9).

Furthermore, in the end stage of sensemaking, it is important to come up with a certain conclusion both in terms of focused story which leads to a conclusion (i.e., the story of the phenomenon) and path or cycle it follows. This requires recall of the models of change (highlighted previously in the literature review section) as: life-cycle, dialectics, evolution, and teleology, in order to explain processes of change (especially in organizational sense) with specific focus on the path that it follows (Van De Ven & Poole 1995). In this way, it can be revealed that the followed path or cycle of the output (i.e., innovation) matches with which model of change at the last stage of the analysis.

Overall, purpose of this qualitative research is to make an analysis by examining the developments and the processes over time, thus reaching a meaningful path by unfolding the connected/independent events in line with the philosophy of process thinking. At this point, such methods and strategies enable the emerging phenomenon to be presented as a meaningful story or pattern with a beginning, development, and outcome (i.e., possible ending) stages, thereby creating a framework analysable and comparable with disruptive innovation theory can be achieved. Thus, considering the automotive sector and Tesla as the case company (with using EVs as a gamechanger innovation), a framework can be drawn by unfolding the historical progression and timeline.

3.5 Evaluation of the Study

In the final stage of the research design, for any scientific research, it is crucial and indispensable part to underline its evaluation. The basis of scientific work is its reliability and validity, in this context: reliability is used to test or evaluate quantitative research and is tested by its quality, on the other hand, concept of validity has no single, fixed, or universal approach, but instead it is designed through the methodology, processes and purposes of the studies (Winter 2000, 1; Golafshani 2003, 601-602). In this context,

trustworthiness lies at the heart for ensuring both validity and reliability, where quality of the study started from the concerns about both concepts (i.e., validity and reliability) in quantitative studies and explained through its direct connection (Seale 1999, 465-467). Accordingly, confirmability, credibility, transferability, and dependability are considered as vital criteria for sustaining both the trustworthiness and achieving quality of the study (Lincoln & Guba 1985; Guba & Lincoln 1994, 114).

First, dependability raises awareness to the capability of other researchers to draw same conclusion using same data source along with same questions when they repeat the study again (Shenton 2004, 71). This includes the future researchers' usage of same work as a model, in other words, seeing it as a "prototype model", and it also allows readers to follow the proper research practices, thus should contain following sections: research design-for describing the plan and execution stages of the study, operational detail of data gathering-for detailed review of the work, and reflective appraisal-for evaluating effectiveness of process (Shenton 2004, 71-72). In this study, types, and models of collected data the approaches and methods required for its analysis are clearly presented through the research design.

In line with the dependability, confirmability is a concept that emphasizes the qualitative researcher's comparable concern with objectivity. Here, collection and execution of data along with its findings are essential to ensure subjectivity and should follow certain logistical evidences and analytical techniques (Lincoln & Guba 1985, 323). In this context, in order to reduce the effect of researcher's bias and facilitate confirmability through application of previous (and proven) research practices and admission of researcher's prior assumptions, guarantee that the findings of the study are the result of informants' experiences and opinions, rather than the researcher's characteristics and preferences (Shenton 2004, 72). As for this study, since data collection and types are based on secondary data, it was aimed to take care to present such data in an unbiased and comparable manner by verifying the data from multiple sources (i.e., confirming the information presented by one source from several different independent sources).

While the concept of credibility is measuring or testing what is intended, the validity focuses what is tried to be achieved: in this context, those concepts are provided by compatibility of the findings with the reality and the reliability of the research (Lincoln & Guba 1985, 219; Shenton 2004, 64). As this study uses secondary data, in order to

achieve this concept: adopting well-established prior research methods in general qualitative research, examining negative case studies, or examining previous research findings to check at things from a different perspective, and previous background research on the focussed subject (Shenton 2004, 64-69).

Finally, transferability focuses on demonstrating that the results of the conducted study can be applied to a wider population, especially since the findings and results of a qualitative project applying primary data are specific to a small number of specific environments and individuals, it makes it impossible to show that they can be applicable to other situations and populations (Shenton 2004, 69). However, since the data used in this study is secondary and it is also aimed to be analysed through independent data sources, transferability has been tried to be increased. In this context, such transfer can be achieved through, ensuring sufficient contextual information, in-depth presentations of the phenomenon and its environment, and emphasizing the commonalities of the results obtained with previous accepted studies (Shenton 2004, 69-71).

To conclude, validity and reliability are important factors to consider when designing any qualitative research, analysing the results, and evaluating the quality of the study (Patton 2002, 542). Hence, in this section, the criteria, and tactics that the study pays attention to through concepts of confirmability, credibility, transferability, and dependability, to focus on ensuring these two conditions, are emphasized, and practiced approaches are presented. Then again, it does not change the fact that there are still aspects of the study that could be improved. For example, usage of secondary and qualitative data necessitates the need for continuous comparison for validation and requires availability of additional sources in case of possible mismatches. In addition, again use of secondary data also makes the evaluation dependent on the used source and requires constant benchmarking as similar studies that previously evaluated using same source.

4 FINDINGS

In this section, through focussed gap and research area mention in literature review, and highlighted methods and approaches in research design section, the phenomenon is tried to be explained. Thus, the main research question "How did Tesla's approach redefine the theory of disruptive innovation?" was designed to be answered through three sub-questions. However, here instead of these three sub-questions, it is examined via three subheadings: "Tesla's Disruption in the Automotive Industry", "Market Entry Strategy of Tesla", and "Incumbent Response to Change".

4.1 Tesla's Disruption in the Automotive Industry

Focussing on the first sub question of “How has Tesla’s EV disrupted the automotive industry?", this subsection examines the activities of the company, which started its commercial life as a start-up in 2003, in the time period that extends to the present. In this framework, while concentrating on the steps taken by the company from the past to the present: released models, investments, and other focussed areas (i.e., R&D, energy storage and charging, autonomous driving, etc.), in parallel, their financial success in the market, as the economic perspective of the business, along with their growth and popularity are examined. In addition, this review tries to prevent mis-examination as mentioned (Christensen, Raynor & McDonald 2015, 4), by comparing Christensen's work (1997), which includes his predictions about EVs, and other studies he updated (with other scholars in the following years), with Tesla's steps for objective outlook.

4.1.1 Story of Tesla, Inc.

The story puts Tesla at the centre as the protagonist, frames the process through: background factors that both embraced and triggered the foundation, establishment goals as their business plan, and presented vehicle models till now as progress to become phenomenon. In this context, Figure 6 (Timeline of Tesla) briefly demonstrates the cornerstone events that are discussed in this section.

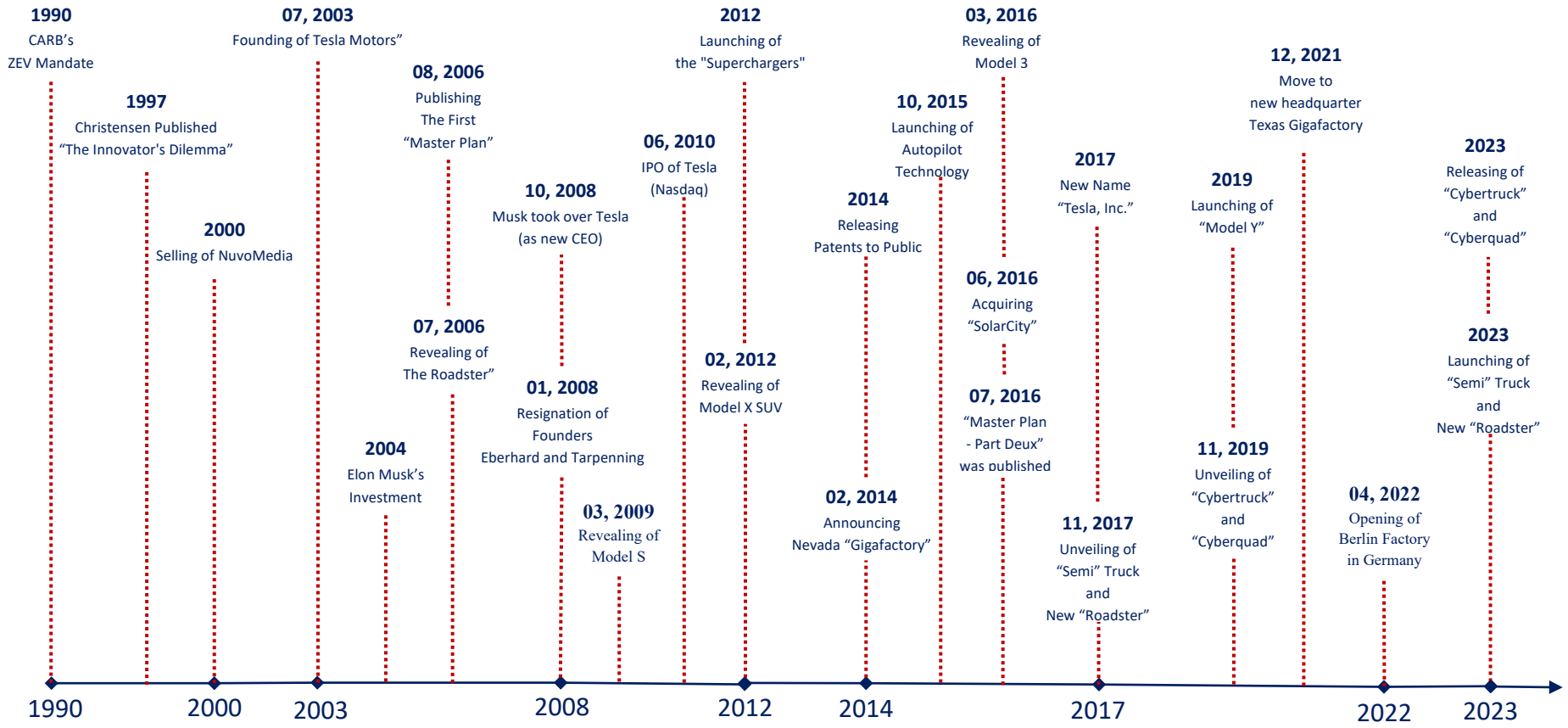


Figure 6. Timeline of Tesla

4.1.1.1 The California Zero-Emission Vehicle Mandate (1990s-2000)

To tell the story of Tesla, it is necessary to travel back in time to California, United States in the early 1990s, not long before the founding of the company. California Air Resources Board (CARB) had achieved a first in world history with the California Zero Emissions Vehicle (ZEV) authorization: to mandate for manufacturing vehicles that do not emit harmful tailpipe pollutants (i.e., non-carbon emitting) with a varying quota based on market share in conventional vehicles to seven major automakers operating in the region (i.e., Chrysler, Ford, General Motors, Honda, Mazda, Nissan, and Toyota) (Sierzchula et al. 2012, 50; Eisler 2016, 36). In this context, the larger the share of companies, the larger the ZEV quota was, additionally, it required that at least 2% of the manufacturer's fleet in this region contain those alternative vehicles (i.e., ZEV) in each model year from 1998 to 2000, 5% in 2001 and 2002, and 10% of models in 2003 and subsequent years (Sierzchula et al. 2012, 50-51; Eisler 2016, 36). This restriction encouraged the development and production of battery electric vehicle (BEV) models, but there was a problem that till then no technology could offer such a performance and price as ICE offers. The reason for this was the balance between battery performance (i.e., top speed and driving range) and vehicle cost in the 1990s, which is why these models were especially visible in niche markets such as low speed vehicles (LSV) at the time (van Bree, Verbong & Kramer 2010, 530-534).

At that time, market observations of Christensen (1997) also support these limitations, as he identified three different key performance criteria: cruising range (i.e., the distance driven without refuelling), the cruising speed, and acceleration time (from 0 miles per hour to 60). In this context, regarding cruising criteria, at the time the expected vehicle range was between 125 to 150 miles where EVs could only offer 50 to 80 and for acceleration speed, it took 20 seconds for an EV to reach the speed that normal gasoline vehicles reach in 10 seconds, in addition, mainstream customers demanded a wide range of options where only a limited number of EV models were offered in the market by then (Christensen 1997, 160). Though, this technological impossibility argument of manufacturers worked, which led to weakening and postponing CARB mandates, also enabled hybrid electric and fuel-cell electric vehicles (which offer higher price-performance as of the period) to be included in the ZEV classification (Eisler 2016, 37). All in all, despite all the efforts of manufacturers, the law triggered these global automotive giants to make more serious investments in EVs.

4.1.1.2 The Beginning of an Era (2000-2003)

As Christensen emphasized, as a result of his observations and analysis with experts, possibility of EV disruption in the market depended on breakthrough in battery technology, as the EVs with such technology at the time failed in all desired customer criteria (1997, 160-162). Previously, nickel batteries were used in vehicles, which was the reason for low performance due to both its heavy weight and lack of storage capacity, on the other hand, the li-ion batteries of early 2000s were offering both the most powerful and the most promising technology available, thanks to its increased battery capacity and reduced weight (Fletcher 2011, 60; Väyrynen & Salminen 2012, 80-81). For Martin Eberhard and Marc Tarpenning (i.e., co-founders of Tesla Motors), li-ion batteries were no strangers: as they used smaller sized ones in electronics for their previous e-reader start-up called "NuvoMedia" (which was sold in 2000); however, they had in mind to develop those for using them in larger sized versions (i.e., for vehicles), which pushed them to generate capital by selling their company in order to enter automotive industry (Fletcher 2011, 60-61).

In this way, the company was founded in the early 2000s (i.e., 2003) as "Tesla Motors, Inc." by those two engineers and technology entrepreneurs from Silicon Valley, Eberhard and Tarpenning, with a business model by standing against industry's excuses for not concentrating on BEV: unsatisfactory battery technologies that leads insufficient performance offering for customers (Eisler 2016, 38). Furthermore, unlike the previous decade, the entrepreneurs had a trump card, called Lithium-ion (Li-ion) batteries which were just starting to be used as an energy storage unit for vehicles. Consequently, the entrepreneurs decided to produce the Roadster, a high-end sports car equipped entirely with a lithium-ion battery, that could make a devastating impact on the established automotive industry by realizing legend of the green supercar.

4.1.1.3 The Roadster (2004-2008)

Disruptive innovation theory explained that the starter started offering their products either from non-existent or niche (i.e., small) markets where competition does not exist (or slightly exist that gives opportunity for newcomer to shine) (Christensen 1997, 40). The founders of Tesla preferred a parallel approach, but they faced a serious problem, which was the cost of batteries. Regarding conditions at the time, the cost of battery (approximately $20,000 and over) along the electric motor made the production of a

standard daily usage-EV unaffordable, so they developed an idea by focusing on performance rather than price, and after negotiations with Lotus (i.e., British sports car manufacturer) for using their frame, they idealized their supercar called the "Roadster" (Fletcher 2011, 62).

However, battery test studies used for electronics, battery production facility and factories required for mass production were costly and required high capital investment. Consequently, PayPal's co-founder and founder of SpaceX, Elon Musk became a partner in the company as a major investor and kept target of supercar alive, and as a prerequisite for his investment, he also became chairman of the company and convinced well-known investors (e.g., Jeff Skoll from eBay, Sergey Brin and Larry Page from Google) to be part of their revolution (Fletcher 2011, 64; Frohman 2014, 42-43). So, the Roadster was first revealed as a prototype in 2006 with having a driving range of about 250 miles, later started production in 2008 and finally launched in 2009 in United States: while the vehicle could travel up to 244 miles on a single charge with its full lithium-ion battery, such full charge required at least 24 hours when plugged into a standard wall outlet (Q.ai 2022).

During all these developments, three major events took place that affected the future of the company: the founders left the company, the company announced a long-term plan, and the global financial crisis was encountered. First, shortly after the Roadster's first reveal in 2006, the same year the company announced a long-term plan (with the second announced 10 years later) called “The Secret Tesla Motors Master Plan (just between you and me)”. In short, despite the hydrocarbon economy, they were aiming to provide environmentally friendly zero-carbon emission energy solutions and to expand it on a global scale, thus, with the popularity and income created by the Roadster, they aimed to produce more affordable vehicles and to offer zero emission electric power generation options (Musk, 2006).

Secondly, acceleration with Musk's arrival brought along the task changes of certain people in the process, among which the founders, Martin Eberhard and Marc Tarpenning, were at the forefront. In 2007, Eberhard, who was asked to resign from the CEO position at the request of the Board of Directors, respectively served as the company's advisory board and President of Technology, on the other hand, Tarpenning was demoted from being CFO to Vice President of Electrical Engineering position, and in 2008, both

founders left the company (but Eberhard would later file a lawsuit claiming that he was forced out of the company, but later dropped the suit in 2009) (Q.ai 2022).

Finally, regarding business context, effect of external environmental is a theme covered in many academic outputs: in which the company's decisions and success is not only linked to their own financial or strategic decisions, but also influenced by their environment (i.e., sector/industry or country/region) (Christensen 1997, 89-100; Pfeffer & Salancik 2003). In fact, the 2008 global financial crisis coincided with the period when the company was starting to grow: Musk was promoted as CEO and under his leadership, the company decided to cut certain operating expenses (in which they fired 24% of their staff) to keep the balance positive and the Roadster and other upcoming projects alive (Q.ai 2022).

4.1.1.4 Model S (2008-2012)

Despite the precautions, the economic crisis severely shook the company (which, as Musk said, Tesla escaped bankruptcy at the last moment), and the board approved $40 million in convertible loans to rectify the situation to continue production, and not postponing future work (Q.ai 2022). In the process, the cornerstones of the company's progress have been provided by major financial investors and collaborations with well-known automotive and technology companies (see more in the "Impact of Tesla" section). Nonetheless, as another move to stave off the effects of the crisis, in 2010 the company went public on the Nasdaq, making it the first automaker to go public in the US since Ford in 1956: the company netted nearly $226 million through downing 13.3 million shares at $17 each, as the company valued $2.22 billion at the end of the opening day (Musk 2014b; Q.ai 2022).

