Disruptive innovation, business models, and encroachment strategies: buyer's perspective on electric and hybrid vehicle technology

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Abstract

According to Disruptive Innovation Theory customers are swayed by new market entrants through low-end and/or new-market disruption, but these predictions do not account for the rising interest in certain product categories such as electric vehicles in emerging markets. To address this research gap, we draw comparisons between disruptive innovation and incremental innovation to account for electric vehicles and hybrid vehicles respectively. We explore the misalignment between technological growth and customer satisfaction by comparing the Electric Vehicle Business Model with the Hybrid Business Model on three parameters: channels, value propositions, and customer relationships. Primary empirical data were collected from participants (N = 307) through surveys. Structural Equation Modeling (SEM) was employed to investigate the similarities and differences between electric vehicles, based on their disruptive innovation, and hybrid vehicles, based on their incremental innovation. We found that electric vehicles’ unique focus on channels leads to a positive influence on their business model and customer satisfaction, while focusing on value propositions leads to positive results for hybrid vehicles. Finally, we discuss the significance of the results considering electric vehicle’s high-end encroachment strategy within the luxury segment and contrast it with the relatively low-end encroachment strategy adopted by firms selling hybrid vehicles.

Keywords: Disruptive, Innovation, Customers, Buyers, Business Model, Emerging Economies
1. Introduction

Electric vehicles were initially introduced to the public more than 150 years ago and they are embodying the notion of disruptive innovation once again (Kamolsook et al., 2019; Weiss et al., 2019), and positioned as viable alternatives to petrol and diesel vehicles, not only in developed markets but also in emerging ones. According to the classic theory of disruptive innovation, new entrants successfully target overlooked segments in niche markets by delivering more suitable products, often at lower prices (Christensen, 1997; Christensen and Raynor, 2003; Christensen et al., 2015) and succeeding in increasing their market share across emerging and developed markets. Unconstrained by the status quo and substitution effects (Feder, 2018), such vehicles are causing a shift in what consumers expect, despite their higher than average prices in contrast to classic and hybrid vehicle counterparts (Weiss et al., 2019). To address the rapid growth in expensive electric vehicles, we view innovative disruption not merely as a supply issue but as a demand issue as well (Gans, 2016) where consumer satisfaction is intrinsically linked to technological performance (Anderson et al., 1994; Kim et al., 2004; Muller, 2020).

Despite being outpaced by technological innovation in terms of research growth and volume, recent advances in consumer behavior research and the global rise of consumer spending power are leading firms to take customer satisfaction more seriously (Reinhardt and Gurtner, 2015; Vecchiato, 2017). Expanding multinational firms that initially catered to cost-conscious consumer segments in emerging economies (Boso, Debrah, and Amankwah-Amoah, 2017), soon adapted to the rise of the middle-class segments in those economies with larger populations (Kumar and Srivastava, 2020). However, some multinational firms, such as General Motors, failed to adapt and withdrew from the Indian market due to the financial cost and the inability to compete (Reuter, 2017). On the other hand, local firms such as Tata Motors, managed to expand...
their presence across the nation (Forbes, 2020) and proved that it is becoming essential to convince consumers that their needs and values are well understood (Dijk et al., 2016).

This discrepancy between what consumers perceive and what firms hope to communicate strengthens the argument that technological expectation and technological development do not work separately, but conjointly. Therefore, our study focuses on the growth of disruptive innovation as a comprehensive process, not as an outcome per se, meaning that a firm should adapt a holistic approach and reach beyond its technology (Petzold et al., 2019). On one hand, electric cars have increased in value because of the rising environmental awareness (Hardman et al., 2013), but the failure to address issues around pollution and global warming may lead to missed opportunities in understanding their consumer audiences. To increase the sale of electric cars, manufacturers have tried to overcome barriers to entry by offering better services and adopting a direct sales model (Bohnsack et al., 2014). On the other hand, an average hybrid vehicle, is seen as a model for incremental innovation offering affordable prices while promising high product reliability (Liu and Meng, 2017). This requires firms to communicate their promises to deliver value to consumers in a consistent manner (Sheehan and Bruni-Bossio, 2015) meaning that a buyer-centric perspective is more essential than ever and needs to be considered when formulating a firm’s business model.

The misalignment between technological growth and customer satisfaction in emerging economies merits further investigation as it is not well understood in the literature. By drawing on the Business Model Canvas (Osterwalder, 2013; Osterwalder and Pigneur, 2010), we compare disruptive and incremental innovation in emerging economies on three specific parameters: value proposition, channels, and customer relationships. Analyzing these business model parameters links research on consumer satisfaction with the business model of electric and hybrid vehicles and their presence in emerging economies. When it comes to disruptive innovation, focusing on
channels and customer relationships will enable firms to reduce perceived barriers and enhance attributes (Khan and Bohnsack, 2020), while clarifying value propositions will strengthen consumer satisfaction with incremental innovation.

We therefore contribute to the literature on disruptive innovation in emerging economies by linking the observed technological growth with customer satisfaction, showing that technology for technology’s sake does not appeal to customers; it’s rather the understanding of technology parameters that lead to consumer satisfaction. From a managerial perspective, we provide evidence in favor of prioritizing customer relationships in general and focusing on certain parameters if disruption of technology is to be successful, especially for firms competing in emerging economies.

The structure of this paper is as follows: we first contextualize our research within the disruptive innovation literature. Second, we discuss electric and hybrid vehicles with respect to their penetration strategies in emerging economies. Third, we address our Business Model Canvas with respect to three parameters; channels, customer relationships, and value propositions, and measure their impact on consumer satisfaction. Forth, we present our methodology, which is designed to investigate the differences and similarities in disruptive innovation and their effects on consumer satisfaction by drawing a comparison between the electronic vehicle business model with the hybrid vehicle business model. Fifth, we present the results in the larger context of recent studies, discuss the theoretical contribution of contextualizing high-end encroachment strategies in disruptively innovative business models, and highlight the managerial implications of applying such a framework, in particular to channels of electric vehicles and value propositions of hybrid vehicles. Finally, we propose future research directions and address current research limitations.
2 Literature Review and Hypothesis Development

2.1 Electric/Hybrid Vehicles and the Disruptive Innovation Theory

Disruptive innovators, traditionally described as new market entrants, successfully target overlooked segments in niche markets by delivering more suitable products, often at lower prices (Christensen et al., 2015). According to the theory of disruptive innovation (Christensen, 1997; Christensen and Raynor, 2003) electric and hybrid vehicles are emerging as viable alternatives to internal combustion engine (ICE) models due to their disruptive technology that might one day replace incumbent products. The failure of incumbent firms, which are often global industry leaders, to adopt such technology successfully (Keller and Hüsig, 2009) can be attributable not only to market fluctuations (Bower and Christensen, 1995), but also to the challenges that arise when managing non-linear technological change (Vecchiato, 2017). When these firms invest aggressively in their most demanding technologies, they potentially ignore new technologies due to their initial small-scale industry appeal and their inability to meet regular consumers’ demand for functionality. In contrast, new entrants succeed because they are unconstrained by the status quo, i.e. substitution effects (Feder, 2018), thereby causing a shift in what customers expect, resulting in an increase in their market share.