What they emphasized in their "Master Plan" was to continually use the revenue of the previous model to produce more affordable vehicles, thus emphasizing a process of electrification that was accessible to all. In this context, the company introduced the Model S in 2009 and the prototype in 2011, and then put it on sale in 2012, furthermore the vehicle could travel 320 miles per charge and accelerate from zero to 60 mph in 4.5 seconds (Q.ai 2022). Considering the economic difficulties, the company faced and the strategy they planned, it was not expected to produce a mainstream vehicle directly. However, the Model S was a very important milestone for the company as a luxury-sedan (premium sedan) move after the sports car segment. The main factor that created this

milestone and turned the model into a legend are the awards given by the public or leading institutions in automotive industry. In this context, the model, which has been compared with other vehicles in its segment in terms of performance, design, technology and range, and even subjected to real road-tests, was chosen for one of most prestigious awards, "Car of the Year" by “Automobile Magazine” (i.e., Motor Trend Magazine) (as the world's first premium electric sedan), achieving a score of 99 (out of 100) as highest test rating for an EV from Consumer Reports (an American non-profit consumer institution), topped Norway's list of new car sales (a first for EVs) and subsequently became the global best-selling plug-in EV in 2015 and 2016 (Tesla 2012; Frohman 2012, 45-46; Barry 2022).

Another chance of the Model S was the constantly evolving battery technology. The newly developed batteries lasted longer and were still operational eight years later, but will do so at a significantly reduced capacity, just like most tech gadgets. The battery-economy still posed a barrier to customers because unlike ICE engines, electric vehicles suffered a significant depreciation in resale, which later overcame by Tesla's resale guarantee, which makes it easy for customers to trade after three years, ensured Model S’ to retain its value and became one of the reasons for its preference (Eisler 2016, 39).

4.1.1.5 Model X (2012-2014)

Batteries are a crucial factor in the company's success, but just as critical is how they are charged. Charging infrastructure poses a major challenge: common expectation was that users should have an experience that mimics the convenience of gas stations as much as possible (i.e., fast charging): just like the time it takes to refuel at a gas station, the vehicle's battery is expected to be almost completely charged. Of course, Tesla had an answer to this problem with its technology, called "Supercharger", which was used as a serious marketing tool for attracting more customers. In 2012 Tesla installed the first network of supercharger stations in California, then increasing it to around 1,000 worldwide, giving Tesla owners free charging faster than regular outlets which can add range of 270 kilometres in about half an hour (Eisler 2016, 39; Q.ai 2022).

In 2012, Tesla introduced its first SUV (Sports Utility Vehicle), the Model X, with seating for seven and having total range of approximately 340 miles, although it was planned to be launched in 2014, was delayed for a year due to some mishaps (Frohman 2014, 46; Q.ai 2022). Although the Model X as an SUV was not a move that fully coincides with

the more affordable production approach, it enabled company to appeal to a different customer segment and expand its market potential.

By 2014, the company presented two major technological breakthroughs: the “gigafactory” and releasing their patents to public. Tesla introduced the project to open a one-of-a-kind battery factory in partnership with Japanese industrial technology giant Panasonic in Nevada, USA, called the "Gigafactory" to meet the increasing demand both in the current period and in the future for mass production of much affordable EVs (Eisler 2016, 38). The biggest difference of Gigafactories from other standard vehicle, automotive parts, or equipment factories, is: here, both certain models and li-ion batteries are produced in these enormous facilities. Moreover, with the effect of the open-source movement, the company made an unprecedented move by making its patents accessible to everyone. While the company stated that it was doing this to develop EV technologies as a contribution to the sustainable transportation movement, it complained that the current incumbent companies were investing only a little on EV technologies which kept the market small (Musk 2014a).

4.1.1.6 Model 3 (2014-2017)

Tesla published the "Master Plan, Part Deux", by updating the plan that was first presented in 2006, concerning a decade of their strategies and missions. Musk basically identified 4 main areas that aimed to develop: to offer more affordable vehicles in all main segments (which he aimed to develop in three different models as low, medium, and high volume), to progress in solar panels with Tesla Energy, to support safe driving by improving autopilot system, and to develop a sharing program that supports customers' car rentals (Musk 2016). EVs were already expected to be the car of the future thanks to zero carbon emissions, and while this strategy involved moving closer to the affordable vehicle that was expected to appeal to the mainstream, it also highlighted two more important new innovations: autonomous driving and car leasing (i.e., car sharing). Self-driving vehicles are seen as an expected disruptive innovation in near the future, also, the decrease in car ownership figures and the trend of car leasing through online platforms and mobile applications are foreseen as the future of transportation, these two trends together are already expected to require major strategy changes of major vehicle manufacturers (Gao et al. 2016; Hoybjerg & Buck 2019; Deloitte 2020).

In line with “Master Plan, Part Deux”, in 2015, the company began offering its customers a software update called "Tesla Autopilot": the system basically offers features such as vehicle lane centring, assisted braking and traffic-responsive acceleration (Q.ai 2022). Later, it was updated with additional enhanced navigation, 3D signal processing, visual feedback and Autosteer and in 2016, for the goal of Full Self-Driving (FSD), they announced that all new and upcoming models will have more cameras, sensors, and an upgraded digital operating platforms and finally, released software update including FSD mode in 2017 (Q.ai 2022). As second part of the plan, in 2016, the company acquired the solar installation company called “Solarcity” (in which Elon Musk was the largest shareholder and owned his cousin) for $ 2.6 billion for offering energy solutions in line with offering solar chargers for homes of Tesla owners (Tesla 2016; Q.ai 2022).

Through their expansion with solar power and battery systems and with its ambition for electrification, the company discarded the "motors" part in its name, thus, with their new name, the company released their fourth model, Model 3 in 2017 (Thomas & Maine 2019, 557-558; Q.ai 2022). As the Model 3 electric compact executive sedan, it was another step down from the luxury segment to more affordable mainstream vehicles.

4.1.1.7 Model Y (2017 and beyond)

Considering the company's determination to expand into different segments and to be permanent in the segment it competes in, Tesla introduced two new concept vehicles in 2017: "Semi" and the renewed Roadster. While "Semi" is scheduled to be released in 2023 as company's first semi-truck, it has already been booked by major retailers and logistics companies such as Walmart, PepsiCo, Walmart, UPS, and FedEx for use as a battery-powered tractor-trailer to transport goods (Levin 2021).

The last vehicle currently on the market, Model Y, was started to make its first launch in 2019 and its first delivery in 2020 (Q.ai 2022). Just like the new Roadster, Model Y, as midsize SUV, which was presented to sustain their strong foothold in the segment and to show their determination towards more affordable vehicles at the market. In the same year, Tesla opened its first gigafactory outside the United States in Shanghai, which also expanded the company’s operation area to China, the world's largest automotive market and in 2022, company opened their third car factory in Berlin, Germany for to increase its effectiveness in Europe, another major market in the world (Carlier 2022; Q.ai 2022). Afterwards, company moved their headquarters from Silicon Valley to their fourth

gigafactory in Austin, Texas and second in United States (after Fremont, California) which was opened in early 2022.

In line with its future goals, the company introduced Cybertruck with bulletproof glasses and futuristic design in 2019, while Musk surprised the audience by also showing Cyberquad as the company's first electric quad bike, in addition to the launch (Levin 2021). Although Tesla scheduled Cybertruck to go on sale at the end of 2021, later also announced its delay till early 2023.

4.1.2 Tesla in Numbers

Although it is important for Tesla to continuously develop as a company by launching new models and investing more for future technologies (as mentioned in the previous section), financial and market data shows the success of the company along with its impact and influence in the market as mentioned in the sub question.

As of 2022, the company operates with six gigafactories located in three continents (North America, Europe, and Asia), of which those in California, Texas, Berlin, and Shanghai are used for manufacturing EVs and batteries and the remainders are for batteries, solar panels, and vehicle parts; and having 99,290 employees worldwide (Tesla 2022a; Bloomberg 2022b). Considering the current status (December, 2022), the company's market cap is approximately $389 billion, having a revenue fluctuating around $17 billion, and stock price averages $123.15 on the Nasdaq, making it the automotive company with the highest market capitalization (or most valuable brand compare to whole industry) (CNN 2022; Bloomberg 2022a).

4.1.2.1 Revenue, Sales Figures & Market Share

The basis of the progress and growth of businesses lies in the customer's response to the product or service they offer. Manufacturing companies, accordingly, generate their revenue mainly from product sales: this creates a necessity to examine Tesla’s sales figures and share in the EV market primarily for revealing its impact in the automotive industry.

In the light of the annual financial results announced by Tesla, more than 80% of the company's revenue is generated from vehicle sales (initially this rate was even above 90%), though Tesla generates some of it from car leasing, energy generation products and

service (i.e., vehicle technical service, etc.) (Tesla 2022b). Based on these reports published since 2011, the company's annual revenue is shown in the Figure 7 (Annual Revenue of Tesla, Inc.).

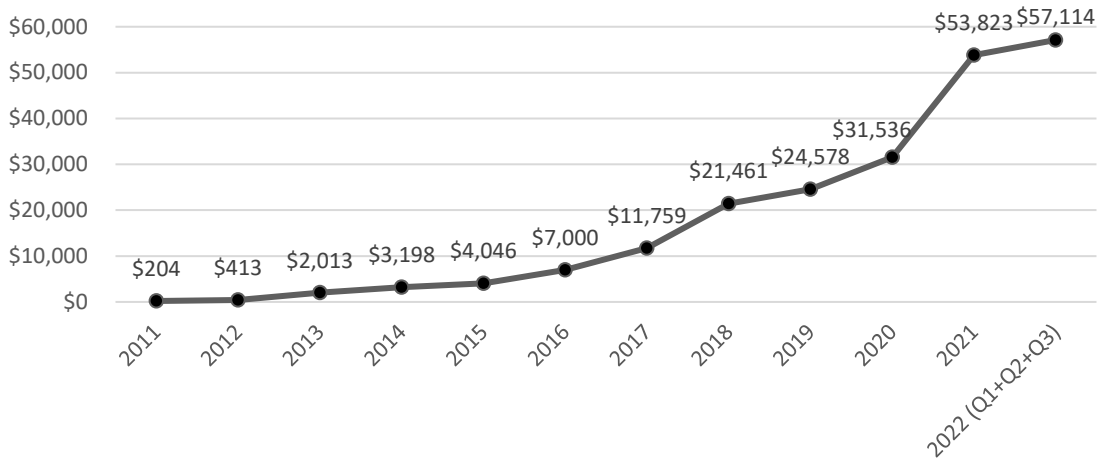


Figure 7. Annual Revenue of Tesla, Inc. (millions of $) (Tesla 2022b)

Regarding the fact that vehicle sales are the key factor in the company's revenue, Figure 8 shows the graph of annual sales figures which is obtained from the company's annual and quarterly financial reports. These data are approximate figures quoted by the company's reports and highlights between the second quarter of 2011 (start date of the vehicle sales/deliveries) till the third quarter of 2022 (announced so far),

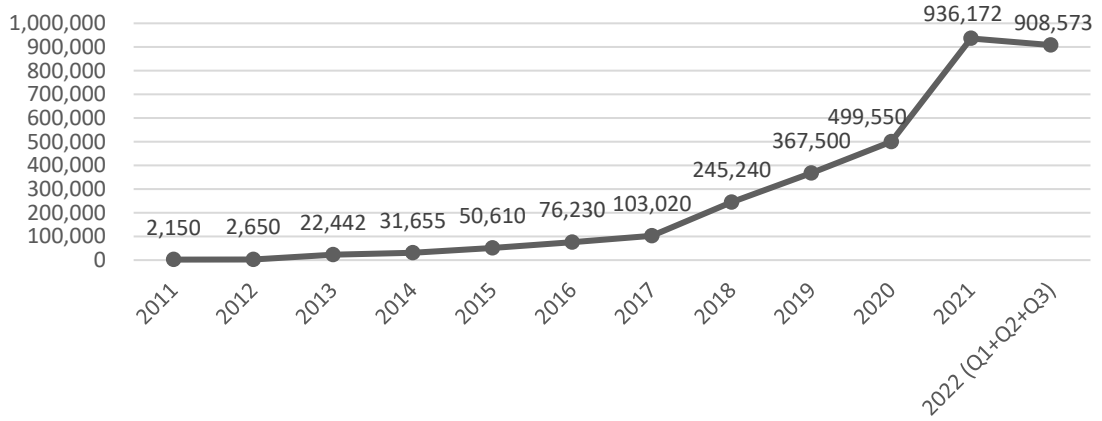


Figure 8. Annual Sales Figures of Tesla, Inc. (Tesla 2022b)

Nevertheless, Table 1 (Sales Figures of Tesla, Inc.) shows Tesla's annual sales figures (total and per model), in other words, distribution of the sales per each model (or pairs of models). In addition, the company deliberately presented the delivery numbers of models in pairs for 2019 and beyond. When the Table 1 is examined, it is seen that the company's model sales have increased in parallel with its revenue over the years, and it should be

noted that the Model 3 has the most sales which unlike other been in the market since 2017.

Table 1. Sales Figures of Tesla, Inc. (Tesla 2022b)

Sales Figures of Tesla, Inc.			
Year	**Model**	**Number of Vehicles Sold/Delivered per Model**	**Total Number of Vehicles Sold/Delivered**
2011	Roadster	2,150	**2,150**
2012	Model S	2,650	**2,650**
2013	Model S	22,442	**22,442**
2014	Model S	31,655	**31,655**
2015	Model S	50,404	**50,610**
	Model X	206	
2016	Model S	50,935	**76,230**
	Model X	25,295	
2017	Model S	54,715	**103,020**
	Model X	46,535	
	Model 3	1,770	
2018	Model S	48,721	**245,240**
	Model X	50,672	
	Model 3	145,846	
2019	Model S/X	66,771	**367,656**
	Model 3	300,885	
2020	Model S/X	57,039	**499,550**
	Model 3/Y	442,511	
2021	Model S/X	24,964	**936,172**
	Model 3/Y	911,208	
2022 (Q1+Q2+Q3)	Model S/X	49,558	**908,573**
	Model 3/Y	859,015	

For deriving a meaningful output from both sales figures and revenue, the last thing to examine is the company's market share, which was basically calculated through the company's total industry revenue from product sales divided by the industry's overall revenue or the percentage of an industry's sales that a particular company owns. Especially when the figures of the last three years are considered, Tesla is at the top of the EV market: considering third quarter of 2022, its sales constitute 65.4% of the market, however, as the share in previous years (i.e., 2021 and 2020) was 68.2% and 79.4%, respectively, Tesla seems to be experiencing an inevitable decline (even though its annual sales figures continue to increase) (Rapier, 2022). Considering that automotive companies

mainly produce according to order or demand forecasts: production volume and its global share can be seen to be directly correlated with the companies' market share. Although EV production is concentrated in a small number of OEMs, with the top six companies accounting for 52% of production in 2021 (up from 55% the previous year), the increase in Tesla's production volume (as seen in Table 1 and Figure 8) makes it the world's largest manufacturers, along with VW Group (Germany) and BYD (China) (IEA 2022b, 152).

Likewise, when the market share in 2021 is analysed in the regional (or continental) dimension (as seen in Figure 9): Although the company still does not achieve global supremacy, it has established a significant dominance in North America and Australia and Oceania regions (Armstrong 2022).

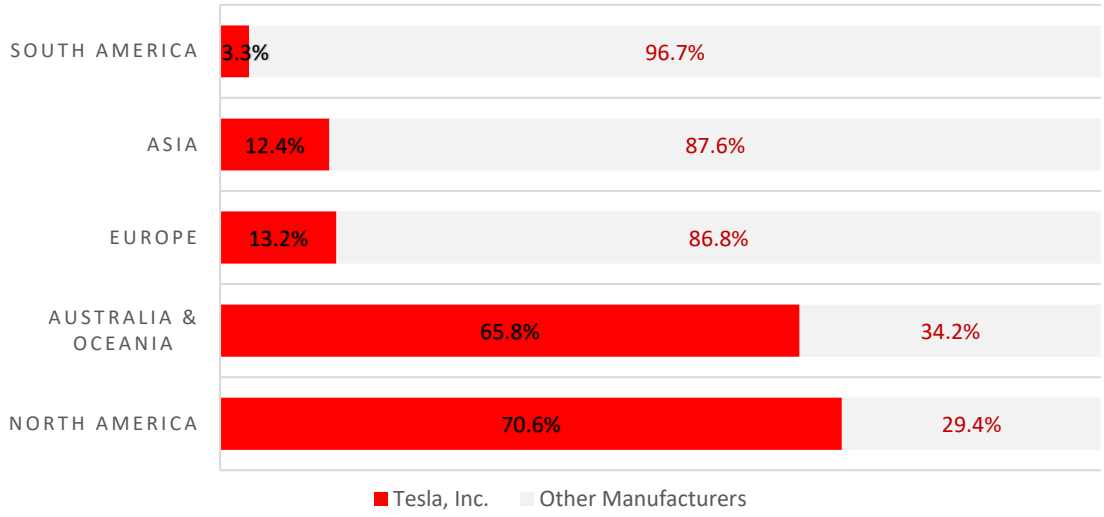


Figure 9. Tesla's Market Share of Total BEV Unit Sales – 2021 (Armstrong 2022)

In fact, considering the sales figures (which can be seen in Table 1), the company's PEV sales shares by automaker account for approximately 40% in its home country, American market, between 2011 and 2019; which was followed by another local company, GM (General Motors), by having a share around 14% (thus, the rest of the manufacturers could not even reach more than 10% share) (Argonne National Laboratory 2021). On the other hand, the reason for the low share, especially in the Asian and European markets, can be explained as the fact that the other two of the top three manufacturers, in other words, the other two competitors have the largest share in their own continents (VW Group in Europe and BYD in Asia) (Armstrong 2022; IEA 2022b). On the other hand, it is planned that the factories opened in Berlin and Shanghai will contribute to the growth and increase the sales volume in these regions in the long run (IEA 2022b; Tesla 2022b).

4.1.2.2 Company's Value & Initial Public Offering

Although the balance of supply and demand forms the basis of trade, the value of businesses cannot be calculated solely on these data, in other words, not just making the most sales and having many factories not only factors determine the value of the company. For this purpose, valuation is used to calculate organizations' both success or failure financially along with giving a clue for its their size, importance, interest, and future prospect of the company in the market. The company valuation (i.e., business valuation) evaluates the total economic value of a business and its assets by considering all aspects of the organization or business (i.e., assets, markets, industry, etc.) and can be performed by several different methods such as: market capitalization, enterprise value or EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) (Misamore 2017). Here, the focus is on market capitalization values (i.e., market cap) to demonstrate the value of the company, since what is emphasized in this study is the increase in the interest and expectation of the company in the market rather than financial equivalent of the company's net value. In short, market capitalization is one of the simplest measures for valuing a publicly traded company and is calculated by multiplying the total number of shares by the current share price (i.e., stock price); however, as a major shortcoming, it only considers the value of equity (as most companies are financed by a combination of debt and equity) (Misamore 2017). Additionally, this value can only reach when the company goes public by initial public offering (IPO) and start selling /exchanging their shares which Tesla did via Nasdaq in 2010. In this context, IPO represents end of the start-up or new venture phase in the company's lifecycle and the beginning of another for raising capital or raising a company's public profile, and allowing most of the original investors to sell portions of their shares (Ashford & Curry 2022).

After the IPO, fluctuation in the value of Tesla's stocks changed either at the times of vital events (along with external factors) or new operations of the company: vehicle releases, technological breakthroughs, or factory openings (Sun & Hong 2021, 5-6). In this context, Figure 10 (Tesla's Stock Price 2010-2022) shows changes in Tesla's stock value in the light of those events and fundamental breakthroughs introduced from its IPO in 2010 to the present. Although the effect of external factors (i.e., interest rates, political turmoil, exchange rate fluctuations, and natural disasters) certainly has an impact on the fluctuation in company's stock price, it mainly focusses on company's strategic moves by overlooking those factors. When examined, observed increases in value (i.e., stock

price) of the company is not only with technological breakthroughs, but also through factory openings (especially the overseas ones, for market expansion) and launching new models on sale (with timely product delivery and minimum recalls of vehicles for errors). Nevertheless, in 2020, by suppressing incumbent companies (that have more annual vehicle sales (ICE, Hybrid, EV combined) and more production facilities) such as Toyota, Volkswagen and Mercedes, Tesla became the most valuable automotive company with having a global market cap over $208 billion (and still maintains its leadership by increasing its value as well) (BBC 2020; Klebnikov 2021; Q.ai 2022). Thus, according to financial analysis organizations such as Cowen and Morgan Stanley, compared to other companies such prices were considered overvalued due to Tesla's underperformance, and the success in the new markets (also highlighted in the previous part, "Sales Figures & Market Share") accompanied by rapid emergence of dominance that reached overtime, can also be one of the influences of such value growth, but still highlighted the fact that many investors see Tesla as a fast-growing technology company instead of an automobile company (Klebnikov 2021).

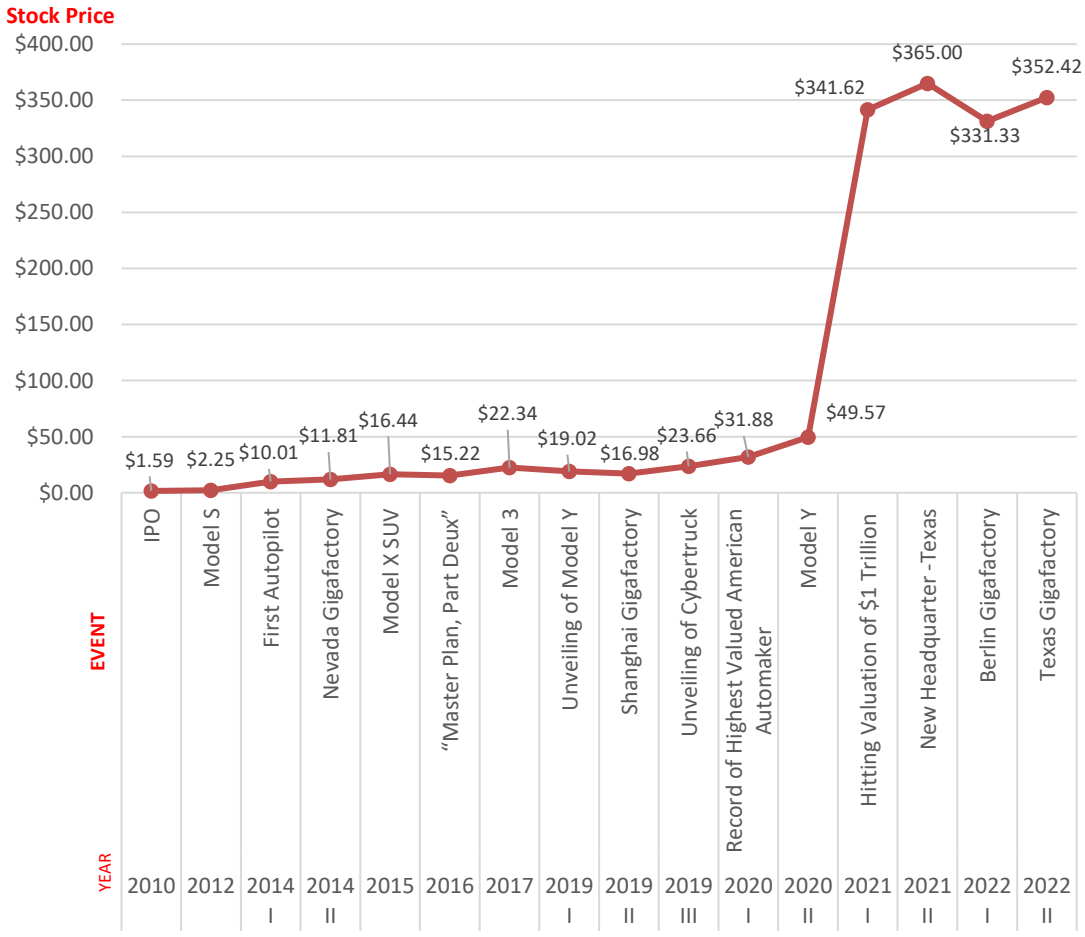


Figure 10. Tesla's Stock Price (2010-2022) (Bloomberg 2022a; Nasdaq 2022a; Q.ai 2022)

4.1.2.3 Partnerships, Fundings & Shareholders

Investments and partnerships both create a boost for target company's success and are beneficial for both parties through knowledge and innovation spill overs. Funds, on the other hand, provide the formation of the revenue necessary for the growth of companies and especially for production and technology development. Those partnerships mainly with Toyota, Lotus, Mercedes AG, and Panasonic along with fundings, are also allowed Tesla's progress from an American start-up to becoming a multinational automotive and clean energy manufacturer.

The first automotive company to cooperate with Tesla was the British sports car brand Lotus. In this context, the company had contracted various engineering and design works for the Roadster model along with various product licenses, most notably the use of the frame of Lotus Elise, and the official manufacturer of the vehicle at its factory in Hentel, United Kingdom (Eberhard 2006; Fletcher 2011, 62-63). After Lotus, the second automotive company to cooperate with Tesla was Daimler AG (currently called as Mercedes-Benz Group AG), which acquired a 9% of Tesla's stake, along with collaboration for li-ion battery packs and charging electronics for Daimler's Smart EVs in 2009 (Tesla 2010a; Q.ai 2022). This investment supported Tesla's dwindling cash for production and became a boost for the firm's next pre-orders before the IPO. However, soon after, in 2014, they sold 4% of their shares, and then the remaining shares as a result of finding an alternative battery supplier and investing more on their R&D (Tesla 2010a; Bryant 2020). In the same year, they made a second strategic partnership with Toyota Motor Corporation (TMC). Toyota's biggest difference from other partnerships or cooperations was the experience they can share with Tesla, especially having a better knowledge of mainstream EV market with their plug-in hybrid vehicle called "Prius" in 1997, as one of the rare EV models that could successfully manage to become permanent and successful at the time (Tesla 2010b). In this context, TMC acquired Tesla's common stock approximately $50 million issued in a private placement before the planned IPO, which later issued for production for electric Toyota RAV4 in 2012 (Tesla 2010b; Q.ai 2022).

Unlike all other companies, Panasonic (as a Japanese industrial electronic manufacturer) has been Tesla's main battery manufacturer and one of the major investors of the company since 2004 (Eisler 2016, 38). This strategic and financial partnership, which started with

the production of the Roadster, continued with joint factories (e.g., Nevada Gigafactory, as one of the first) and later models such as Model S and X, and even let Panasonic to buy stake of Tesla after the IPO in 2010 (Tesla 2011; Panasonic 2013; Eisler 2016, 38). However, later in 2021, Panasonic sold this stake which worth approximately $730 million but contrary to popular belief at the time, indicated that both sides continue to collaborate (Ohnsman 2021). The increase in sales figures and the financial success that came with the IPO in the following years also enabled Tesla to invest in Panasonic. In this context, the company continued to collaborate with its battery supplier large-scale battery manufacturing facilities and joint works in 2014 and beyond (Tesla 2014). Panasonic, as a key partner and supplier of game-changing battery technology of Tesla, has also benefited from this success in EV market: companies such as Mercedes AG and Hyundai Motor, whose investments in EV have increased and aiming to launch new models, have also chosen the Japanese company as battery supplier, and supported company's new battery factories that will open in different locations around the world (Ohnsman 2022).

Although IPO is an important step for the growth of companies, investments or funds are also as critical for the growth of companies for the formation of the necessary capital for their strategic moves. No matter how successful the company's product or service is, marketing and attracting investors are crucial factors for its success. Being able to attack these investors depends on both the plan/project and the product/service that the company offers, and important funding corporations generally prefer to invest in structures they trust, in this context, Tesla is one of the companies that has succeeded, especially after Elon Musk's arrival in 2004 (Frohman 2012; Eisler 2016; Q.ai 2022). Musk's belief in the green supercar idea led to invest for being part of the organization, and during his earlier era as chairman: his first move was to start convincing his world-renowned friends (e.g., Jeff Skoll, Sergey Brin and Larry Page) from Silicon Valley to invest, and later continued with attracting major large technology funds (Q.ai 2022). Up to this date (December 2022), the company has raised approximately $20 billion in funding: some became shareholder of the company in return for their investment, while others earned income by making sales thanks to the appreciation of these shares in response to the success of the company, others (e.g., automotive or technology companies) have benefited in partnerships via technology, innovation, knowledge, or system transfers (CNN 2022; Crunchbase 2022).

In this context, the Figure 11 (Shareholders of Tesla) demonstrates the percentage distribution of the company's shares. As emphasized by well-known financial analysis organizations, such distribution is often encountered in most automotive companies and here, regarding institutional shareholders (i.e., part other than publicly traded shares): featuring Elon Musk as part of the individual shareholders; the rest of the share (including both mutual fund holders and others) are mainly owned by major investment groups such as The Vanguard Group and BlackRock along with financial services corporations as State Street Corporation and Morgan Stanley (CNN 2022; Nasdaq 2022b). Although these mutual funds have made noteworthy investments in the company over time, the financial analysis showed that: while the inevitable trend of EVs in the market and Tesla's approach in this context influence such trend, just as observed in the IPO, most investors see Tesla as a technology company rather than an automotive company (Klebnikov 2021).

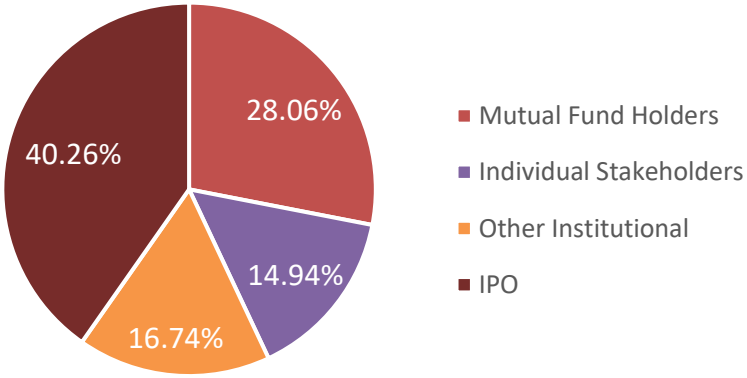


Figure 11. Shareholders of Tesla (CNN 2022)

4.2 Market Entry Strategy of Tesla

As highlighted through the second sub question “How did Tesla’s high-end market entrance reshape the disruptive low-end approach?": the company's market entry strategy is perhaps the most contradictory part of the case as theory offers versa. With Tesla's high-end entry and their seemingly progress for approaching the mainstream over the years, and the theory's approach from the low-end entry to the top is under scrutiny along with company’s future goals, projects, and models to be released.

Yet again, as mentioned in the previous sections, EVs were one of the case examples from the real sectors that Christensen (1997) used to strengthen his theory, however, what distinguishes it from the other examples was that the innovation had not yet completed itself at the time. While he was running the automakers program, he managed to share

both an outlook about the market and present managerial approach to be followed a potential entrant. Even so, it should be noted that: his approach must be evaluated against the circumstances and technologies of the late 1990s: even before new technological innovations, and newly enacted laws (as also stated by himself) (Christensen 1997, 159-171); and it should not be ignored that Tesla both benefited and took part for the formation of such innovations. Even if his managerial approaches were formed in a time before the existence of such breakthroughs, such comparative approach plays an important role in demonstrating the impact and magnitude of change as well.

4.2.1 High-End Market Entry with The Roadster

As emphasized through the core components of the theory, it basically describes a process by which a relatively small company (or entrant) with fewer resources can successfully challenge incumbent businesses: while incumbent companies focus on developing their products and services for their most profitable (i.e., high-end and mainstream) customers, they exceed and ignore the needs of some downstream segments, participants start by successfully targeting these overlooked segments (by offering more functionality, often at a lower price) for gaining a position (Christensen, Raynor & McDonald 2015, 4-5). On the contrary, Tesla's market approach was exactly the opposite from the high-end, with the Roadster model, but here, not only the vehicle segment, but also the uniqueness of the EV battery technology concept it used was vital for the period. Back to the theory, as these small companies or entrants are slowly rising (i.e., approaching the mainstream) they begin to deliver the performance that incumbent's customers need: here, "disruption" mentioned in theory happens when these customers start to adopt this new offering instead of incumbent's product. Again, Tesla's approach was quite different which is known as "leapfrogging" in the literature: it involves creating innovations that make it difficult for incumbents to imitate quickly with radical innovative moves and then using those technologies to reduce costs over time instead of using technology to improve performance (Furr & Dyer 2015; Chandrasekaran et al. 2022).

In the previous sections (i.e., Story of Tesla): at the time when Tesla was established to produce electric cars, it was uncommon for vehicles to be powered entirely by batteries, besides, batteries were not efficient and suitable for long-range driving. When the founders of Tesla decided to use the li-ion battery in their vehicles, the cost of the one that could generate the energy required to operating a vehicle was at least $20,000,

making entry from the lower and middle classes technically close to impossible (Fletcher 2011, 62). Those large battery packs represent a significant fraction of the vehicle's cost: like the Roadster, for Model S's high-performance models these packs account for close to 30% of the suggested retail price of $95,000 to $138,000, and yet, the founders started by opting for high-end disruption with embracing performance over price mentality and entering from sports car segment (Eisler 2016, 38-39).

The Roadster project, which started in the early 2000s with the progression for both the battery production, the establishment of partnerships for vehicle manufacturing and design, and the financial crisis, finally concluded with market entry for the S-segment (sport car) for $100,000 to $110,000 in the beginning of 2008 (Q.ai 2022). As the first BEV in its class, the Roadster could do 0-60 in acceleration of under 4 seconds (3.7 seconds), and reach 245 miles on a full charge, which was the first low-emission vehicle to offer it, thus, such performance offerings and target segment, made it a vehicle comparable to high-end sports and luxury cars worth over one million dollars by famous manufacturers like Porsche, Lamborghini, and Ferrari (Brown 2016; Thomas & Maine 2019, 658). After its domestic entry, the company started to expand to the European and Asian markets, and reached a global sales figure of around 2,400 until its production and sales were stopped in 2012 (Woody 2012; Tesla 2022b).

4.2.2 Approach to the Mainstream

The Roadster was the first project in the market that Tesla entered as a start-up, after which they aimed to offer products and technology in a more affordable way for the company's progress and growth. Such strategy appeared throughout the progress of the company with newly released models and revealed mission and vision statements. In this context, Tesla's Master Plans (as seen in Figure 12) highlight the key objectives the company aims to develop over a period of nearly two decades: in the first masterplan, they highlighted the fact that, although the initial model was a sports car, the company's long-term plans are to create a wide range of models, including affordable family cars, and being part of the change by supporting move from a “mine-and-burn hydrocarbon economy” towards a solar electric economy with providing sustainable transport and power generation solutions and supporting battery innovations; as for the second, they underlined their support for sustainable mobility along with the company's long-aimed strides in the areas of solar energy generation and storage, while lowering segments of

current premium sedans and SUVs (i.e., Model S and X) and expanding vehicle model range to cover the main forms of land transport (i.e., heavy-duty trucks and high passenger-density urban transport with the "Semi" model), and continuously investing on future of mobility such as autonomy and sharing (i.e., autonomous driving and car leasing) (Musk 2006; 2016).