The technology behind electric vehicles is both innovative and disruptive, commanding higher than average prices when compared to their classic and hybrid vehicle competitors (Weiss et al., 2019). This is contrary to classic debates on disruptive innovation which suggest that entrants use low prices to enter the market. To account for this discrepancy, we anchor our discussions on modern findings and debates (i.e. see Christensen et al., 2018; Gans, 2016; Kapoor & Klueter, 2015), arguing that disruptive innovation has not always been treated as a theoretical concept, but either used as a catchphrase or as an final outcome. To remedy this, we regard disruptive innovation as a process, not an outcome per se, meaning that a firm should look
beyond the technology, and act and adapt in a dynamic way (Petzold et al., 2019). More specifically, we consider disruption to be a supply issue, and a demand issue as well (Gans, 2016) whereby consumers satisfaction is intrinsically linked to performance (Anderson et al., 1994; Kim et al., 2004; Muller, 2020).

Convincing customers to switch to a disruptive technology product requires reframing the new technology to stand out above and beyond the existing one, while minimizing the perceived barriers to utilizing it and strengthening the benefits associated with it (Khan and Bohnsack, 2020). Both technology attributes and market dynamics should be acknowledged as the nature of disruptive innovation is multidimensional (Petzold et al., 2019). Indeed, the reaction of traditional customers to disruptive innovation depends on their external environment (Guo, et al., 2019). For example, electric cars have increased in value because of the current environmental concerns (Hardman et al., 2013). For a firm selling electric vehicles to succeed, it needs to clearly highlight the benefits and attributes it offers to customers and to prove that their needs and values are well understood (Dijk et al., 2016). In terms of electric vehicles, environmental issues around pollution and global warming also need to be addressed in addition to other perceived barriers like cost and inconvenience. To increase the sale of electric cars, manufacturers have tried to overcome these barriers to entry by offering better services, adopting a direct sales model and educating consumers about the benefits of using electric vehicles (Bohnsack et al., 2014). However, communicating value and minimizing perceived barriers rely on acknowledging the fact that customers do not always share the same opinion of the product sales managers with respect to what they prefer or choose to buy (Padgett and Mulvey, 2007). This means that a buyer-centric perspective is essential and needs to be considered when formulating a firm’s business model.
Selling disruptive innovation technology to consumers poses additional challenges in emerging economies, which comprise more than 70% of the world’s population (IMF, 2020). While the global economic and policy implications of sustainable technologies have been widely acknowledged (Acemoglu et al., 2016; Gerarden et al., 2015), research on disruptive innovation with high encroachment strategies in emerging economies is scarce (Devine and McCollum, 2019); most of the research in this area examines the need for affordable products rather than expensive ones (Wu et al., 2010; Zeschky et al., 2011; Hadengue et al., 2017). Furthermore, how to convey value and reach consumers through marketing strategies in emerging markets is also not well understood (Brooksbank et al., 2018). Despite these gaps, the frequency of multinational corporations investing in emerging economies is increasing and becoming more prevalent (Hadengue et al., 2017; Amankwah-Amoah, Osabutey, and Egbetokun, 2018), which requires fine-tuning and context appropriate business models.

### 2.2 The Electric versus Hybrid Business Model

Christensen et al (2018) recent discussions on disruptive innovation as a theoretical concept helps to further decipher the business model (Kapoor and Klueter, 2015). Since the term business model was first coined (Drucker, 1955), various definitions have been proposed, with recent explanations pointing to it as a means to deliver the core logic of a firm (Shafer et al., 2005) by creating, delivering, and capturing value through its strategic choices (Barquet et al., 2013; Kaplan, 2012). A theory of the business models generally consists of three parts. First, the environment of the organization and all that applies to it: the market, consumer, society, organizational structure, and technology; second, the specific mission of the organization (Craig et al., 2016; Drucker, 1994). For instance, the mission statement of the electric vehicle producer Tesla is: “to accelerate the advent of sustainable transport by bringing compelling electric cars to
mass markets as soon as possible” (Musk, 2019). Third, the area for growth should be identified in order to capture and maintain leadership (Drucker, 1994). While in the past, scholars did not distinguish between the application of a firm’s business model and its strategy, modern research suggests that an organization’s strategy can serve as an antecedent to its business model (Osterwalder et al., 2010 and Barquet et al., 2013).

A unique business model (Liu and Meng, 2017), aided by increasing environmental concerns to reduce CO2 emissions produced by transportation can lead to a combined growth of electric vehicles in the transportation industry as well as a rising interest in new sources of renewable energy, and eventually an emergence of innovative business models in the automotive industry (Christensen et al., 2012; Kley et al., 2011; Wells, 2013; Wesseling, et al., 2020). Aiming to overcome main barriers to market penetration, many manufacturers have attempted to modify their business models and even radically change them for the sake of boosting electric vehicles sales (Liao et al., 2019).

In this study, we adopt the business model concept of Osterwalder et al. (2010), called “Business Model Canvas”, as the main reference for analyzing business models in the automotive industry. The canvas’s primary goal is to help organizations move from product-oriented thinking to innovative business model thinking. The Business Model Canvas was developed and based on a comprehensive study of business model theory and it is widely accepted by many experts from both academia and industry. Moreover, it has been successfully applied by many large organizations globally, such as: Nestle, P&G, IBM, and Tesla. As shown in Table 1a, the Business Model Canvas consists of nine elements (Osterwalder, 2013).

To address the research aims of this study, three elements from the Business Model Canvas (Table 1b): value propositions, customer relationships and channels were chosen because of their direct influence on customers’ satisfaction (Hafner et al., 2017; Matthews et al., 2017;
While value propositions are crafted to deliver value and communicate it via solving existing problems that customers face (Clauss et al., 2019; Ibarra et al., 2018), Channels (Cannon and Perreault, 1999; Hamelink and Opdenakker, 2019; Lemon and Verhoef, 2016) require strategies to reach specific customer segments in an efficient way. Finally, customer relationships revolve around retaining customers and establishing new relationships.

<table>
<thead>
<tr>
<th>Table 1a</th>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Key Resources</th>
<th>Value Propositions</th>
<th>Customer Relationships</th>
<th>Channels</th>
<th>Customer Segments</th>
<th>Cost Structure</th>
<th>Revenue Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Who are our key partners?</td>
<td>What key activities do our value propositions require?</td>
<td>Who are our key suppliers?</td>
<td>What value do we deliver to the customer?</td>
<td>How do we get, keep, and grow customers?</td>
<td>Through which channels do our customer segments want to be reached?</td>
<td>For whom are we creating value?</td>
<td>What are the most important costs inherent to our business model?</td>
<td>For what value are our customers really willing to pay?</td>
</tr>
<tr>
<td></td>
<td>Who are our key suppliers?</td>
<td>Distribution channels?</td>
<td>Which key resources are we acquiring for our partners?</td>
<td>Which one of our customers’ problems are we helping to solve?</td>
<td>Which customer relationships have we established?</td>
<td>How do other companies reach them now?</td>
<td>Who are our most important customers?</td>
<td>Which key resources are most expensive?</td>
<td>For what do they currently pay?</td>
</tr>
<tr>
<td></td>
<td>Which key activities do partners perform?</td>
<td>Customer Relationships?</td>
<td>Distribution channels?</td>
<td>What bundles of products and services are we offering to each segment?</td>
<td>How are they integrated with the rest of our business model?</td>
<td>Which ones work best?</td>
<td>What are the customer archetypes?</td>
<td>Which key activities are most expensive?</td>
<td>What is the revenue model?</td>
</tr>
<tr>
<td></td>
<td>Revenue streams?</td>
<td>Customer Relationships?</td>
<td>Customer Relationships?</td>
<td>Which customer needs are we satisfying?</td>
<td>How costly are they?</td>
<td>Which ones are most cost-efficient?</td>
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<td>What are the pricing tactics?</td>
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</table>

Business Model Canvas. Adapted from Osterwalder (2013).
To understand the business models of electric and hybrid vehicles, it is important to illustrate their makeup and explain the related terminology. First, hybrid vehicles are cars with an internal combustion engine and an electric motor that supplement each other during the ride. Second, plug-in hybrid vehicles (PHEV), have a small battery for trips up to 25 miles, and an internal combination engine for long distance driving. Third, fully electric battery-powered vehicles are powered by a large battery allowing one charge to provide lasting energy for up to 500 miles (Vliet et al., 2011 and Tesla, 2017). Generally, the first and the second types are combined into one category and commonly referred to as hybrids, while electric vehicles fall under a different category. Therefore, we focus on comparing the business models of hybrid and electric vehicles’ business models, because of their shared technological similarities. We also highlight interest in business models for electric vehicles, as research in this area is not well developed and defined (Nieuwenhuis, 2018). Furthermore, due to their differences in adopting disruptive versus incremental innovation, we also discuss these business models in light of customer satisfaction.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Variable name</th>
<th>Items</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Propositions 1</td>
<td>Q6.1: Car’s performance (maximal speed, acceleration from 0-60 mph, etc.)</td>
<td>Degirmenci and Breitner (2017)</td>
<td></td>
</tr>
<tr>
<td>Value Propositions 2</td>
<td>Q6.2: Brand image (car to reflect self-image and identity)</td>
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<tr>
<td>Value Propositions 3</td>
<td>Q6.3: Environmental considerations (emissions, noise)</td>
<td>Hafner, Walker and Verplanken (2017)</td>
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<tr>
<td>Value Propositions 4</td>
<td>Q6.4: Finance (initial outlay, cost of insurance/tax, fuel efficiency, maintenance costs, depreciation)</td>
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<tr>
<td>Value Propositions 5</td>
<td>Q6.5: Risk factors (car’s safety systems, reliability, etc.)</td>
<td>Nezamoddini and Wang (2016)</td>
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<tr>
<td>Customers relationships 1</td>
<td>Q7.1: Concerns about availability of free/paid parking area</td>
<td>Gao et al. (2014)</td>
<td></td>
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<tr>
<td>Customers relationships 2</td>
<td>Q7.2: Salesperson information and awareness about the product</td>
<td>Matthews et al. (2017)</td>
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<tr>
<td>Customers relationships 3</td>
<td>Q7.3: Charging networks</td>
<td>Chen, Liu and Yin (2017)</td>
<td></td>
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<tr>
<td>Customers relationships 4</td>
<td>Q7.4: Service (qualified maintenance specialists, high quality equipment, etc.)</td>
<td>Matthews et al. (2017)</td>
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<tr>
<td>Customers relationships 5</td>
<td>Q7.5: Strong community of the car owners (support from community, mutual aid, etc.)</td>
<td>Axsen and Kurani (2012)</td>
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<tr>
<td>Channels 1</td>
<td>Q8.1: Company's actions to raise public awareness about their products and services (unveilings, news media)</td>
<td>Hafner, Walker and Verplanken (2017)</td>
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<tr>
<td>Channels 2</td>
<td>Q8.2: Supplements such as discounts and promotions</td>
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<tr>
<td>Channels 3</td>
<td>Q8.3: Purchasing experience (direct sales model)</td>
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<tr>
<td>Channels 4</td>
<td>Q8.4: Vehicle availability to buy</td>
<td>Matthews et al. (2017)</td>
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<tr>
<td>Channels 5</td>
<td>Q8.5: After sales support (ability to quickly repair a car, software/hardware updates)</td>
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<tr>
<td>Satisfaction 1</td>
<td>Q9.1: Overall car’s performance (maximal speed, acceleration from 0-60 mph, etc.)</td>
<td>Suárez, García-Mariñoso and Santos (2016)</td>
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<tr>
<td>Satisfaction 2</td>
<td>Q9.2: Prices</td>
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<tr>
<td>Satisfaction 3</td>
<td>Q9.3: Service</td>
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<td>Satisfaction 4</td>
<td>Q9.4: Driving ranges on a single charge</td>
<td>Degirmenci and Breitner (2017)</td>
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<td>Hybrid Vehicle Business Model</td>
<td>Customer Satisfaction</td>
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<tr>
<td><strong>Satisfaction 5</strong></td>
<td>Q9.5: Charging networks</td>
<td>Chen, Liu and Yin (2017)</td>
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<tr>
<td><strong>Value Propositions 1</strong></td>
<td>Q10.1: Car’s performance (maximal speed, acceleration from 0-60 mph, etc.)</td>
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<td><strong>Customers relationships 2</strong></td>
<td>Q11.2: Salesperson information and awareness about the product</td>
<td>Matthews et al. (2017)</td>
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<tr>
<td><strong>Customers relationships 3</strong></td>
<td>Q11.3: Filling networks</td>
<td>Chen, Liu and Yin (2017)</td>
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<tr>
<td><strong>Customers relationships 4</strong></td>
<td>Q11.4: Service (qualified maintenance specialists, high quality equipment, etc.)</td>
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<tr>
<td><strong>Channels 1</strong></td>
<td>Q12.1: Companies' actions to raise public awareness about their products and services (unveilings, news media)</td>
<td>Hafner, Walker and Verplanken (2017)</td>
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<tr>
<td><strong>Channels 2</strong></td>
<td>Q12.2: Supplements such as discounts and promotions</td>
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<td><strong>Channels 3</strong></td>
<td>Q12.3: Purchasing experience (franchised dealerships)</td>
<td>Matthews et al. (2017)</td>
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<tr>
<td><strong>Channels 4</strong></td>
<td>Q12.4: Vehicle availability to buy</td>
<td></td>
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<td>Channels 5</td>
<td>Q12.5: After sales support (ability to quickly repair a car, software/hardware updates)</td>
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<tr>
<td>Satisfaction 1</td>
<td>Q13.1: Overall car’s performance (maximal speed, acceleration from 0-60 mph, etc.)</td>
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</tr>
<tr>
<td>Satisfaction 2</td>
<td>Q13.2: Prices</td>
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<tr>
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<td>Satisfaction 4</td>
<td>Q13.4: Driving ranges on a single charge</td>
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<tr>
<td>Satisfaction 5</td>
<td>Q13.5: Refuelling networks</td>
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</table>