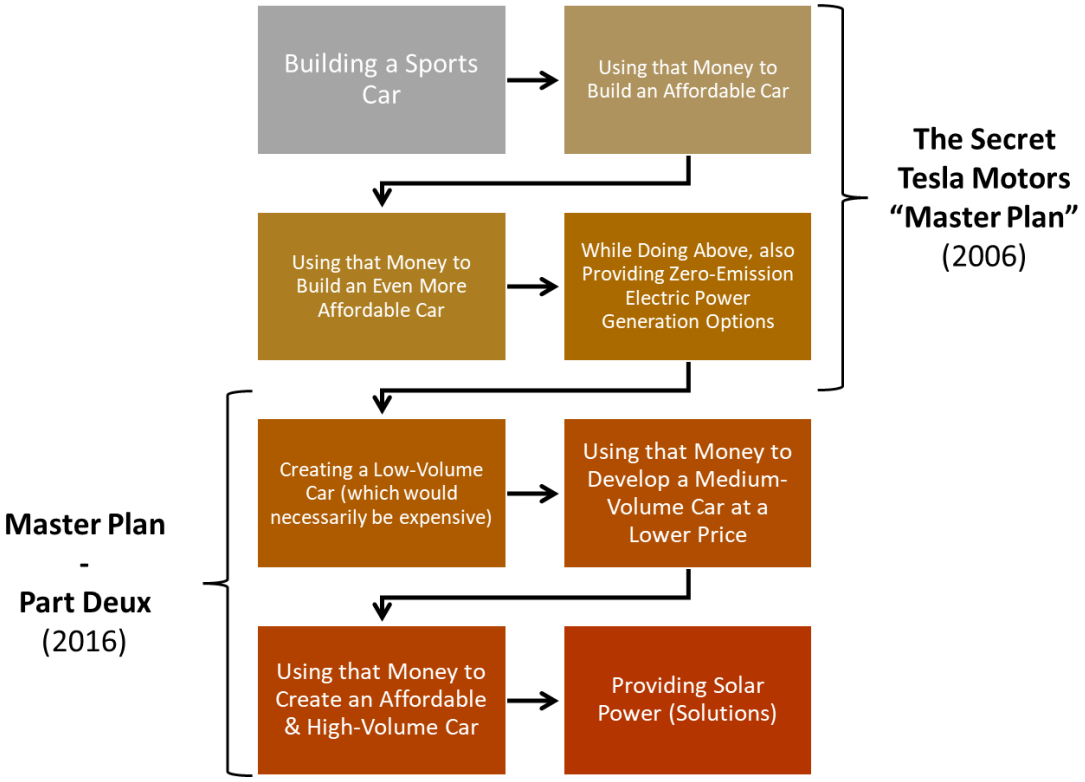


Figure 12. Master Plans of Tesla, Inc.

4.2.2.1 Price & Performance Offerings of Tesla

When especially American and European markets are examined, the companies that made up the mainstream by making the most sales are generally formed with mid-size vehicle (i.e., C-segment) models in terms of price-performance. (Jolley 2021; Hirsch 2022). Those market researches also highlight, although there have been improvements in battery technology and electrification trend over time, batteries still constitute the most expensive item of EVs, making it difficult for their prices to compete with ICE. The trend of Tesla models' prices and segments over the years can be seen in Figure 13: the price review is based on the MSRP (Manufacturer's Suggested Retail Price) of the models at its release time in United States and segments are based on the U.S. EPA (Environmental Protection Agency).

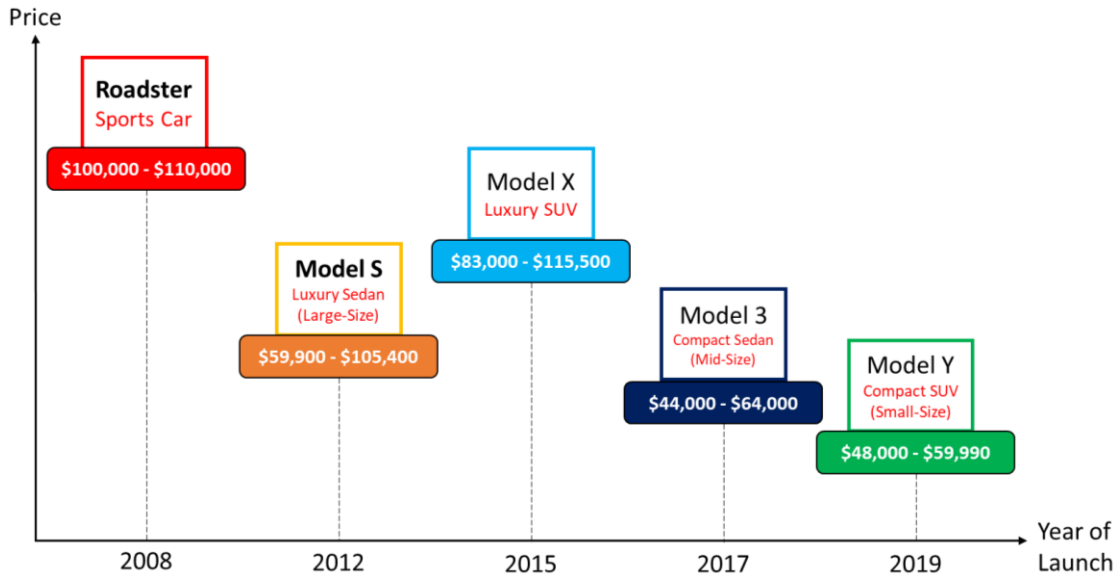


Figure 13. Tesla's Model Prices & Segments (Q.ai 2022; U.S. Department of Energy 2023a; 2023b)

Regarding the Figure 13, while the battery and range (i.e., additional performance features) in the models offered are the main reason for the price range, the vehicle segments here highlight the trend more clearly. Nevertheless, the main obstacle to not conducting a current price review is: while the increase in the age of the models affects their prices inversely, external factors in the global market over the years also complicate price evaluation. In this context, the COVID-19 pandemic and the subsequent chip shortage in the vehicle supply chain, the energy problems created by the Russia-Ukraine crisis (especially faced by vehicle manufacturers operating in Europe), and additionally the increase in the cost of metals (i.e., lithium, nickel, and cobalt) (key for EV batteries), has caused serious increase in vehicle prices in general (J.P. Morgan 2022; St. John 2022). Additionally, Tesla's pricing strategies or privilege that governments provide for promoting EV transition, such as the United States' government electric vehicle tax credit have also caused prices to fluctuate constantly over time (Bellon & Nivedita, 2020)

As for key performance indicators, automotive companies mostly use: driving range, which are the main reasons that increase the price of the vehicle and affect the price range in the models (directly proportional to the power of the battery); and acceleration, which is an attribute that make up the difference between the segments. While range for ICEs is defined as the distance a vehicle can travel without needing to refuel or recharge in EVs, acceleration is the rate at which a vehicle can increase its speed, in other words, it is usually presented as the time it takes to reach a certain speed, as in automotive it is usually presented as 0-60 mph (zero to sixty mile per hour) (Pearre et. al 2011, 1171-1172;

Thomas & Maine 2019, 658-659). Here, the Table 2 demonstrates Tesla's key performance indicators in terms of driving range and acceleration regarding the independent tests of EPA in United States. While the other models in the table (Table 2), except Model X and Model Y, are the data of basic vehicle models, those that fit the average were added from the variations extracted in these models. Just like linear relation between cost of a vehicle and battery size, EV's range, so as its acceleration, varies in relation with its segment: where acceleration increases linearly especially with the speed factor in determining the segment, driving range is a more valuable indicator for lower segments in terms of economy of scale (Thomas & Maine 2019, 658-659; Jolley 2021). However, since battery technology is (still) progressing over time, both performance criteria evolve unlike its segment as seen in the Table 2 (Tesla's Key Performance Criteria).

Table 2. Tesla's Key Performance Criteria (Tesla 2010c; U.S. Department of Energy 2023a; 2023b)

		Performance Criteria	
Year	**Model**	**Driving Range** *(in miles)*	**0-60 mph Acceleration** *(in seconds)*
2008	Roadster	245	3.9
2012	Model S	265	5.9
2016	Model X (90D)	257	4.8
2017	Model 3	215	5.6
2020	Model Y (Performance AWD)	315	4.8

4.2.2.2 Market Domination

Both Tesla's annual revenue (as seen in Figure 7) and sales figures (as seen in Figure 8) show that although this is an opposite approach to the disruptive innovation theory, the company was able to wreak havoc in the market by using its innovation. As for the reason of disruption, the theory highlights that incumbent companies overlook (i.e., disinterested) such innovation: since such offering of an entrant remains undesirable for mainstream customers (where incumbents target) and stays to niche markets, they do not need to produce competitive innovations (Christensen, Raynor & McDonald 2015, 5). As seen in the Table 3, regarding EPA registered vehicles (full list can be seen in Appendix 1), driving ranges so as the number of models in the EV market progressing over the

years, likewise, it seems that Tesla's technological dominance has continued for many years (and even still) and even recently other companies have started to offer competitive performance in terms of range (U.S. Department of Energy 2023a; 2023b).

Table 3. Vehicles with the Most Driving Range (in miles) in the EV Market (EPA Registered) (U.S. Department of Energy 2023a; 2023b)

Brand	Model / Year	2008	2012	2016	2020	2022
TESLA	Roadster	245				
MINI	MiniE	100				
TESLA	Model S		265			
BYD	e6		122			
TESLA	Model S (AWD - P100D)			315		
TESLA	Model X (AWD - P100D)			289		
BYD	e6			187		
NISSAN	Leaf (30 kW-hr battery pack)			107		
TESLA	Model S (Long Range Plus)				402	
TESLA	Model X (Long Range Plus)				351	
TESLA	Model 3 (Long Range)				330	
TESLA	Model Y (Long Range AWD)				316	
CHEVROLET	Bolt EV				259	
HYUNDAI	Kona Electric				258	
KIA	Soul Electric				243	
JAGUAR	I-Pace				234	
LUCID	Air Dream R AWD (w/19-inch wheels)					520
TESLA	Model S					405
TESLA	Model 3 (Long Range AWD)					358
MERCEDES-BENZ	EQS (450 Plus)					350
TESLA	Model X					348
TESLA	Model Y (Long Range AWD)					330
BMW	iX xDrive50 (20-inch wheels)					324
RIVIAN	R1S					316
FORD	Mustang Mach-E (CAL RT 1 ER AWD)					312
Total Number of Models in the EV Market		**2**	**7**	**12**	**16**	**34**

4.2.2.3 Future Strategies of Tesla

The basis of Tesla's future strategies is also in line with their top-down approach for sustainable mobility with fully-electric: entering the segment with a premium (upper class) vehicle and then trying to produce more affordable products (lowering the class and size), and continuing the cycle by spreading to new and different segments (Musk 2006; 2016). In this context, when the instant "Model Tree" of the company is examined (as seen in Figure 14), it presents the models that the company has already produced and which are produced in 2022 and later (some will be put on sale in 2023). Especially in Sedan and SUV models, it seems that the first two stages of the plan have been

successfully executed and more affordable production has begun, while market expansion is expected to other segments, especially in 2022 and beyond. The production and sales of the truck "Semi" and second-generation Roadster, presented in 2017, and the Cybertruck and Cyberquad, presented in 2019, which are not yet on the market are planned to be released in 2023: so that the company expands into three new vehicle segments and along with regenerating Roadster model, which's production is ceased in 2012 (Levin 2021; Q.ai. 2022). Regarding the strategy of going to the mainstream: in addition to increasing the annual production capacity, Tesla presented another new model will either be entered the market through SUV or Sedan segment (or any other new segment), which is expected to be the most affordable vehicle of the brand at a price of around $25,000, has not yet found a place in the "Model Tree" as the launch, production or realising date has not been realized (Levin 2021).

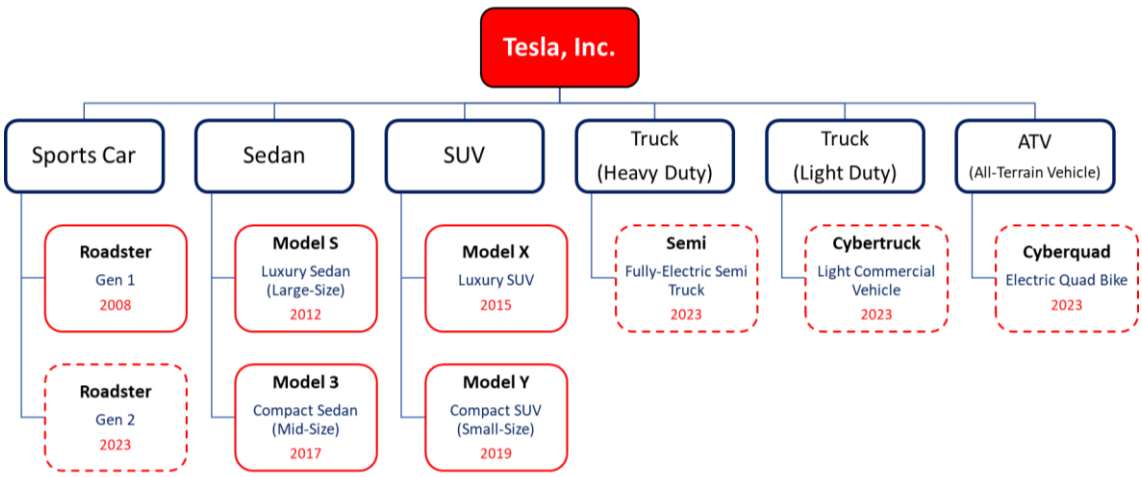


Figure 14. "Model Tree" of Tesla, Inc. (Levin 2021; Q.ai. 2022; Tesla 2022b)

4.3 Incumbents' Response to Disruptive Innovation

As the last section of the findings, the other actor (or even seeming victim) of the theory, the incumbents in the automotive industry, is on the spotlight for questioning "why did they respond slowly, causing Tesla to gain their position?". Here, as disruptive innovation, EVs are systems that provide infrastructure with grid and storage to guarantee electrical power supply both inside and outside the vehicle, with certain different types such as: battery electric vehicles (BEV), hybrid electric vehicle (HEV), etc. (U.S. Department of Energy 2021). In line with the theory, to better understand their approach, points to be unfolded are: brief history of the innovation (i.e., EV or electrical motors),

the trend of electrification with its driving forces, incumbents technologic-, resource- and customer-oriented strategies along with market and external factors led that positioning. In addition, Tesla's role is also considered as the disruptive entrant, that created momentum to (perhaps) disturb the market and approaches of incumbent and established organizations.

4.3.1 History & Progress of Electric Vehicles

In order to understand the approach of the incumbent, it is also necessary to understand the EV as an invention along with its history beforehand. Since, although Tesla brought a new breath to EV with its innovative approach and used it as a serious instrument in its success, it should not be forgotten that electric vehicles (or engines) have a history as old as the internal combustion engine. Such historical perspective can also reveal the reasons why incumbent companies, that have been in the market for many years (unlike Tesla), have recently shifted to EV trend.

4.3.1.1 Invention and Fall of Electric Vehicles

Contrary to expectations, electric cars have been on the market for a long time: the beginning of this innovation is based on the storage of electricity (i.e., the basis of battery technology), which began in 1800 with Alessandro Volta's presentation of the chemical storage of energy, followed by Michael Faraday’s demonstration the principles that laid the foundation for the electric motor/generator in 1821 (as inspired by Volta's developments) (Hoyer 2008, 63; Kley, Lerch & Dallinger 2011, 3392). Subsequently, in the 1830s, Robert Anderson invented an electric carriage or vehicle powered by non-rechargeable primary cells; later, William Ayrton and John Perry invented the first electric tricycle in 1881 (even before Carl Benz's combustion engine in 1885); almost two decades later, Ferdinand Porsche and Ludwig Lohner developed the first hybrid engine system, which marked as the era of both combustion and electrical engines and by the early 1900s, it comprised almost one-third of the vehicles produced by manufacturers in America and Europe (Hoyer 2008, 64; Kley, Lerch & Dallinger 2011, 3392-3393; Eisler 2016, 36).

In 1901, Thomas Edison patented rechargeable batteries made of nickel-zinc and nickel-iron, which could be the basis for EV technology and energy storage and even continued to invest in these vehicles thus produce his own vehicle prototypes (Eisler 2016, 36). Back

in time, it was normal to see frequent problems in vehicles during the development phases, however, in contrast to electrical motors, problems encountered in combustion engine technology at that time were overcome due to the rapid progress especially in the early years of the 20th century (Hoyer 2008, 64). As a result, the combustion engine technology became a more cost-effective solution together with ease and increased availability of oil (which encouraged mass production and oil economy for mobility) and allowed internal combustion engine technology to completely dominate the market, as well as causing battery-powered EVs to almost disappear as an alternative technology completely by 1930s (Cowan & Hultén 1996, 61-62; Kley, Lerch & Dallinger 2011, 3392).

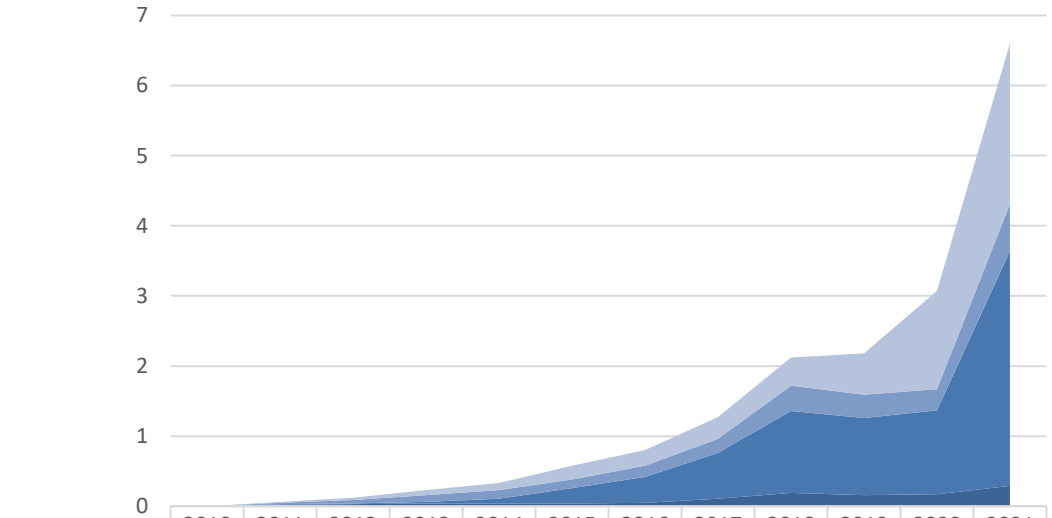
4.3.1.2 Rise of Electric Vehicles

As highlighted earlier (in “Once Upon a Time in United States” subsection), starting in 1990, the regulation in the United States was the first step to restrict those automotive manufacturers, who were producing in the region at that time, such as Chrysler, Ford, General Motors (GM), Honda, Nissan, and Toyota (also international incumbents of the industry), and albeit unwillingly triggering them to find new and greener alternatives. Thus, first, GM introduced the all-electric concept vehicle "Impact" in 1990, and the "EV-1" model six years later (which ended with the model being recalled and production stopped due to technical problems in 2000s); later, in 1994, Daimler-Benz launched “NECAR 1” as the first hydrogen fuel-cell EV; and finally, in 1997, Toyota introduced the “Prius” as a hybrid electric vehicle which powered by gasoline engine with NIMH (nickel-metal hydride) battery (Eisler 2016, 36-37).