### 2.3 Electric and Hybrid Vehicle Business Models: Theoretical Model

We have earlier argued that the business model is an important element that incorporates the effect of high encroachment strategies and customers satisfaction. We have also emphasized the necessity to measure customer satisfaction in this model to illustrate what firms can focus on in order to penetrate the market. Hence, based on a relevant literature review and Business Model Canvas approach (Table 1), the Electric and Hybrid Vehicle Business Model for Customer Satisfaction was developed. As can be seen from Figures 1a and 1b, only value propositions, customer relationships, and channels are chosen from Business Model Canvas and included into our initial Business Models since only those elements met our initial requirements (Osterwalder, 2013). These requirements test the ability of ordinary electric and hybrid vehicle consumers, who do not have any specialized technical knowledge (except general awareness of these types of vehicles), to answer specific questions related to Business Models listed below.
Hence, our paper explores the relationship between value propositions, customer relationships, and channels within the Electric and Hybrid Vehicle Business Model Customer Satisfaction framework.

2.4 Electric and Hybrid Vehicle Business Models: Channels

When consumers are unable to find electric vehicles at a dealership, one of the most common barriers is reaching them through other efficient means (Matthews, Lynes, Riemer, Del
Matto, and Cloet, 2017). This is a considerable factor that can prevent the adoption of a new type of disruptive technology – in this case, a vehicle. For example, Tesla is by no means a stranger to the concept of disruptive thinking: in 2019 it announced that its electric cars will be sold over the internet, escaping the traditional practice of having the physical interaction with the car (The Wall Street Journal, 2019). While the academic literature suggests that not all consumers agree on what makes a product disruptive, it does propose that its functionality needs to be radical. Therefore, there is clear merit and rationale behind the strategy of assessing a consumer’s perspective (Nagy, Schuessler, and Dubinsky, 2016).

Sellers of electric vehicles, such as Tesla for instance, also add to the discrepancy in predicting customer reactions to disruptive products by virtue of having a high-end encroachment strategy, meaning that they gain market share from their competitors through higher priced products (Hardman et al., 2015; Rhee et al., 2012). The literature also does not specify the role of high-end market encroachment strategies in the disruptive innovation theory (Hardman et al., 2015; Rhee et al., 2012; Schmidt, 2004). Although the original definition of disruptive innovation theory does not refer to high-end encroachment strategies, such strategies have at times been associated with sustainable technology, rather than disruptive ones (Schmidt, 2004).

A high-end encroachment strategy helps new entrants to proactively respond to incumbents, who have the advantage of utilizing and optimizing their existing infrastructure. Indeed, electric vehicles, such as Tesla, need to compete not only with hybrid and conventional ones, but also with many other established automakers with a high level of experience in mass production. In order to understand the processes behind such strategies, the concept of business models need be taken into consideration, whereby entrants reach out and communicate effectively to their customers (Hamelink and Opdenakker, 2019). Such high-end encroachment strategies that help to promote quality products and services instead of offering price reductions,
are changing the current understanding of what a disruptive innovation can achieve. By indirectly driving the incumbents’ product down-market, the new entrant can utilize a high-end encroachment strategy fast enough to successfully introduce a disruptive innovation to the market and increase customer satisfaction.

While the literature specifies that channels have a positive effect on customer satisfaction (Matthews et al., 2017; Hafner et al., 2017), the links between channels, customer satisfaction and the business model of disruptive technology are yet to be established. Such links are useful to be made as they would help to differentiate between radical and incremental technologies, especially regarding the way they are developed by the firms and are affected by customer satisfaction. Thus, we hypothesize the following:

**H1a**: *Channels have a positive influence on Electric Vehicle Business Model Customer Satisfaction.*

To this point, we have argued that the approach adopted by sellers of electric vehicles is distinctive in terms of using their high-end encroachment strategies, despite them being disruptive innovators. This results in differentiating electric vehicles from the other competing products, like hybrid vehicles, which have been in the market for much longer and offer relatively incremental technology. As such, firms that sell incremental technology, in the form of hybrid vehicles, do not rely on channels to increase customer satisfaction the same way that sellers of electric vehicles do. Therefore, we hypothesize that:

**H1b**: *Channels do not have an influence on Hybrid Vehicle Business Model Customer Satisfaction.*
2.5 Electric and Hybrid Vehicle Business Models: Customers Relationships

While several definitions of customer satisfaction have been proposed in the literature, one of the most essential approaches for the measurement of customer satisfaction in the context of consumer behavior was formulated by Oliver (1997), who defined customer satisfaction as a judgement that leads to a level of fulfilment after the consumption of a product or service. The classic approach to customer satisfaction measurement, known as expectancy disconfirmation model, is well known in the scientific community and the automotive industry (Chih, 2012). Others have added to the definition to include the delight or discomfort produced after evaluating a product against one’s expectations (Hernon and Whitman, 2001). Achieving elevated levels of customer satisfaction is essential for raising the revenue and the overall sales, despite the paradoxical challenge in the automotive industry of improving product quality while cutting down the time needed to develop new ones (Yadav and Goel, 2008).

The product development processes are associated with a prominent level of pressure, especially since the vehicle’s quality and reliability play a significant role in establishing customer satisfaction (Chougule et al., 2013). Failing to do so can weaken the link between successful quality management systems and after-sale services in the automotive industry with customer satisfaction. Customer relationships are affected with a variety of factors such as electric charging networks, service, and concerns about availability of free/paid parking area, etc. They subsequently have high impact on customer satisfaction for electric and hybrid vehicle owners alike (Axsen and Kurani, 2012; Gao et al., 2014; Chen et al., 2017; Matthews et al., 2017).

According to Liu and Meng’s (2017) analysis of innovative business models in the automotive industry, Electric Vehicle Business Model is unique due to its ability to apply a light type of asset management, strong capital operation, and a keen sense of customer orientation. The latter is captured in the firm’s high-end encroachment strategy and materialized in China’s
emphasis on flexible product development and customer-oriented processes (Wan, Williamson, and Yin, 2019), while also allowing international manufacturers to own the car production process, thereby making the presence of electric vehicle firms, such as Tesla, far more favorable (Financial Times, 2018). The large amounts of capital required for such firms to continue investment in innovations reflect their ability to use a large variety of different financial tools to raise money. Tesla, for example, draws on its unique strengths by operating in a high value-added industry and engaging in ongoing battery and electric motor technology developments. Based on this, we hypothesize that:

**H2a:** Customer Relationships have a positive influence on Electric Vehicle Business Model Customer Satisfaction.

Hybrid Vehicle Business Models also focus on customer satisfaction by offering affordable prices, being quality oriented and promising high product reliability (Liu and Meng, 2017). Based on this we argue that:

**H2b:** Customer Relationships have a positive influence on Hybrid Vehicle Business Model Customer Satisfaction.

In addition to having access to efficient channels and forming adequate customer relationships, it is essential to understand how this disruptive technology can outcompete traditional models of cars and communicate value at a topical moment, rather than at the wrong time (Adner and Kapoor, 2016).
2.6 Electric and Hybrid Vehicle Business Models: Value Propositions

Despite the media buzz around new electric vehicle models, experts in technological forecasting argue that firms need not only to understand consumers’ perceptions towards these technologies, but also to know how to communicate the advantages that they provide beyond traditional products (Adamuthe and Thampi, 2019). In this regard, it’s crucial to assess whether marketplace expectations can be challenged and whether disruptive innovation can be perceived to have radical functionality. Electric cars are after all complex pieces of technology, and signaling their attributes to consumers can be met with resistance if it is not done properly (Mukherjee and Hoyer, 2001). Sellers of electric vehicles have been attempting to address and create environmental value for their target market (Bohnsack and Pinkse, 2017), but consumers do not always appreciate or understand it.

Devising successful value propositions means communicating a promise to deliver value to consumers in a consistent manner (Sheehan and Bruni-Bossio, 2015). Low cost, quality, speed, service and innovation are five types of value propositions which help to illustrate the relevance of a product to the target market (Ulrich et al., 1999). Thus, when the value of a product is justified in the mind of the consumer, the diffusion of that technology is thus more likely (Khan and Bohnsack, 2020). In this context, since innovations are constantly evolving, value propositions need to be dynamic, in tandem with successful and updated business models (Antonopoulou and Begkos, 2020). Ultimately this means that entrants must improve customer perceptions and clarify their distinct value propositions, especially when competing with disruptive innovations (Khan and Bohnsack, 2020).

Although previous studies have recognized that value propositions can highly influence customer satisfaction in the automotive industry (Degirmenci and Breitner, 2017; Hafner et al., 2017; Nezamoddini and Wang, 2016), there has been little examination of the effect of disruptive
innovation business models on customer satisfaction (Reinhardt and Gurtner, 2015; Vecchiato, 2017, Liu and Meng, 2017). The extant literature mostly focuses on ongoing consumer’s brand loyalty at the expense of identifying the motivations behind switching to a new product or service (Kamolsook, Badir, and Frank, 2019). Part of the process of building value propositions that are alluring to customers is for firms to identify which of these customers need to be targeted, what perceived problems need to be addressed, and how they can be satisfied by the firm (Johnson, Christensen, and Kagermann, 2008).

Understanding business models as units of assessment helps to highlight the holistically strategic approach of the firm and to create and communicate value (Zott, Amit, and Massa, 2011). As disruptive innovators, electric vehicles do not fall in line with the research on disruptive innovation theory which emphasizes the role of low-end strategic approaches in market penetration and disruption. Therefore, if an entrant high-end encroachment strategy can be utilized in tandem with value propositions that clarify and communicate the core benefits of a product (Payne, Frow, and Eggert, 2017), we can establish whether the value propositions have an effect on consumer satisfaction. We hypothesize the following:

**H3a: Value Propositions have a positive influence on Electric Vehicle Business Model Customer Satisfaction.**

Sellers of hybrid vehicles might rely on other tactics to increase customer satisfaction, such as attempting to increase acceptance of their products from existing mainstream customers and integrating this into their value propositions (Bohnsack, and Pinkse, 2017). Nevertheless, the result is that they also rely on delivering strong value propositions, and we hypothesize that:
H3b: Value Propositions have a positive influence on Hybrid Vehicle Business Model Customer Satisfaction.

2.7 Measuring Customer Satisfaction

Due to the importance of customer satisfaction, automotive firms have been using a variety of attributes and parameters to measure it. Specialized organizations such as JD Power and Associates (2019), which use an automotive industry benchmark called the Vehicle Dependability Study (VDS), evaluate a vehicle's long-term dependability and customer satisfaction. To proceed with VDS, the company asks car owners to complete a survey describing issues that have arisen during the previous 12 months of usage of what once was a new car three years prior.

Starting from 70 parameters and four categories in 2007, the firm extended the number to almost 180 areas, and eight specific categories (car exterior and interior, comfort, features, driving experience, ventilation system, entertainment, engine and transmission) (Youngs, 2015) in order to measure the full range of attributes (JD Power and Associates, 2019). These attributes are presented as surveys by dealership centers in order to identify problem areas influencing customer satisfaction. Another type of study widely used by automotive firms to measure customer satisfaction is Initial Quality Study (IQS) which helps to measure the car quality in the first 3 months of ownership by monitoring any quality-linked issue noticed by the vehicle owner. To calculate the IQS, companies measure the amount of claimed problems per 100 cars where a lower score indicates a higher satisfaction and vice versa (Sabbagha et al., 2016).

However, we used slightly different approach, asking participants to evaluate their satisfaction for five major indicators, based on a Likert-scale from 1-7, where 1 is ‘not at all satisfied’ and 7 is ‘very satisfied’. The indicators of customer satisfaction issues such as overall
car’s performance, price, service, driving range on a single charge and charging networks were obtained from the extant literature, similar to those identified as playing an important role for owners of Electric and hybrid vehicles (Suárez et al., 2016; Degirmenci and Breitner, 2017; Chen et al., 2017).