By the beginning of the new decade (2000s), especially for overcoming the climate problems and possible shortages of energy sources (especially those used by combustion engines such as oil and gas), ever more regulations coming into force particularly aiming to reduce carbon dioxide (CO2) emissions by governments and intergovernmental organization (Hoyer 2008, 67; Aggeri, Elmquist & Pohl 2009, 131). Hence, taking the foothold of change in both automotive companies and the market started with this period.

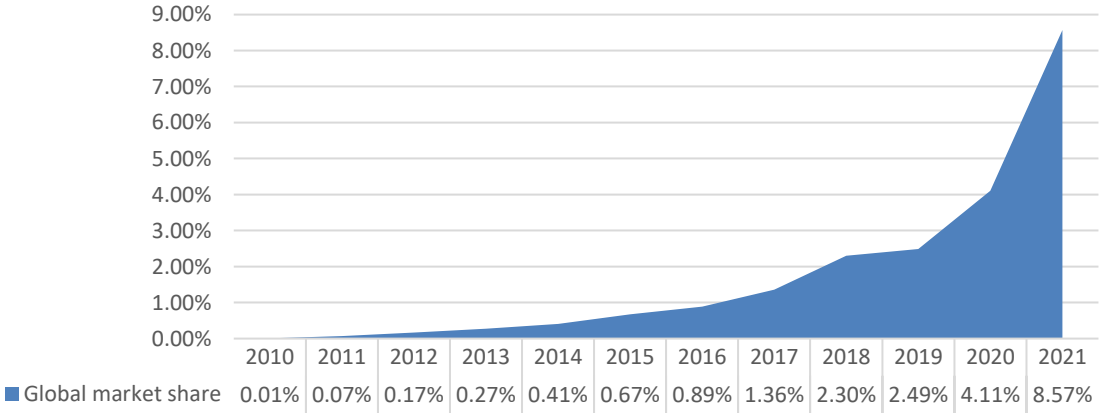
In this context, the 2000s marked as the beginning of (or re-awakening of) EV-era as an alternative to the ICE, which has resulted a trend that began to be seen in the 2010s. As seen in the Figure 15, by the mid-2010s, the use and model of electric vehicles has increased and by 2021 (compared to the previous year) the number of electric vehicles

has almost tripled and is expected to cover the entire market in the coming decades (European Environment Agency 2022). Furthermore, as proof of this trend, around 43% increase in global EV sales (compared to 2019) also led increase in the share of global EV market: as seen in the Figure 16, by rising to a record over 4.00% in 2020 and a year later, even doubled its record by progressing around 8.5% (Irle 2021; IEA 2022c).



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Europe	0	0.01	0.03	0.07	0.1	0.2	0.22	0.31	0.4	0.59	1.4	2.29
United States	0	0.02	0.05	0.1	0.12	0.12	0.16	0.2	0.36	0.33	0.3	0.67
China	0	0.01	0.01	0.02	0.07	0.22	0.37	0.65	1.17	1.1	1.2	3.35
Others	0	0.02	0.03	0.04	0.04	0.04	0.05	0.11	0.19	0.16	0.17	0.29

Figure 15. Global EV Sales (in millions) (IEA 2022c)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Global market share	0.01%	0.07%	0.17%	0.27%	0.41%	0.67%	0.89%	1.36%	2.30%	2.49%	4.11%	8.57%

Figure 16. Global Market Share of EV Sales (IEA 2022c)

4.3.2 Incumbents' Approach to Electric Vehicles

Considering the theory and previous sections, Tesla's performance offerings (as seen in Table 2 & 3), value (as seen in Figure 10) and share in global markets (as seen in Figure

9) made an impact in line with the definition of disruptor, conversely, the new adaptation of incumbents to the EV market (which was seen as a niche at the time) in the process also overlaps the theory. During the trend of electrification, incumbent companies also made investments in EVs together with their mainstream fossil fuel powered models as their both major financial source of business and structure, also a seem as a barrier to their shift to electricity, while on the contrary, the trend has attracted further entrants (like Tesla) to the market, both from and outside the industry, for the purpose of producing and developing all-electric vehicles (along with its technology, side-parts, batteries, etc.) (Eisler 2016, 30).

The Incumbent's approach has basically two pillars: investment, as the effort of companies to develop and deliver outputs (vehicles and technology) with their own R&D, and collaborations, aiming to develop and deliver innovations through partnerships with companies from inside and outside the industry. Eventually, such approach of incumbents (like entrants) also enabled the realization of long-term predictions (some also mentioned in theory) about EVs: offering a greater range of products, capturing petrol vehicles in most performance parameters, offering lower carbon emissions (e.g., being more environmentally friendly) and having access to fuels just like ICEs accessing gas stations (i.e., charging points for EVs) (Christensen 1997, 159-171; U.S. EPA 2022).

4.3.2.1 Investments

Investments and R&D researches of incumbents are the most important trump card in responding to emerging disruptive innovation (i.e., EV): as mentioned in theory, incumbents have financial power that provides a serious competitive advantage in their hands, unlike entrants (Christensen 1997; Christensen, Raynor & McDonald 2015). In this context, when the investments of the top 20 global carmakers on EVs are examined (as seen in Figure 17), they recently exceeded the level of £71 billion (i.e., around $90 billion) in 2021, despite crises such as the pandemic and the chip crisis. Such investment also expected to rise even further in upcoming years, wherein R&D on internal combustion vehicles has also probably been reduced by some manufacturers (shifting it to EV), mainly because major regions (e.g., Europe and United Kingdom specifically) are expected to ban the sale of petrol and diesel cars (for light commercial vehicles) around 2030 and 2035 (BDO 2021; Wood 2022). Here, it seems that a significant part of the investment is especially in battery technology, however, authorities and carmakers still

could not manage to have breakthrough: as it has progressed as evolutionary rather than revolutionary until today; instead, even being renewed, and developed with new materials and methods, it still appears as the bottleneck, which seems as a barrier to the acceleration of EVs going mainstream (BDO 2021; Mims 2022).

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Other countries	£1.5	£1.7	£1.7	£1.9	£2.1	£2.1
China	£1.3	£1.8	£1.9	£2.5	£3.4	£3.3
United States	£11.3	£11.2	£10.9	£12.0	£12.6	£12.6
Japan	£17.8	£18.7	£18.1	£19.5	£19.7	£20.4
Europe	£28.4	£30.0	£31.5	£33.0	£34.1	£33.3

Figure 17. Top 20 Vehicle Manufacturers' R&D Investments on EVs (in Billions £) (BDO 2021)

Looking on the bright side, as a reflection of these investments, when the increase in the number of EV models offered to the global market (especially between 2015 and 2021) is examined (as seen in Figure 18): the linear progresses can be observed with its sales figure and market share (as seen in Figures 15 & 16) and that new models are getting even closer to the mainstream (in terms of price / performance) seems to be an important factor for this escalation (IEA 2022b).

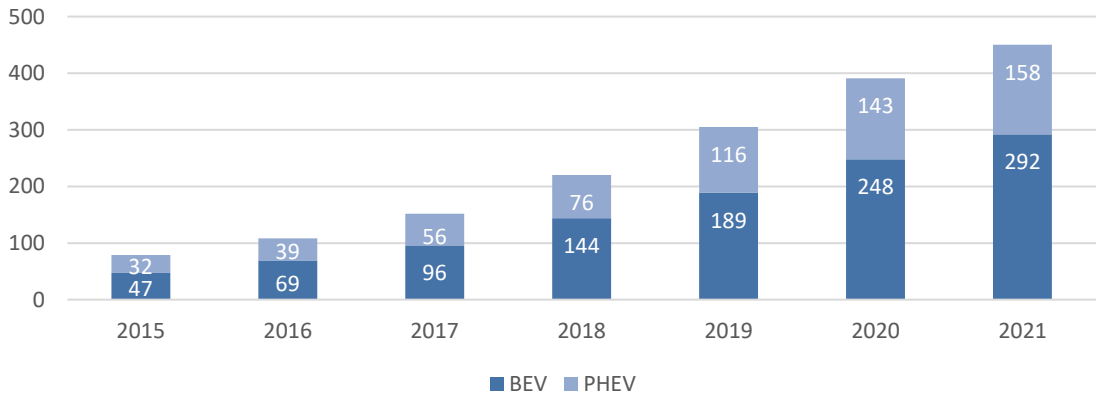


Figure 18. Number of Available EV Models (IEA 2022b)

4.3.2.2 Collaborations

As part of the disruptive innovation theory, organizational strategy involves companies' openness to innovation, adaptability, and overcoming disruptive effects of emerging innovation; and as highlighted, most incumbent companies tend to establish independent organizations that are either allied with them but using different brand names or are formed through partnerships (with others or ones from neighboring industries), or as for most automotive brands, mutual collaborations for sharing knowledge, reaching new markets, and financial empowerment (Christensen 1997, 68). When Tesla's development was examined in the previous sections (especially the "Partnerships, Fundings & Shareholders" subsection), the company has established mutual partnerships with both Mercedes, Toyota, and Lotus from the automotive sector (even can be considered as incumbents), and with Panasonic company from outside the sector. In this context, with mutual knowledge spillovers, the companies used Tesla's know-how in the development of their own EV models and in return made significant financial investments in the company's development, or Tesla worked with these companies to provide battery technology and vehicle design.

First, Volkswagen is one of the international automotive groups which trying to solve the innovation development within its own company group with the “Modular Electric Toolkit (MEB)”: with this platform, they are trying to produce a total of 15 million vehicles in different targeted segments by sharing information, technology, and strategy for the transition to the electrified system by 2025 with the subsidiaries in the company group (e.g., Volkswagen, Audi, Skoda Seat etc.) (Volkswagen AG 2019). As for collaborations outside the group, in 2022, they made an agreement with another automotive group called Mahindra and Mahindra as electric components supplier to eliminate their shortcomings such as driving range (Steitz & Thomas 2022). Contrary, examples of incumbents collaborating with non-sector companies can be GM, as one of the companies that took the first step after ZEV in the early 1990s (also one of Tesla's competitors in the American market), is currently collaborating with LG Energy Solution for development of battery cells, GE Renewable Energy for raw material and component supplier of EVs, other cooperations for developing and supplying electronic solutions and car leasing systems (General Motors 2021).

As highlighted by Christensen (1997), creation of independent organizations is another technique still used by automotive incumbent. In this context, such examples can be: Polestar (est. in 1996), a Swedish EV and performance brand of Volvo, which acquired in 2015 for generating engines and performance vehicles for the Swedish automotive giant and later with Geely Group, (a Chinese automotive corporation) turned into an EV brand; and Rivian (est. in 2009), an American EV company targeting sports and SUV segment which cooperates for development of new models with its both investor and partners Ford Motor Corporation and Amazon (Austin, 2021; Forbes Wheels 2022).

Finally, contrary to the previous examples, incumbents also choose a novel path of EV development through alliances that have formed by merging among themselves. In this context, Renault–Nissan–Mitsubishi Alliance (est. in 1999) can be given as an example of collaborative product and technology development: considering their carbon neutral production and vehicle strategy by 2050, the alliance lays the foundations for these innovative efforts in supporting EV production and development worldwide by also spreading to markets where each other cannot reach (Alliance RNM 2022).

Additionally, as a side effect of those collaborations with partners outside the industry, such trend also triggers new entrants (even from different industries) to be part of the market over time, such as: incumbent companies in the technology market such as Apple and Google have been involved in the automotive market as either start-up manufacturers or OEMs (i.e., original equipment manufacturer) to produce electric and autonomous vehicles and its technologies (Wittmann 2017, 138). Unlike what is expected, these companies have the potential to be a challenger against incumbents and apart from their serious accumulation of financial resources and technology, their only shortcomings seem as product uncertainty from customer's perspective, industry knowledge, know-how and systemic deficiencies which will be ensured by the experience and customer trust gained over time (Wittmann 2017, 158; Morrison 2022).

4.3.3 Breaking Moments in Incumbents' Strategy

Disruptive innovation theory states that while entrants only appeal to niche markets and a limited set of customers, incumbents base their strategy by considering the mainstream and high-end market: offering already adapted products or services with incrementally improving or correcting shortcomings (Christensen 1997; Christensen, Raynor & McDonald 2015). In this context, the reason for the delay of incumbents in EVs against

entrants such as Tesla in the market is the slowness, hesitations, and doubts in the adaptation of the targeted customers to the product. In addition, external factors play an important role in the development and adaptation of innovation: aligning strategies against those factors boosts competitive advantages both for incumbents and entrants (O'Reilly & Tushman 2016, 22-24).

4.3.3.1 Condition of the Market

When examined in terms of the customer and the market's own dynamics (internal factors), as mentioned earlier (in the "The Beginning of an Era" subsection), the biggest problem in the early stages of EVs was the lack of technological infrastructure (i.e., energy storage, charging and battery) that most incumbents and established companies often either ignored or made limited investment in those areas. Although investments have come from both entrants such as Tesla and other incumbent companies to overcome this shortcoming, considering the market share (as seen in Figure 16) (even with such notable growth), issues that restrict sales figures and demand are still considered to exist against the fossil fuelled options.

First major problem is driving range: although this range has increased as models have improved (as seen in Table 3), driving speed, weather conditions, etc., which directly affect the battery capacity and efficiency are seen as factors cause customers to concern (Wood 2022). As seen in the Figure 19 (Average Range of EV by Powertrain), although there has been an undeniable improvement (and it is expected to be even better in the future), major differences over the years may be the main reason for customers to hesitate.

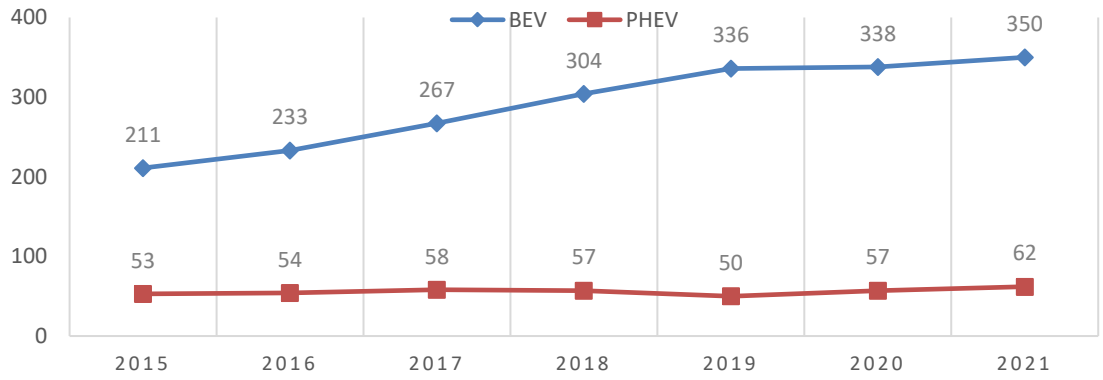


Figure 19. Average Range of EV by Powertrain (in km) (IEA 2022b)

Secondly, limited access to charging infrastructure: despite a 40% increase in the number of charging points in 2021 (which corresponds to about 1.8 million globally), users still

use home charging which corresponds about 80% (Wood 2022). When the global distribution of publicly available chargers is examined (as seen in Figure 20), the increase in major regions over the years is remarkable, but it is still not as common as gas stations and investments of certain countries in the regions raise these general averages (not a balanced distribution) (IEA 2022e).