In sum, to demonstrate the effect of business models on electric and hybrid vehicles, we measure the extent to which customer satisfaction is affected by consumer perceptions towards channels, customer relationships, and value propositions. The following section consists of the sample selection, method, and data collection.

3. Research Design and Methodology

3.1. Sample Selection

To investigate the differences in emerging economies on customer satisfaction (dependent variable) for the business models of Electric Vehicles and Hybrid Vehicles, opinions for the following components (independent variables) were sought: value propositions, customer relationships, and channels. To obtain a representative sample, the selection criteria included participants over 18 years old with knowledge of electric and hybrid vehicles. A short description of the research and a link to the survey were included in the postings. Messages were sent through public and private postings on social media (Facebook, VKontakte, Linkedin, MTurk) through a combination of systematic stratification, and on automotive-themed forums (Tesla Motors Club, SpeakEV, EVowners, etc.) through self-selection.

We collected a total of 307 responses (70% male; 30% female); within the participants 41% were 18-24 years old, 25% were 25-34 years old, 17% were 35-44, and 17% were 45 and above (Table 1). The opinions of a wide range of participants were collected, representing 39 different countries, with respondents in India representing the largest country from emerging
economies. In addition to 28% owning either an electric, hybrid, or combination of the two, 51% either owned a petrol or diesel vehicle, and 22% did not own a vehicle.

3.2 Method and Data Collection

In order to determine the influence of disruptive innovation business models for electric and hybrid vehicles on customer satisfaction, an online survey was designed using Qualtrics to reach a large sample of people as well as collect a large amount of data in a relatively short period of time. The authors received ethics approval from the University Ethics Committee and disseminated information about the survey was disseminated prior to receiving written consent from participants. Participants were asked to confirm whether they have been exposed to information about electric and hybrid vehicles or whether they own or have had experience owing/driving electric/hybrids vehicles, in addition to being able to read the survey in English.

There are three main components to the survey, two of which measure customer satisfaction (Figure 2), and one general participant demographics (see Appendix): Section 1) measures Electric Vehicle Business Model, Customers Satisfaction, 2) Hybrid Vehicle Business Model, Customers Satisfaction, and 3) General demographic questions. The first two sections include four tables with 5 questions each, with a Likert-scale from 1 to 7, where 1 is “not at all important” and 7 is “very important” or 1 is “not satisfied at all” and 7 is “very satisfied”. Structural Equation Modeling (SEM) was used to analyze the data in SPSS Amos by IBM.
Q6) i: Car’s performance
Q6) ii: Brand image
Q6) iii: Environmental considerations
Q6) iv: Finance
Q6) v: Risk factors

Q7) i: Concerns about availability of parking area
Q7) ii: Salesperson information and awareness about the product
Q7) iii: Charging networks
Q7) iv: Service
Q7) v: Strong community of the car owners

Q8) i: Company's actions to raise public awareness
Q8) ii: Supplements such as discounts and promotions
Q8) iii: Purchasing experience
Q8) iv: Vehicle availability to buy
Q8) v: After sales support

Q9) i: Overall car’s performance
Q9) ii: Driving ranges on a single charge
Q9) iii: Service
Q9) iv: Prices
Q9) v: Charging networks

Value Propositions

Customers relationships

Electric Business Model
Customer Satisfaction

Channels

Fig. 2. Electric and Hybrid Business Model Customer Satisfaction.
4. Results
4.1 Data Analysis

Structural Equation Modeling (SEM), a comprehensive statistical tool, was used to test customer satisfaction towards Electric and Hybrid Vehicle Business Models. SEM tests variables that are both observed and latent (unobserved) and their relationships (both observed and unobserved) (MacCallum and Austin, 2000). The descriptive statistics (Table 2) and the measurement model with the standardized coefficients for both business models is also presented (Figures 3-9).

A factor analysis was conducted to obtain factor loadings for each variable. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy produced a value of .85 for the Electric Business Model, and .92 for the Hybrid Vehicle Business Model. Both meet the minimum accepted value of 0.6 (Field, 2009). The results of Bartlett’s test of sphericity indicated that the values for both business models were significant and equal to .000. This also confirms that the factor analytic model was an appropriate choice for the data.

Most factor loadings data obtained here can be considered to be significant. However, few variables from both models were dropped because they did not meet this requirement, where .4 is acceptable and .7 is considered to be significant (Stevens, 2002). To check reliability, Cronbach’s alpha of each construct was obtained through Principle Axis Factoring. For Electric Vehicles the minimum received is .585 and a maximum is .803, and for Hybrid Vehicles, the data yielded a minimum of .826 and a maximum of .868 for the Cronbach’s alpha values, (see Appendix for full list of correlations). In addition, the determinant value for the correlation for both the Electric and Hybrid Business Models Electric is equal to .001, which is more than the minimum value of 0.000001 (Field, 2009).
When Cronbach’s alpha is above the recommended value of 0.70, the scales have sufficient internal reliability Lance et al. (2006). The Hybrid Vehicle Business Model perfectly fits the requirements, while one construct of Electric Business Model falls slightly below the recommended minimum. However, Hinton et al. (2004) assert that “0.5 to 0.75 is generally accepted as it indicates a moderately reliable scale, while a figure below this generally suggests a scale of low reliability”. Therefore, the Cronbach’s alpha values for both models can be accepted.

Further, to count the composites reliability the standardized factor loadings from AMOS output were used. According to (Boduszek et al., 2013), composite reliability should be greater than 0.5. The data yielded a minimum of 0.691 and a maximum of 0.785 for Electric Vehicle Business Models, while the Hybrid Business Model resulted with a minimum of 0.692 and a maximum of 0.776. Thus, both models have passed the composed reliability test which is measured by taking the standardized factor loading from AMOS output and inserting them into the formula: “Variance extracted = [(sum of standardized loadings)²]/[(sum of standardized loadings)² + (sum of (standardized loadings)²)]” (see Hair et al., 1998). Tables 3 and 4 represent the data analysis results for Hybrid Vehicle Business Models Customer Satisfaction and Electric Business Models Customer Satisfaction accordingly.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Electric Business Model</th>
<th>Hybrid Vehicle Business Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Proposition 1 (TVP1)</td>
<td>5.27 1.40</td>
<td>5.31 1.39</td>
</tr>
<tr>
<td>Value Proposition 2 (TVP2)</td>
<td>5.19 1.46</td>
<td>5.06 1.51</td>
</tr>
<tr>
<td>Value Proposition 3 (TVP3)</td>
<td>5.35 1.61</td>
<td>5.36 1.62</td>
</tr>
<tr>
<td>Value Proposition 4 (TVP4)</td>
<td>5.7 1.34</td>
<td>5.70 1.42</td>
</tr>
<tr>
<td>Value Proposition 5 (TVP5)</td>
<td>6.18 1.16</td>
<td>5.93 1.30</td>
</tr>
<tr>
<td>Construct</td>
<td>Variable</td>
<td>Factor loadings</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Customer Relationships</td>
<td>TC1</td>
<td>.751</td>
</tr>
<tr>
<td></td>
<td>TCR2</td>
<td>.611</td>
</tr>
<tr>
<td></td>
<td>TCR5</td>
<td>.594</td>
</tr>
<tr>
<td>Channels</td>
<td>TC4</td>
<td>.716</td>
</tr>
<tr>
<td></td>
<td>TC5</td>
<td>.748</td>
</tr>
<tr>
<td></td>
<td>TCR4</td>
<td>.624</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>TS2</td>
<td>.681</td>
</tr>
<tr>
<td></td>
<td>TS4</td>
<td>.799</td>
</tr>
<tr>
<td></td>
<td>TS5</td>
<td>.741</td>
</tr>
</tbody>
</table>