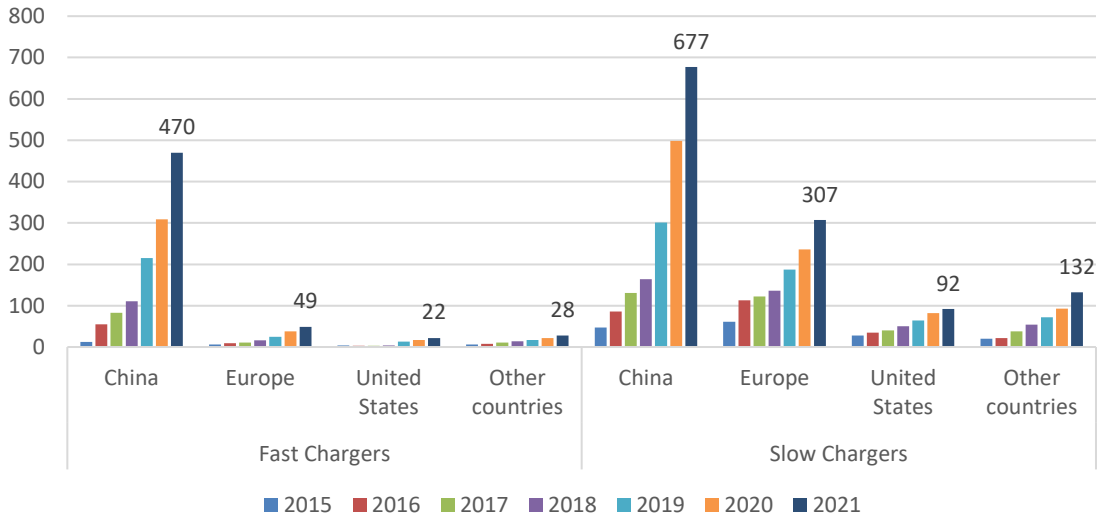


Figure 20. Publicly Available Chargers (in thousands) (IEA 2022e)

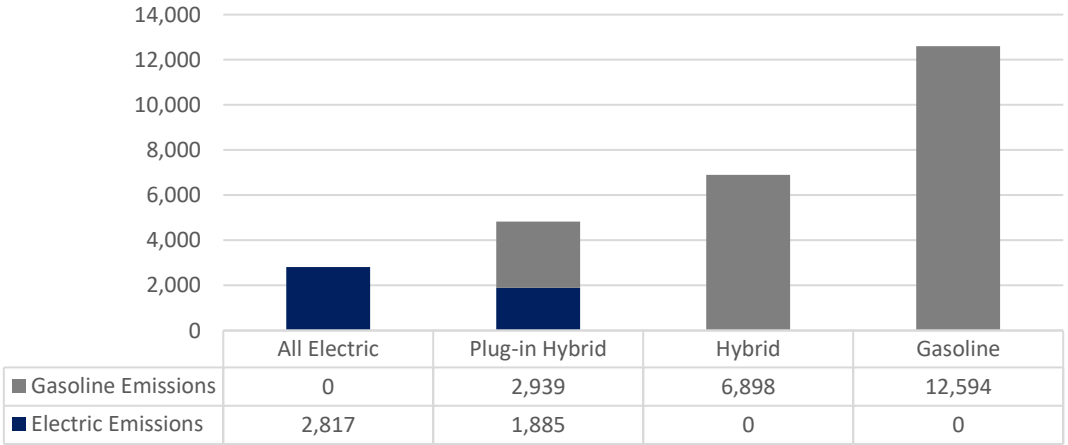
Finally, high upfront costs or total cost of ownership (TCO) of electric vehicles: (as discussed before in "Price & Performance Offerings of Tesla"), even if EVs are more energy efficient than their competitors in the same segment (i.e., cheaper to run) and countries encourage financially with their policies, they are more costly for the consumer in terms of both the product price and the charging method (Wood, 2022). According to market studies, looking at all equivalent models around the world, the EV sticker price is higher than ICE (such difference is even greater for luxury vehicles versus smaller ones) in most scenarios (although the subsidies and high residual value of EVs are used to lower TCO), besides, unlike the United States, the higher cost of oil and diesel relative to electricity also has a significant impact on TCO, particularly in Europe and Asia (Nickel Institute 2021).

4.3.3.2 Environmental Factors, Policies & Targets

Regarding the impact of external factors, fundamental issues that directly concern the strategies of companies and the market are consumption of limited energy sources (especially the fossil fuels, natural gas etc.) that in business perspective alarms shortage and efficiency issues (i.e., indirectly battery technology and the ability to generate energy

for vehicles to go) and in global scale environmental issues. Such global scale environmental problems, mainly carbon emissions, are emphasized as the main trigger of the climate crisis, and to cope with it: governments and intergovernmental organizations are pursuing targets and policies to support the move to EVs (i.e., electrification), which are alternatives to common petrol and diesel vehicles with emitting less carbon and ultimately appear to be greener substitute (IEA 2022d; Moseman & Paltsev 2022; Wood, 2022). And, in terms of business perspective, such actions influence the strategies of automotive manufacturers to pursue alternatives of models (i.e., EVs) and technologies (i.e., battery technology), vis-à-vis, as both have a vital role in the development of EVs, as it has likewise triggered the incumbent to take action (Sierzchula et al. 2012, 50-52; Eisler 2016, 35-39).

At the last point of EV development, by 2021, as can be seen in Figure 21, it has been proven that EV are overall emitting less carbon dioxide compared to other models (AFDC 2021). However, although studies have proven the low emissions, it turns out that the emission level in production of EVs are head-to head (and even more) compare to gasoline-burning models: here, extraction and conversion of the minerals (i.e., lithium, cobalt, and nickel) required for the battery production proven to cover most share, also, studies show that most ICE models (compared to EVs) emit less emissions at short-range due to its reached efficiency and performance level (Lienert 2021; Moseman & Paltsev 2022). Still, those studies also emphasized that EVs will be greener if both the charging of batteries and the generation of energy required in production are achieved to be decarbonize (as the goal of most countries and international organizations in the long run) (Moseman & Paltsev 2022).



	All Electric	Plug-in Hybrid	Hybrid	Gasoline
Gasoline Emissions	0	2,939	6,898	12,594
Electric Emissions	2,817	1,885	0	0

Figure 21. Annual Emissions per Vehicle (in pounds of CO2 equivalent) (AFDC 2021)

As highlighted previously on “Story of Tesla” section, by the 1990s, as one of the cornerstones of the rise of EVs: the California Zero Emissions Vehicle (ZEV) authorization was one of the pioneer actions taken by a governmental organization against carbon emission, which required automotive manufacturers to produce non-carbon emitting models directly proportional to the carbon emitting ones (i.e., ICE) they produce and sell (Sierzchula et al. 2012, 50). Given the advancement in EV technology, its accessibility and overall carbon emissions, alternatively, it turned into an innovation promoted by policy-makers (i.e., governments and intergovernmental organizations) and in return they are setting up dates for prohibiting sale of petrol and diesel cars. In this context, by 2035 European Union’s (EU) along with United Kingdom’s ban (as they put it further ahead from the same year as EU) to even closer to 2030, it will come in force and as for China (the world’s biggest market), they are aiming to capture 40% EV sales by 2030 (IEA 2022d; Wood 2022). Finally, in the United States, the home of Tesla, as seen in the ZEV, although each State has its own agenda, the Federal Government aims to have zero emissions of 50% of all new vehicles sold in the US by 2030 and additionally aims to build a fair network of 500,000 chargers to make EVs locally accessible for everyone (U.S. Department of Transportation 2021; IEA 2022d).

5 CONCLUSION

Disruptive innovation theory, as a business theory developed by Christensen and first introduced in 1995: presents the progress of a product or service that enters either already established market with new value creation or creates its own unique market, and dominates the market (becoming a new leader) over time and displaces the previous offering. Although the theory is previously based on the technological and innovative breakthroughs that have taken place in the past, it has been frequently applied and exemplified on many examples over time after its presentation. This study focuses on electric vehicles, one of the innovations that Christensen, the founder of the theory, foretold its destructiveness twenty-five years ago and made projections about the industry and potential structure of such disrupter organization (1997, 159-171). At the moment, as a disruptive innovation, EVs are sooner or later expected to overthrow ICE engines that have dominated the automotive industry for more than a century. However, in this transformation, it turns out that the development of the market and the reaction of incumbents (although it may be interpreted differently in the future) are not compatible with the theory, as it does not comply with the Tesla's approach.

5.1 Case Company: Tesla, Inc.

Undeniably, for EVs to be called disruptive innovations (as in theory), it is also necessary to examine the entrant(s) who used it as an effective instrument for transforming such niche product into a mainstream one. In this context, the case company which inspired its name by Nikola Tesla, the creator of alternating-current (AC) power transmission (along with induction motor) (as the basic system required to run EV engine); has completed its twentieth year in the automotive industry as one of the most valuable (also the first all-electric) brand and forerunner developer of EVs (Davies 2013). Although Tesla is seen as an entrant that simulates similar impact (as highlighted in theory) led by disruptive EVs, contrary to theory, the company achieved it by entering the niche market from the high-end rather than the lower segment. Such contradiction has been analysed by most scholars (i.e., Frohman 2014; Chen & Perez 2018; Thomas & Maine 2019) beforehand, for both comparing and revealing a pattern in Tesla's strategy as an alternative to the theory. Christensen, who many years ago predicted the destructiveness of EVs and described the entrant profile that could do so, argued that Tesla, Inc. as an example of a prominent but miscategorized high-profile start-up which entered the market from a

segment that attracts both interest and investment of incumbents (Christensen, Raynor & McDonald 2015, 11).

Similarly, such high-entry that attracted these automotive incumbents, has prevented Tesla's progress from happening quietly, indeed, both their support (investment and partnerships) and collaborations contributed to its success. Despite that, Tesla's mainly bold all-electric initiative also has been reflected by numbers: performance offering (which has outperformed its competitors for many years), financial valuation and popularity (growth and selling figures) and accompanying with entry to new markets (both in terms of vehicle segment and regional), set them apart from competitors and even from most other major companies in the industry. Following the electrification trend, entry of more and more incumbent of established companies to the EV-market in which Tesla has long been the leading unrivalled leader both in terms of investment and technology, made the market appear as the mainstream of the future. All is taken into account, if the process is observed like a movie in which EVs are an inevitable and destructive innovation, as this study focuses on, it necessitates the examination of Tesla's journey and impact as an anti-hero with its both opposite approach to theory and position gained considerably in short time.

5.2 Disruptive Innovation Theory Redefined

With Tesla-centric view, this study focuses on Tesla's progress through the lens of disruptive innovation theory and examines both sides style by asking "*How did Tesla's approach redefine the theory of disruptive innovation?*" as the main research question. As an answer to this question, although EVs are currently changing the market, Tesla did not redefine the theory (as being an example that did not fit), but instead offered an alternative approach along with allowing to observe market development (including incumbents) also not fitting the theory. In this regard, the study interrogates such redefinition through breaking the approach into three different parts (i.e., sub-questions): industry disruption, market entry, and the approach of competitors (also known as incumbents). These parts also provide an examination of the approaches from different angles as the basic pillars of the theory.

5.2.1 Disruption in the Industry

The answer to this question should be divided into two: first, from framework defined by the theory (as a significant part of which was aimed to be answered in the second sub-question), and second, in terms of the success a company achieved in terms of business (also mentioned but slightly different in terms of pattern in theory). While the first part should be mentioned briefly as most of it is answered in the second sub-question, the second part should be analysed at by investigating the company in terms of both financial and performance offering with more in-depth numbers.

To begin with, the theory briefly considers the entrant company's entry into the non-existent or niche market with the product or service it developed by either targeting overlooked customers or ones who could not afford the current mainstream one, and then becoming the dominant offering as it reaches more and more customers and becoming a strong alternative to replace the mainstream one. In line, as an entrant, Tesla Motors targeted the EV market that used to be considered as a niche market where incumbents made limited investment because of certain governmental constraints (i.e., ZEV and similar restrictions), thus, back then, having many unsuccessful and inefficient attempts and offering only limited number of alternatives. In its nearly twenty-year adventure, Tesla has succeeded in bringing itself (hence the niche market been in) to the mainstream with its products: in a nutshell, when the company launched its first product in 2008 (primarily in the US as the domestic market), it was unrivalled in its segment (i.e., not facing any competition at all), also until the 2020s, despite approaching the lower segments (since the Roadster was in the sport-car segment, it was already expected that its performance would be higher than the others), still had the significant performance dominance in general EVs. Speaking of approaching the mainstream as mentioned in theory, as can be seen in Tesla's model prices and its segments, as the company gets closer to the sub-segments (i.e., thus the performance offering decreases in line with the segment), the company has sold more and more products and reached the gradually more customers/markets. Subsequently, Tesla has become one of the best-selling brands in the EV market and obtaining a strong position in most global markets.

From the business perspective, it is also necessary to look at the financial development of both the company and the EV market in order to confirm such disruption in global industry level. When the annual sales figure and revenue are examined, Tesla has

achieved an increase in momentum over the years, with a limited variety of models in various segments (i.e., with two different product/price offerings in both premium and standard models in those classes). The purpose of emphasizing this data is: as Christensen mentions (1997, 11), for realizing such disruption, it is expected from companies to offer more affordable products that will trigger consumers to replace their dominant option. Contrary, with its top-down approach, Tesla has succeeded in being desirable and the most valuable company in the market (first EV, then general), by surpassing other automotive incumbents. Although incumbents have the upper hand in terms of overall vehicle sales, infrastructure, and manufacturing facility, what makes Tesla unique is its vision of the future ("EVs are the future") and its continuous R&D investment in areas that seem to be the future of mobility, making it considered rather as trending technology company that pays its dividends in the electrified future (Musk 2006; 2016; Klebnikov 2021). Speaking of the future, by looking at the evolution of the EV market over the years: both Figures 15 (Global EV Sales) and 15 (Global Market Share of EV Sales) prove that electrification trend, in which Tesla also has an undisputed share (with both all-in electric strategy and battery/technological investment), seems to fulfil the prophecy of the theory's disruption by becoming the dominant option in near future.

5.2.2 Market Entry Strategy

As frequently emphasized in this study, the basis of the theory is: by introducing the disruptive innovation developed by the entrant into the lower-end of the market (i.e., either from a non-established or niche market that incumbents ignore); it involves replacing the mainstream offering that has proven itself over time, both in terms of price and performance (Christensen, Raynor & McDonald 2015, 7). Tesla, on the other hand, took the opposite approach, as seen in Figure 22 (Tesla's Disruption Model) by entering from the expensive and advanced performance demanding, high-end (i.e., s-segment). Nevertheless, the company has made its progress by slowly approaching the mainstream in a top-down manner: in each different vehicle segment it enters always started with the premium or luxurious model.

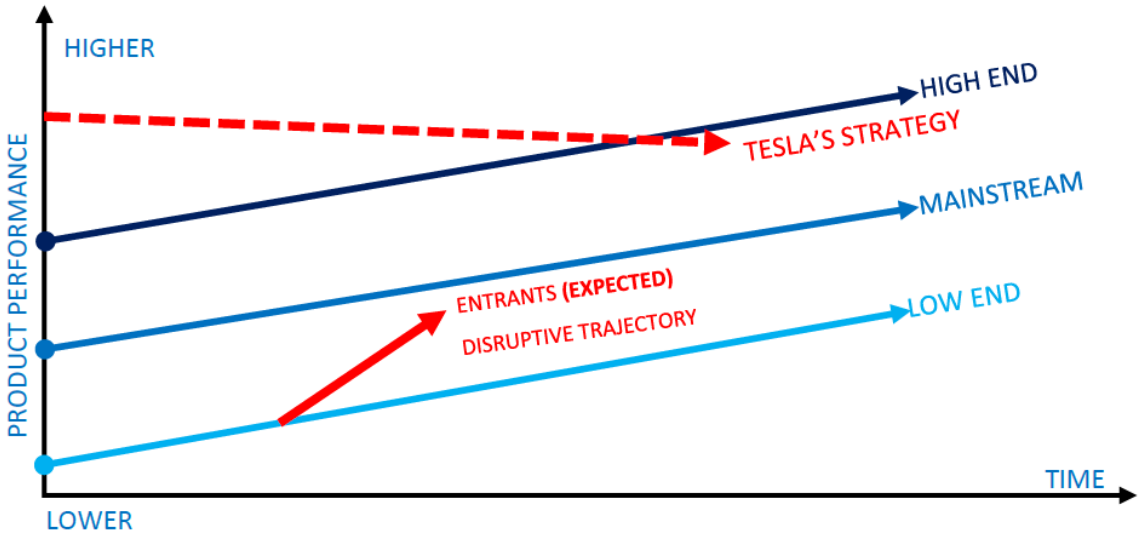


Figure 22. Tesla's Disruption Model

5.2.2.1 Tesla's Approach

Although Tesla's approach is conflicting with the theory, as mentioned earlier, such strategy overlaps with what is known as the "frogleaping" strategy in both academic and business literature. In essence, the strategy contains: companies entry to market from the top with an unattempted (e.g., radical, or disruptive) innovation for preventing incumbents from adapting it; thus, after providing the necessary income, it allows companies to approach mainstream by aiming to offer more affordable options by reducing both products' performance and price (Furr & Dyer 2015; Chandrasekaran et al. 2022). That is exactly what Tesla did: by the early 2000s, poor battery technology underpinned EVs poor performance, as it was both materially costly and had not yielded in previous trials (by incumbents). In 2003, Tesla's founders thought of developing the li-ion battery and installing it in the vehicle with the breakthrough they gained from their previous work experience, but the size of the battery to power the vehicle made its price more expensive than its mainstream fossil-fueled competitors (Fletcher 2011, 60-61). So, this led company to be dependent on breakthroughs and developments in battery technology (although they also played a role in its progress) for specifying their future strategy. As a result, they made a considerably bold move to enter from high-end, by saying: "If an expensive product is going to be produced, why not consider a segment that is equivalent to its price?", thus advancements in battery technology (i.e., offering more efficient performance at a lower price), in parallel, enabled the company's long-term strategy to be used as a boost in descending to lower segments (Musk 2006; 2016).

5.2.2.2 Christensen's EV Approach against Tesla's Strategy

By putting EV at the core as disruptive innovation, Christensen had also created a roadmap where he explained lower-end market entry not only by vehicle model and customer, but also by the strategies companies should develop: specifically, through five major strategic parameters as marketing, product development, technology, distribution, and organization (Christensen 1997, 159-171). As Tesla's market entry began in 2006 (with the initial launch of the Roadster and lasted until 2008 when the model hit the roads), such theory's supporting parameters are also crucial to analyse the company's contrasting entry not only with the EV perspective, but also regarding its strategy.

Back in 1997, Christensen's the marketing strategy was formed at the where EVs cannot fulfil the performance requirements demanded by mainstream customers. By approaching through the positive attributes of the product such as lower acceleration and driving range with considerably fewer fuel cost and carbon emissions, such entrant can target parents of high school students (which they can buy to their kids regarding its speed and range features to overcome convenience concerns), and cities with serious traffic jam and/or air pollution (e.g., Southwest Asian markets as taxi and small-parcel delivery vehicles): the product can become widespread, as the EV market was not totally established yet (Christensen 1997, 161-164). Tesla's marketing strategy was, on the other hand, started with targeting high-end customers by applying their advanced li-ion battery technology which they took part in the formation and later became pioneers in usage. The model was first launched in USA in 2006 along with first orders or reservations (which was later delivered in 2008) and tried to come to the fore with its performance attributes by entering directly from the upper segment (S-segment) (Q.ai 2022). After its domestic entry, company started to expand to the European and Asian markets, respectively, in the last quarter of 2011 and reached total sales figure of over 2000 globally (Tesla 2022b).

Secondly, in the absence of a market, there is no clear or reliable customer input, vis-a-vis, there can be no market without a product that meets the needs of customers. In this context, product strategy for an entrant EV company, as Christensen suggested to use both process learning method (for continuously collect input from feedbacks from the customers) and positioning the product in line with the theory: by highlighting the simplicity, reliability, and usefulness features on a platform where dynamic changes on those can be made quickly and cost-effectively for winning design of the EV race in the

early stages (Christensen 1997, 164-165). Contrary to the disruptive innovations offered by theory, Tesla aimed to outperform existing products in key performance dimensions in the market, thanks to its high-end technology innovations. The company aimed to move forward by selling its products at a high price and in the upper segment, often targeting the most discriminatory and least price sensitive buyers, likewise, due to the lower customer volume of the segment, the presented technology's (i.e., battery and overall EV) performance feedback created a foothold for company to later entry to the mass market (Furr & Dyer 2015). As for technology strategy, Christensen advocated focusing more on performance improvement (i.e., battery advancement) of the EV. While such innovation did not involve brand new product but rather offering certain breakthroughs in battery technology, it must aim to meet the required performance benchmarks offered by mainstream gasoline alternatives (Christensen 1997, 165-166). In line with his approach, with the steps and partnerships (e.g., Panasonic), Tesla also tried to ensure the incremental development of the battery technology, which was first revealed as a radical innovation rather than the vehicle itself (Eisler 2016, 38-40).

Thirdly, the distribution strategy as one of the most critical links in the chain, to let customer to access the product, the scholar highlighted retailers and distributors' near-mainstream revenue generation methods for profit. Due to such strategic mismatch, distributorship of disruptive technologies also revealed the need to have a new strategic proposition: to find or create brand new product-based distribution channels (Christensen 1997, 166-167). In line with Christensen's approach, despite the dealer-based nature of incumbents, Tesla was followed primarily a "no dealer" method of distribution, and using a network of supercharging stations that work only with a Tesla (for commercialization), and later opened their own dealers (as adapted from cutting-edge technology companies like Apple), after generating the enough revenue and reputation (Furr & Dyer 2015).

Finally, as for the organization strategy, where most incumbents approach for creation of autonomous business units or independent organizations to well-position the main brand against the disruptiveness of the innovation (with open to tolerable failure), as for entrant he discussed that such organizations should create a structure against possible failure since they are new to the market. Here, he bases two pillars on building resilience and appropriate tolerance to failure: changing the values/culture of the mainstream organization or creating a new one along with offering sustainable technological innovations by risk taking and open to failure, and investigating emerging customer needs

(Christensen 1997, 167-169). Again, with many overlapping points, the first "Master Plan", presented by CEO Musk right after the launch of the Roadster in 2006, presented that the organization's progress was aimed at continuous improvement by learning and developing innovative solutions and progressing through the mass market (i.e., mainstream) through offering more affordable cars over time (Musk 2006).

5.2.3 Incumbents' Approach to Disruptive Innovation

Finally, when the theory is analysed from the perspective of incumbents in the automotive industry: they are expected to overlook low-margin and low-expectation customers (i.e., lower-end) while normally focusing on more profitable and mass segments (i.e., mainstream, and high-end), with rather applying incremental innovations for their offerings to sustain their competitive position (Christensen, McDonald, Altman & Palmer 2018, 1048). However, Tesla debuted from the high-end profile, which is clearly one of incumbents targets that have never ignored before which caused it to become a misfit for the theory to worthy of study as a non-disrupter (Christensen, Raynor & McDonald 2015, 11). Such inconsistency has been emphasized in previous sub-questions: Tesla's EVs as part of the inevitable breakthrough in the market through enabling incumbents to keep an eye on the progress. Therefore, it allows the approach of incumbents to be viewed from two different perspectives: theory's perspective where completely innovation-oriented advantages change market and customer habits, or first-movers perspective where Tesla, who took an early position in the change already triggered by the effect of environmental factors, prevailed over the others.

First of all, from the perspective of the theory, regarding the scenario that Tesla succeeded and incumbents failed: it can be seen that the company has achieved high ground with both its unique strategy and developed battery technology along with their EVs. Such scenario also comes with the understanding that incumbents had consistently ignored EVs during pre-Tesla era and shifted right after its impact became visible in the market. As a proof, after launching of each model and presentation of each investment (e.g., new factory or technology), its reflections can be shown in proportionally increases in sales figures, IPO, and EV market share over time. Considering Tesla's strong position in the EV market, both the fact that vehicles like ICEs are still being the mainstream product (i.e., incumbents still not dethrone the dominant product), and Tesla's inability to reduce the price of their product (especially due to battery, technology, and production costs) to

a sufficient affordable or mainstream level (despite its efforts): it can be argued that despite threatening incumbents in the industry (and even achieving leadership and trend-maker image in the EV market), they have not collapsed as in theory.

As for the second perspective, regarding Tesla gaining an advantage by being early mover against transformation (i.e., electrification) in the industry, evolution of environmental factors (i.e., government's regulations, infrastructure, and technology availability) has been observed to support such benefit of the company. In this context, Tesla's dominance started with a serious li-ion battery breakthrough by investing in R&D that most established companies could not at the time. Such dominance also led company to be unrivalled (in terms of performance and technology) for a long time. However, during Tesla's unrivalled dominance, there was still not a serious EV market until the mid-2010s (also in terms of charging infrastructure, vehicle maintenance and production transformation), along with the low market share (still does not exceed 10% as of 2021) in comparison with the rest of the market: also, can be considered as reasons for incumbents' late reaction. Emergence of new manufacturers that offer more efficient batteries governmental laws (as environmental factors) will come into force in most countries around 2030, along with provided EV incentives and increase in the charging infrastructure of cities: accordingly, these factors enabled incumbents to transform their production facilities and strategies suitable for EV production over time, and to launch more models, especially through collaborations and partnerships among themselves (with knowledge spillovers and transfers).

All in all, the process resembles the Greek fabulist, Aesop's "the rabbit and the tortoise" story. As an entrant or "tortoise" in the story, Tesla started racing in the EV market with fewer finance and infrastructure: what made the company stand out in such a niche market was the battery technology it developed and its aggressive all-electric strategy. On the other hand, Tesla's biggest shortcomings as an entrant was the lack of both vehicle and battery production infrastructure and knowledge along with its inability to reach the global markets, which incumbents or "rabbit(s)" in the story had (except the technology). For overcoming barriers faced by both sides, they made collaborations with each other (i.e., between Tesla and Toyota, Daimler etc.), in return, Tesla provided its unique battery and EV infrastructure for the development of those incumbents' EV models (Tesla even later released most of its patents to the public for market growth), and in return received financial and installation support. From these perspectives, unlike the story, since the

rabbit or incumbents are already confident about leading sooner thanks to its speed (i.e., its global facilities, infrastructures and economic advantages, its presence in almost every market), allowing Tesla or tortoise to have a head start (i.e., letting Tesla to be most valuable automotive company and owning largest EV share in many markets). Moreover, while the incumbents lagged behind, they have still followed the path Tesla provided (or paved), observed the establishment of the market with regulations and systems that will allow electrification. Although there does not seem to be a clear winner, it is still difficult to say whether incumbents will catch up with steadily developing Tesla but it can be said that everyone will enter the market unless an alternative technology comes out.

5.3 Theoretical Contributions

The theoretical contribution can be highlighted as: the expected contrasts seen between the approaches of the company and the theory (e.g., some of previous studies which were therefore unable to draw conclusions or pointed out to be directly opposite), similarities seen in other related innovation literature and theories, (since this study also questions incumbents' aspect) comparison of expected and performed behaviours of incumbents, and analysis of Tesla's and the general market's EV (innovation) approach and development through models of change (Van De Ven & Poole 1995).

Regarding the contrasting points, primarily the areas that are the focal of the disruptive innovation theory (such as i.e., rules, dynamics) were investigated specifically for Tesla and EVs: low-end entry, being in a non-existed or niche market, innovation-oriented promotion, more affordable product offering, and development with the disruptor's trajectory (Rosenbloom & Christensen 1994; Christensen 1997; Christensen, Raynor & McDonald 2015; Christensen, McDonald, Altman & Palmer 2018). To begin with, as Christensen previously mentioned, regarding case-theory mismatch, as if Tesla matched theory: the company would either be part of the incumbent or compete fiercely with them as it progressed in the market; but, also seen in the theory the company is still independent and long unrivalled in the EV market (Christensen, Raynor & McDonald 2015, 11). As seen in previous similar studies (Frohman 2014; Christensen, Raynor & McDonald 2015; Thomas & Maine 2019), it was again seen that Tesla did not follow a disruptive innovation strategy, instead, it did so with opposing top-down approach by placing its innovation (not only its EV but more the way they used battery and additional technologies) at the core of their strategy. In this case, it sets out to be an example where

such strategy of placing innovations on the market from the high-end can also be advantageous in the long run.

The disruptive all-electric strategy has also been observed to be close to the attacker's advantage approach with innovation in a market that has not yet been established just as mention both from Christensen's theory and scholars also compare it with the company (Christensen & Rosenbloom 1995; Chen & Perez, 2018). Thus, from both seen in the disruptive innovation theory and related innovation literatures (Christensen 1997; Utterback & Acee, 2020, 8-9): although disruptive products outperform established products in mainstream markets, they typically offer marginal and valuable features that make them unique at considerably cheaper price (as they enter from lower-end). In particular, it has been observed that despite offering marginal features and having explicit market strategies (i.e., in target segments), price tags can be dependent on parts and production costs which indeed, can be influential in the market entrance of companies. Additionally, this study had also revealed that, Tesla has not only implemented top-down strategy but also step-by-step premium to standard strategy (i.e., going most expensive to affordable) in every segment it enters. Rather than previous innovation theories, the study also discussed that companies may follow unique strategies for each sub-segment instead of general strategy.

On the other hand, considering the compatible features of the case to literature, looking at Christensen's EVs-focused strategic approach (1997, 159-171) (as seen in the "Christensen's EV Approach against Tesla's Strategy" section), it seems that what is expected from entrants overlaps with Tesla in the emerging market also encountered in previous studies (Frohman 2014). In this context, another similarity in Tesla's rise in the automotive industry is completely overlapping with the unique strategy offering and the cutting-edge innovations it has developed on the basis of the recognition and progress of entrants disruptive path (Bower & Christensen 1995; Gans & Stern 2003; O'Reilly & Tushman 2016). Such path, as seen in similar approaches in the literature (O'Reilly & Tushman, 2016, 22-24) for breakthroughs to occur and become successful: certain time, human and financial resources, market opportunities, as well as the strategies and philosophies of the managements should be in line to meet the compatible market needs. In this study, it had been established that this overlap has occurred in terms of the history of EVs and Tesla's market entry timing that the company emerged as a response to the emerging need (low carbon emission alternative) in long run. Nevertheless, some studies

also highlighted that the market entry of entrants does not have to be only lower-end, alternatively: when as the product is getting radicalized and entrant facing lack of competition in the market, once launched it can effectively sell at a monopolistic price, as Tesla did by entering the high-end at the time where there was no alternative EV that can offer similar performance (Schmidt & Van Der Rhee, 2014, 18).

Regarding incumbents and Tesla comparison, in terms of exploration and exploitation, which are the approach/strategy of companies in the innovation process (March, 1991). As this study highlighted, on one hand, Tesla has adopted exploration approach with the entry into a non-existed market in the early 2000s and later continued with its product development strategy over time. On the other hand, it has been seen those incumbents (even though they made some trials during the same period) proceeded by following Tesla's path in the market (as a serious contributor in the formation of the market), exploiting and adapting its technology and strategy on their products during their subsequent entry.

Considering the factors that created their strategy and entry time difference, the contribution of external factors mentioned in previous studies (March, 1991, 72-73; Drucker, 2002, 6-8) was again observed such as: laws or limitations created by environmental factors (e.g., linkage between carbon emissions and environmental pollution and subsequently to global warming) triggered the search for alternatives and enabled the formation of entrants like Tesla, and change in the customer preference towards EVs. Regarding such perception change, since an efficient product could not be offered in the market, customer preferences remained in the usual mainstream product for a long time, until when companies like Tesla offered efficient alternatives and proved their performance in the market, in the face of this (more environmentally friendly) efficient alternative, customers have changed their perspectives and shifted their demands to EVs, thus enabling incumbents to follow exploration strategy in this context.

As the study was also examined from the perspective of the incumbents, can also try to answer whether there is "incumbent's curse" (Chandy & Tellis 2000) mentioned in the literature: despite their delay (in market entry) and the exploitation of EV-oriented companies like Tesla, in terms of internal factors both the technology (e.g., battery), reaching minerals/materials and infrastructure are newly decreased (and updated) to more

affordable levels, and as for external factors, both delays in customers' orientation and restrictions, still providing a flexible space and opportunity for incumbents to catch Tesla.

When the journey/development of innovation is examined through the change models of Van de Ven and Poole (1995), a clear structure could not be determined from the whole process. However, the findings have been grasped that the relevance of the models must be examined separately, not only for the overall (i.e., industry) advancement of innovation (i.e., EV), but also within Tesla's organizational structure. So, when the overall development of the innovation is analysed in terms of organizational change, three different stages are emerged: first, companies in the industry choosing combustion engines over the electric motors (i.e., forming the mainstream to date) vis a vis EV's re-development and commercialization in the industry (i.e., footsteps of the emerging future mainstream) and Tesla's own approach for change. Considering the industry development (i.e., the competition of EVs and ICEs to become mainstream in the market), two theories of development emerge as the selection takes place over multiple entities: evolution and dialectic. In this context, when the period between 1900s and 2000s with the dominance of undisputed ICE engines is examined: (as seen in Figure 23) as mentioned in the theory (Van De Ven & Poole 1995, 517-520), the effect of competition and environmental factors enabled one entity to be superior to the other during prescribed mode of change, that is, to turn into the mainstream in the industry.

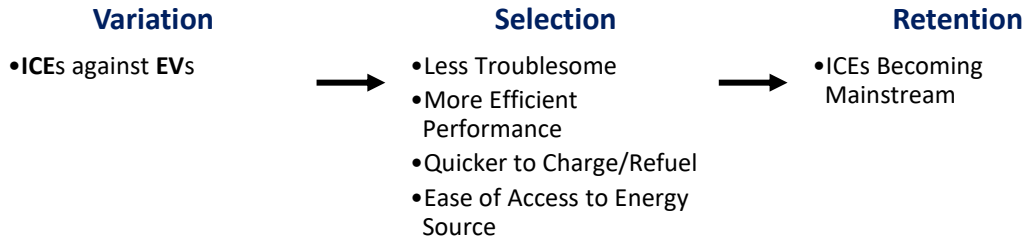


Figure 23. Evolutionary Development of the Automotive Industry (1900s to 2000s)

Instead, with the 2000s, the first steps to change the mainstream began to be taken. The main reason why the industry, which was looking for an alternative, turned to electric motors was that they emit less carbon, so this need led the developments and change in this field (in which Tesla had a significant share). The development and change of the two entities, who came face to face after almost a century, follows a contrasting development closer to the dialectic theory: whenever the antithesis developed against the thesis comes to a level that can compete with the thesis, then challenges the status-quo

that is ensured by confrontation and conflicts that occur in a continuous constructive change mode (Van De Ven & Poole, 1995, 517). In this context, as seen in the Figure 24 (Dialectical Development of the Automotive Industry (2000s to Present)) when the development of EV started to approach ICEs (i.e., in terms of conflicting situations), it constructed the synthesis and developed of those aspects for challenging the status-quo (i.e., mainstream entity). In the long run, perhaps this transformation will again reach an evolutionary stage, especially when external factors (i.e., regulations and limitations) and performance offerings are fully balanced. Even though, most EVs currently cannot deliver high level efficiency with high-performance, its efforts to approach what ICEs offer (with conflicting factors) are now triggering its development and ensuring change in the industry.

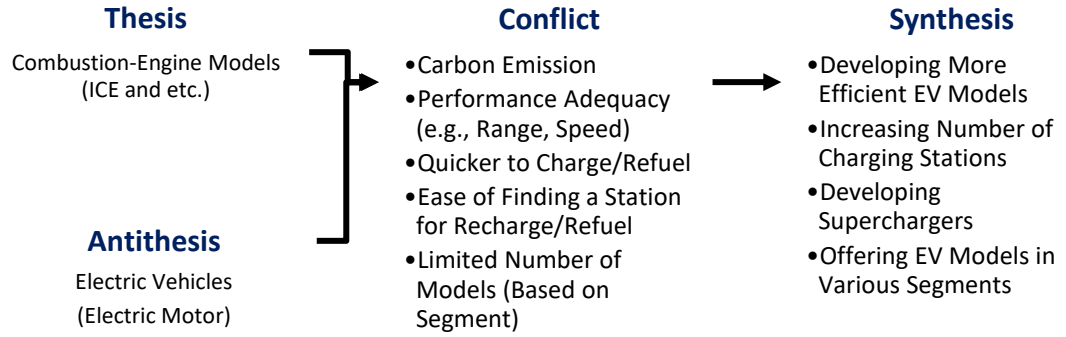


Figure 24. Dialectical Development of the Automotive Industry (2000s to Present)

Finally, when Tesla's organizational process of change is examined (as seen in Figure 25): seems to follow teleological approach since it has a single entity (i.e., EVs) and enabling its development in a constructive way. In contrast with the evolutionary theory, it does not foresee a necessary sequence of events, but rather defines development as a process that changes the entity towards its final state with constructive ways (e.g., fulfilling the needs, accomplishing goals, and building components (Van De Ven & Poole, 1995, 515-517). As for Tesla's organization and development (as seen in Figure 25): since the company is committed to developing not only electric vehicle development, but also market expansion, product range expansion, and additional products to support the vehicle (e.g., chargers and batteries, it is seen that this change/development, which is also reflected in their strategies, occurs with a constructive way, such as learning through processes, market research, benchmarking the mainstream offering and customer feedbacks.