Electric and Hybrid Vehicle Business Models, Customer Satisfaction. Note: M = Mean, SD = Standard Deviation; Minimum = 1, Maximum = 7.

Table 3
Data analysis results (Electric Business Models Customer Satisfaction).

### 4.2 Satisfaction path models for the Electric and Hybrid Vehicle Business Models

#### Table 4

<table>
<thead>
<tr>
<th>Construct</th>
<th>Variable</th>
<th>Factor loadings</th>
<th>Cronbach’s alpha</th>
<th>Composite reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Propositions</td>
<td>HVP4</td>
<td>.682</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HVP5</td>
<td>.768</td>
<td>.856</td>
<td>.776</td>
</tr>
<tr>
<td></td>
<td>HCR4</td>
<td>.832</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HC5</td>
<td>.822</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channels</td>
<td>HC1</td>
<td>.688</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HC2</td>
<td>.698</td>
<td>.805</td>
<td>.692</td>
</tr>
<tr>
<td></td>
<td>HC3</td>
<td>.709</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HCR2</td>
<td>.762</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>HS2</td>
<td>.774</td>
<td>.755</td>
<td>.768</td>
</tr>
<tr>
<td></td>
<td>HS3</td>
<td>.809</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HS5</td>
<td>.579</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figures 6 and 10 represent satisfaction path models and the main constructs in the Electric Business Model Customer Satisfaction and Hybrid Vehicle Business Model Customer Satisfaction accordingly. Unidirectional arrows identify the relationships between variables that were tested. Table 5 is a goodness-of-fit matrix, which represents a numerical summary of the discrepancy between the observed values and the values expected under a statistical model (Maydeu-Olivares and García-Forero, 2010). NFI, RFI and TLI are used to measure model fit and should be in a range between 0 and 1. However, according to Hair et al. (2009), the closer the value is to 1 the better the fit. Since indexes for both models showed a minimum of 0.883 and a maximum of 0.971, the results can be accepted. Moreover, Hair et al. (2009) state that NFI,
which is also known as the Bentler-Bonett normed fit index, should be above 0.9, which we have achieved and have established an ideal fit (Ullman, 2001). The index for CFI compares the fit of a target model to the fit of an independent model and ranges from 0 to 1 with values of 0.7 and greater considered acceptable (Bollen, 1989). Thus, the CFI index for both models can be accepted. The RMSEA (root mean square error of approximation) value also should be between 0 and 1 range, but the smaller the number the better (Steiger, 2000). Moreover, according to Hoe (2008), there is a range of values which are considered to be a good fit (less than 0.05), reasonable fit (between 0.05 and 0.08), or mediocre (0.08 and 0.12). The fit of the RMSEA values of 0.073 for Electric Business Model and 0.060 for Hybrid Vehicle Business Model are reasonable.

Fig 3. Channels (Electric Vehicle Business Model, Customer Satisfaction).

Fig 5. Customer Relationships and Channels (Electric Vehicle Business Model, Customer Satisfaction).

Fig 7. Value Propositions (Hybrid Vehicle Business Model, Customer Satisfaction).

Fig 8. Customer Relationships (Hybrid Vehicle Business Model, Customer Satisfaction).

Fig 10. Customer Satisfaction measurement model (Hybrid Vehicle Business Model, Customer Satisfaction).

Table 5

<table>
<thead>
<tr>
<th>Model</th>
<th>NFI</th>
<th>RFI</th>
<th>IFI</th>
<th>TLI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Business Model Customer Satisfaction</td>
<td>Δ 1</td>
<td>p₁</td>
<td>Δ 2</td>
<td>p²</td>
<td>.949</td>
<td>.073</td>
</tr>
<tr>
<td>Hybrid Vehicle Business Model Customer Satisfaction</td>
<td>.946</td>
<td>.927</td>
<td>.971</td>
<td>.960</td>
<td>.971</td>
<td>.060</td>
</tr>
</tbody>
</table>

*Goodness-of-fit values.*

Table 6 shows a summary of the outcome for our hypothesis testing. Hypotheses 1a, 1b, 2a, and 2b, were confirmed, because we expected a positive influence of channels on the Electric Business Model, but not for the hybrid vehicles and we expected customer relationships to have a positive effect on consumer satisfaction for both business models. Hypotheses 3a was rejected, but hypotheses 3b was confirmed. Using standardized coefficients or β, it can be said that when
channels go up by one standard deviation, Electric Business Model Customer Satisfaction goes up by .357 standard deviations, and when the customer relationships go up by one standard deviation, the customer satisfaction goes up by .326 standard deviations. When value propositions go up by one standard deviation, Hybrid Vehicle Business Model Customer Satisfaction goes up at .539 standard deviations, and when the customer relationships go up by one standard deviation for Hybrid Vehicles, customer satisfaction goes up by .317.

**Table 6**
Hypotheses and related p-values.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>p-Value</th>
<th>Accepted or rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>**</td>
<td>Accepted</td>
</tr>
<tr>
<td>H1b</td>
<td>**</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2a</td>
<td>**</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2b</td>
<td>**</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3a</td>
<td>.34</td>
<td>Rejected</td>
</tr>
<tr>
<td>H3b</td>
<td>**</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

*Note: * represents significant p-values at the .05 level, ** represents significant p-values at the .001 level.*
5. Discussion

The purpose of this paper is to investigate the role that disruptive business models have on the demand side of innovation in emerging markets; more specifically consumer satisfaction. We contribute to the literature on disruptive innovation by assessing the role that high-encroachment, rather than low-encroachment, strategies play in building customer satisfaction. More specifically, we measured the extent to which value propositions, channel influence, and customer relationships affect customer satisfaction by conducting Structural Equation Modeling. Our results indicate that channels and customer relationships influence customer satisfaction with respect to the Electric Vehicle Business Model, while value propositions and customer relationships influence the Hybrid Vehicle Business Model. As improvements in battery technology, price reductions, policy changes, and infrastructure are helping electric vehicles compete more successfully (Deloitte, 2019); such technological developments should not be assumed to follow the same trajectory for both electric and hybrid models. Likewise, prospective buyers in either market may not react to these developments in the same way.