Figure 25. Tesla's Teleological Model of Organizational Development

5.4 Managerial Implications

This study provides an analysis of the "disruptive innovation theory", which offers a unique approach to the development of innovations in the business literature with Tesla, as the case company. Regarding the emerging innovation in the automotive industry, EVs, whose market is growing day by day, are expected to become mainstream in the future, thus being the dominant mobility technology, which is considered as environmentally friendly (thanks to its low emission) and can perform as efficiently as today's ICE vehicles. In addition, through the dimensions the study focused on while examining the theory and the case, it has also revealed practical patterns such as innovative entrant entries into the sector and positioning of innovation in the market.

First of all, regarding the entry strategy, Tesla had already been studied on many different business theories and been the subject of caseworks considering its unique strategy and its innovative offering to a more than a century-old EVs, which also considered as a new breath into the market. Although the company is considered as the new incumbent of the EV market, back in time it used to be an entrant with limited competence (in terms of organizational structure, financial, infrastructure, etc.). As seen in through study, many companies in the industry (including incumbents) had already introduced EV models to the market before Tesla, but they could not get enough attention (i.e., success) from the

customers. Most of these trials before Tesla (especially incumbents') always aimed to develop and market products by emphasizing both affordable and environmental elements, nevertheless battery technology of the period was not efficient enough(both in terms of price and performance). Instead, the approach of Tesla's founders was feasible: considering the cost of li-ion batteries (which they had a share in implementing for EVs) and vehicle production at the time, they aimed to produce a model that was worth the money instead of making the vehicle cheaper. For this reason, the company had to enter the market from the high-end, and over time it moved more affordably options (more sub-segments and mainstream). In this case, despite the risks, it reveals the importance of developing viable and sustainable (financially) strategy for companies while entering the market with a new innovation.

The study also discovered situations and approaches that seemed to be disadvantages at the time but benefit the company in the long run: the all-electric strategy, targeting a high segment which few can afford (without even having any brand reputation), and risk of being the first mover. First the all-electric strategy seemed bold (even risky) at first, but with the foresight that there is a tendency towards low-emission alternatives in the long run, it was a step that would provide serious benefits. Here, the advantage is not about taking risks, but making long-term plans successfully by predicting the next steps, briefly exemplified: it was expected that states would take steps to trigger the production and development of low-emission vehicles, starting with the ZEV mandate in the United States, so being an EV company was risky in the early 2000s but not nowadays. Secondly, targeting the high-end with a sports car was another disadvantage considering that only a limited customer base could afford, but Tesla used this situation to turn it into a myth just like a technology company and made it a part of its marketing strategy. Besides, this has helped attract the attention of other customers and increase the value of the brands, the ability of entrants to compete in a conservative industry like automotive (e.g., mostly progress with incremental innovations) depends on the difference-making factors they have and ability to present/market them for transforming it into something the customer desires and follows. Finally, the study exposed that "Tesla was unrivaled in the market because it had the first-mover advantage" viewpoint was partially true: company was unique in the sports car segment it entered, but there were other EVs on the market. However, considering the sports EV and other products had launched over time, it seems that the company had a serious technological and performance advantages (driven by the

battery technology), thus allowing the company the flexibility to act as a monopoly in the market for a long time. In this context, through collaborations (transfer of competitive advantages with knowledge and technology spillovers between parties), strategic moves to expand niche or unestablished market, moves to attract financial investment, and aggressively developing and adapting newest technologies also boosted their first-mover advantage.

Another point that Tesla has achieved and that other companies (especially entrants) in the sector should consider is being user-friendly. The reason why electric vehicles were not preferred for a long time was the lacking of charging spots and long charging times. Tesla got rid of this issue thanks to the superchargers they developed and installed around the locations and even with their energy system investments, the company also supported customers to own them in their homes. This perspective was a brand new and even a technology company-style approach for automotive industry that both fuel delivery and vehicle production are provided by different and independent companies.

Finally, regarding incumbents' reaction towards disruptive innovation, many theories and studies have emphasized that incumbents are caught off guard in such innovation. Although findings display automotive incumbents to face similar matters in early stages, they also used these competitive advantages that Tesla had in benchmarking and supporting growth of the market (making the market formation and customers adapting). In addition, despite Tesla's all-electric approach for constantly innovating EVs, incumbents were aiming to compensate their late entry with their capability (infrastructure, supply chain, global network, financial power, etc.). Nevertheless, the study also highlighted considering barriers such as the constraints of the states in the near future and the evolution of battery technology (having evolutionary progress instead of revolutionary), it gives incumbents both time and flexibility to their shift to electrification (in terms of strategies like: transformation of production facilities, material selection, supply chain activities, marketing campaigns, etc.).

5.5 Limitations and Future Research

For examining the disruptive innovation theory, automotive industry has been chosen with the emerging electric vehicles as the disruptive innovation. Since the theory is about the progress of an entrant with innovation, Tesla, as both the pioneer practitioner, and developer in the industry with all-electric philosophy, was chosen as the case company.

Focusing on innovation and company-based approach, the qualitative study sought to make a meaningful process analysis of the development of both EVs and the company over time by collecting secondary data. In this context, as highlighted in the conclusion, the evaluation of the obtained data was made in the dimensions oriented by the theory (with research questions): the company's market/industry disruption, the company's market entry strategy, and the reasons for the reaction (or non-responsiveness) of other major actors (i.e., incumbent companies) in the market. Due to the dynamic progress of innovation and its effects on the industry, it both limits some of the outputs and requires future review in that sense.

As for the limitations, although it was chosen as the case company, since an important milestone in the innovation's journey was Tesla's establishment and entry into the market, as observed in the study the Tesla-centric perspective also brought some certain limitations during the analysis of the work. Due to the fact that the company is based in the United States where its first market entry took place (and even continued for a certain period), it caused the focus of most of the work to be shifted from the global scale to domestic scale (in line with companies early strategy). Related to this, as seen while drawing a conclusion in the first sub-question, as the company's recent market expansion (to countries or regions), and the EV market's formation at a global level had just reached a certain level by the mid-2010s, making analysis of the occurrence of such disruption was limited to certain markets (e.g., United States, Europe, and China). In the context of EV market's formation, this delay unsurprisingly affected the strategy and entry of the incumbents, thus limiting the answer of the third sub-question.

As for the future work, since the EV phenomenon has not yet reached its maturity stage at both the vehicle and market levels, it limits most studies like this one to produce loud and clear results. When these levels are reached in the future, it will allow the research questions of this study to be answered more clearly. In this context, as the theory of disruptive innovation underlines, even if Tesla seizes the EV market till now (with its experience and technology), when incumbents shift their structures completely to this market (with the influence of external factors), the company's preservation of its throne is a question that can only be answered in its future studies. Yet again, from Tesla's point of view, as emphasized in the second sub-question: the company has approached every segment it targets in the automotive industry by adopting a top-down model so far. Even though such model was mentioned in the first two master plans (Musk 2006; 2016), both

technological progress and increasing competition in the market may redirect the third master plan, which will be announced in the coming years, to follow a different path. In this case, it may indirectly cause the second sub-question's answer to be revised in the future. Finally, the effect of environmental factors was observed when drawing the conclusion of the third sub-question. In this regard, although most authorizations and laws imposed by the state and international organizations based on climate and environmental pollution will come into force in 2030 and later, it also affects the work to be done in the future. New studies can be conducted to examine the impact of such environmental factors on the progress of an innovation on EVs, as well as studies can also be done for reflecting 2030 and beyond, or a re-examination of the market with the enactment of those regulations.

6 SUMMARY

Innovations are crucial element in the progress of companies and industries: they enable start-ups to grow, as well as incumbents to gain competitive advantage in the market. Most academic and business studies argue that innovations are divided into different types based on market impact and level of newness. Disruptive innovation is one among these types that has both a serious impact on the market and offers high level of newness which both permanently changes habits/preferences of customers, and also revolutionizes markets along with positions and strategies of companies. In this context, Christensen presented a theory in 1997, which focuses on the entry of an entrant company into niche or unestablished market and its progress to reach mainstream by developing and offering disruptive innovation. Due to the disruptive nature of innovation, In successful cases, it has an influence to completely change the market and industries by leaving place of incumbent companies which dominate the market to entrants that develop the innovation.

Recently, a similar disruption is seen in the automotive industry with electric vehicles (EVs) as its market share and demand increasing rapidly each year. Such change previously highlighted by Christensen (in 1997), at time when there was neither EV manufacturers nor investors like today, and no electric motor or battery technology that could compete with combustion-engine. Thanks to new technological developments over time, such progress has been observed in the industry, and during this process, company called “Tesla, Inc.” stands out from the others and emerges as a case that turns the theory to reality. Likewise, Tesla entered the market with the strategy of producing all-electric vehicles and played a major role in realization of the electrification trend, but what made the company different was its contrasting points with the disruptive theory: adopting a top-down approach by entering the market from the high-end, in completely conflicting with the theory.

Despite such contrast, by providing the change in the market emphasized that theory, necessitated Tesla to examine as a theory-specific case by asking “How did Tesla's approach redefine the theory of disruptive innovation?” as the main research question. Furthermore, it was also essential to examine the case from not only the market entry but also from other elements of the theory such as company’s level of disruption and incumbents reaction towards such change. In this context, the sub-questions were formed as “How has Tesla’s EV disrupted the automotive industry?”, “How did Tesla’s high-end

market entrance reshape the disruptive low-end approach?", and "Why did incumbents respond slowly, causing Tesla to gain their position?".

In answering the research questions, a qualitative research method was adopted so that the formation, development, and conclusion of the process in real life setting could be analysed. Secondary data was also collected to unfold the process since the occurrence of the phenomenon took place over a large period, on a global scale, and in a large industry like automotive. Additionally, considering the industry, the fact that companies and institutions generally present those data publicly had enabled to examine the dataset which was already used in previous academic studies from a different perspective with new research questions. In this context, secondary data was collected through previous similar academic studies, company and industry outputs, government presentations, consultancy companies analysis and online newspapers. Later, these data were analysed using the process analysis method, in which each step of the process was unfolded one by one, in order to draw a meaningful conclusion about the events that occurred. Finally, for the evaluation, it was ensured that the data were reliable and was compared with different sources which were previously mentioned.

After the data analysis, the findings revealed that: overall, it is not possible to explain Tesla's approach with disruptive innovation theory, so it would not be accurate to claim that the difference in the company's approach redefined the theory. The main reason for such perception is formed by the sub-questions: Tesla certainly achieved significant impact and success (both in terms of financial, production and brand image) through creation and development of the EV market with its innovations and investments, and in return achieving rapid growth and attention that incumbents could not in the industry. In comparison with the theory, it was also observed the company's incompatibility with the theory, not only in terms of market entry but also other several strategies (e.g., product orientation and development strategy, investments, partnerships etc.). The study also revealed the difficulty for EVs to enter from lower segment in during 2000s due to the cost of competitive and efficient battery technology. Finally, regarding incumbents, although they did not seem to take EVs seriously for a long time (due to commercial and financial concerns), the study also highlighted that due to technological progress, market formation and providing adequate infrastructure along with environmental factors (i.e., restrictions and rules that will come into effect in the near future) allowed incumbents to

be reluctant and giving them a flexibility in their investment and product development strategies during the early stages of electrification period.

Yet, those findings also not negate Christensen's prediction of EVs (as an innovation) to become the potential mainstream mobility genre of the future. The innovation had already formed a serious market that is expected to grow in the near future (just as the early-stages that the theory mentioned). Similarly, the fact that shift to electrification or maturity level of the electric vehicle phenomenon has not yet been accomplished, time was also a factor that limited the results of the study. For Tesla as the case, such incompleteness and current lack of competition favour its superiority, which might need to be re-evaluated when incumbent companies are fully oriented towards the market in the future.

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APPENDIX 1 Data of Table 3

Vehicle Models Introduced to the EV Market (EPA Registered, 2008-2022)				
Year	Class	Brand	Model	(max.) Driving Range (miles)
2008	Sport Car	TESLA	Roadster	245
2008	Minicompact Car	MINI	MiniE	100
2012	Large Car	TESLA	Model S	265
2012	Sport Utility Vehicle	BYD	e6	122
2012	Sport Utility Vehicle	TOYOTA	RAV4 EV	103
2012	Subcompact Car	CODA AUTOMOTIVE	CODA†	88
2012	Compact Car	FORD	Focus Electric	76
2012	Midsize Car	NISSAN	Leaf	73
2012	Subcompact Car	MITSUBISHI	i-MiEV	62
2016	Standard Sport Utility Vehicle	TESLA	Model X (AWD - P100D)	289
2016	Two-Seater Car	SMART	fortwo electric drive	68
2016	Minicompact Car	FIAT	500e	84
2016	Subcompact Car	BMW	i3 BEV	81
2016	Subcompact Car	CHEVROLET	Spark EV	82
2016	Subcompact Car	MITSUBISHI	i-MiEV	62
2016	Compact Car	VOLKSWAGEN	e-Golf	83
2016	Midsize Car	MERCEDES-BENZ	MERCEDES-BENZ	87
2016	Large Car	TESLA	Model S (AWD - P100D)	315
2016	Small Station Wagon	KIA	Soul Electric	93
2016	Small Sport Utility Vehicle	BYD	e6	187
2016	Midsize Car	NISSAN	Leaf (30 kW-hr battery pack)	107
2020	Subcompact Car	BMW	i3	153
2020	Subcompact Car	MINI	Cooper SE Hardtop	110
2020	Midsize Car	HYUNDAI	Ioniq Electric	170
2020	Midsize Car	NISSAN	Leaf (62 kW-hr battery pack)	226
2020	Midsize Car	TESLA	Model 3 (Long Range)	330
2020	Large Car	PORSCHE	Taycan 4S Perf Battery Plus	203
2020	Large Car	TESLA	Model S (Long Range Plus)	402
2020	Small Station Wagons	CHEVROLET	Bolt EV	259
2020	Small Station Wagons	FORD	Mach-E AWD	N/A
2020	Small Station Wagons	KIA	Soul Electric	243
2020	Small Sport Utility Vehicle	BYD	e6	187
2020	Small Sport Utility Vehicle	HYUNDAI	Kona Electric	258
2020	Small Sport Utility Vehicle	JAGUAR	I-Pace	234
2020	Small Sport Utility Vehicle	TESLA	Model Y (Long Range AWD)	316
2020	Standard Sport Utility Vehicle	AUDI	e-tron Sportback	218
2020	Standard Sport Utility Vehicle	TESLA	Model X (Long Range Plus)	351
2022	Two-Seater Car	HISPANO SUIZA CARS	Carmen Boulogne	N/A
2022	Two-Seater Car	RIMAC AUTOMOBILI	Nevera	N/A
2022	Subcompact Car	BMW	i4 eDrive40 Gran Coupe	301
2022	Subcompact Car	MINI	Cooper SE Hardtop	114
2022	Compact Car	PORSCHE	Taycan GTS	246
2022	Compact Car	SC AUTOSPORTS, LLC	Kandi K27	N/A

2022	Midsize Car	AUDI	e-tron GT	238
2022	Midsize Car	MAZDA	MX-30	100
2022	Midsize Car	NISSAN	Leaf (62 kW-hr battery pack)	226
2022	Midsize Car	POLESTAR	2 Single Motor	270
2022	Midsize Car	PORSCHE	Taycan 4 Cross Turismo	215
2022	Midsize Car	TESLA	Model 3 (Long Range AWD)	358
2022	Large Car	HYUNDAI	Ioniq 5 RWD (Long Range)	303
2022	Large Car	LUCID	Air Dream R AWD (w/19 inch wheels)	520
2022	Large Car	MERCEDES-BENZ	EQS (450 Plus)	350
2022	Large Car	SC AUTOSPORTS, LLC	Kandi K23	N/A
2022	Large Car	TESLA	Model S	405
2022	Small Station Wagon	CHEVROLET	Bolt EV	259
2022	Small Station Wagon	KIA	EV6 RWD (Long Range)	310
2022	Standard Pickup Truck	FORD	F-150 Lightning (4WD Extended Range)	320
2022	Standard Pickup Truck	RIVIAN	R1T	314
2022	Small Sport Utility Vehicle	FORD	Mustang Mach-E (CAL RT 1 ER RWD)	314
2022	Small Sport Utility Vehicle	HYUNDAI	Kona Electric	258
2022	Small Sport Utility Vehicle	TESLA	Model Y (Long Range AWD)	330
2022	Small Sport Utility Vehicle	VOLKSWAGEN	ID.4 Pro	275
2022	Small Sport Utility Vehicle	FORD	Mustang Mach-E (CAL RT 1 ER AWD)	312
2022	Small Sport Utility Vehicle	MERCEDES-BENZ	EQB (350 4M)	N/A
2022	Small Sport Utility Vehicle	VOLKSWAGEN	ID.4 AWD Pro	251
2022	Small Sport Utility Vehicle	VOLVO	C40 Recharge twin	226
2022	Standard Sport Utility Vehicle	AUDI	Q4 e-tron (quattro)	241
2022	Standard Sport Utility Vehicle	AUDI	e-tron (quattro)	222
2022	Standard Sport Utility Vehicle	BMW	iX xDrive50 (20 inch wheels)	324
2022	Standard Sport Utility Vehicle	RIVIAN	R1S	316
2022	Standard Sport Utility Vehicle	TESLA	Model X	348