5.1 Theoretical Contribution

In this paper we illustrate that prices and technology cannot be used in isolation to enhance a firm’s business model. In order to improve customer satisfaction, firms should strengthen perceptions towards their customer relationships, but also to adopt different strategies: whereby entrants (Electric Vehicle Sellers) should focus on channels, and incumbents (Hybrid Vehicle Sellers) on value propositions. In the case of electric cars, costly products require after sales support and should be easily available to reduce the pain of purchase. Hybrid vehicles, on the other hand, reply on reducing perceived risk factors and mainlining a reasonable price. In light of recent acknowledgements that consumer perception is an area worth investigating (i.e.
see Teixeira, 2019), our findings show that business models are not only conceptually relevant, but also useful for measuring consumer satisfaction towards these disruptive technologies in the automotive industry in emerging economies. Firms can therefore adopt their business models to increase customer satisfaction in a dynamic way.

The novelty of our study also lies in investigating the demand-side of disruptive innovation through perceptions toward channels, value propositions, and customer relationships. We contribute to research on the theory of disruptive innovation by looking beyond product-oriented technologies (Christensen, 1997) and including the emergence of new business models (Christensen et al., 2015; Guo et al., 2019). While prior research has framed disruptive innovation in terms of targeting low-end markets (Kamolsook et al., 2019; Si and Chen, 2020), we focus on high-end encroachment market strategies in light of the demand-side of disruptive innovation.

To date, few studies have focused on holistically identifying factors that affect the technical (Baker et al., 2010), environmental (Silva, 2011), and psychological/behavioral (Chu et al., 2019) aspects of business models and disruptive innovations. We address this by combining consumer perceptions towards value propositions, customer relationship, and channels. We showed that even in the automotive industry, different elements contribute to increasing customer satisfaction, and while most studies explore only some aspects of this relationship, they do so on either electric or hybrid vehicles, but not both (Hamelink and Opdenakker, 2019). In the sections that follow we illustrated the importance of each business model in increasing customer satisfaction.
5.2 Electric Vehicles: Consumer Satisfaction Business Model

The business model for electric vehicles relies on consumer satisfaction with channels and customer relationships. More specifically, we found that customer satisfaction with channels depends on vehicle availability to buy through these channels and after-sales support provided by them, while customer satisfaction with their relationships with the firms depends on customers’ public awareness and their strong community ties.

For firms to provide outstanding service and after sales support to their customers, the literature suggests that the use of a high-end encroachment strategy is needed. While the link between customer relationships and satisfaction has been established in a variety of contexts (Garbarino and Johnson, 1999; Szymanski and Henard, 2001), the value of disruptive technology that is customer-oriented remains topical (Danneels, 2004; Obal, 2017). This trend is illustrated by the growth of “gigafactories”, such as those producing Tesla’s electric vehicles in China for example. To ensure that customers are provided with after-sales support, Tesla’s supercharger network charges the battery faster than any other charger available on the market, for free (Ashique et al., 2017). Moreover, the company provides “Service Plus”, which allows Tesla staff to check for all types of breakages and to repair them online. Additionally, they offer them constant software updates that add new functions to their cars that had never been used in the automotive sector before (Korosec, 2017). Indeed, Tesla is a prime example of a firm that has managed to understand its customers and orient its campaign towards them well (Liu and Meng, 2017).

In addition, makers of electric vehicles signal their high-end encroachment strategies by providing consumers with access to other loyal customers (i.e. community electric vehicle fan clubs). Raising public awareness has been recognised as an important factor for self-driving vehicles (Pettigrew et al., 2018) and establishing strong brand communities that consumers
belong to as fan-based network, have shown to increase their satisfaction and loyalty to the brand (Pettigrew et al., 2018). In general co-creation establishes a stronger propensity and satisfaction for the product or brand (Lan et al., 2017).

5.3 Hybrid Vehicles: Consumer Satisfaction Business Model

While we have shown that electric and hybrid vehicles share commonalities in terms of the effect of customer relationships on satisfaction, electric vehicles are unique in terms of the effect of channels on consumer satisfaction, and hybrid vehicles are unique in terms of their value propositions. More specifically, hybrid vehicles are affected by value propositions due to risk factors, service/maintenance, and after-sales support. Hybrids are also affected by customer relationships and how these are formed due to public awareness, parking availability, and purchase experience.

In contrast to electric vehicles, the technology for hybrid vehicles is relatively incremental and our results suggest that value propositions are important in driving customer satisfaction towards these technologies. The focus for these types of firms should be on value propositions and be framed as such in order to illustrate how the product’s benefits clearly outweigh the perceived psychological costs (Bohnsack and Pinkse, 2017). Many sellers of hybrid vehicles often utilize conventional franchised dealership networks rather than the advanced ones used by some of the top electric vehicle manufacturers and their buyers have different priorities, since hybrid cars are usually cheaper, and customers often buy them as their main transport method (Ashique et al., 2017; Korosec, 2017; Matthews et al., 2017; Sandström, 2015).

Thus, the results obtained in our study were likely caused by the diversity of encroachment strategies used in each type of vehicle’s business models, since hybrid vehicles sellers tend to target more price-sensitive markets, where consumers are also more concerned
about risk factors, while electric vehicles sellers utilize their unique channels, leaving potential buyers less concerned about financial factors and related risks. Thus, in this paper we adopted a novel way of examining the effect of business models on customer’s satisfaction for disruptive technologies (Reinhardt and Gurtner, 2015; Vecchiato, 2017) in the automotive industry. We believe that these business models can be expanded and utilized in emerging economies.

5.2 Managerial Implications

The way we travel from point A to point B might radically change in the future, especially due to environmental concerns and technological developments. At the forefront of these changes are electric vehicles which are quickly adopting and challenging the classic diesel, petrol, and even plug-in hybrid engine technologies. A recent report by Deloitte (2019) highlights the role for managerial action: these disruptive technologies should not be sold at cheap prices, but rather they should be positioned differently to attract consumers. Moreover, a dynamic, consumer-friendly business model is the key to successfully competing in the electric vehicle market. It is done by understanding the importance of channels and customer relationships to build customer satisfaction for electric vehicles, while customer satisfaction for hybrid vehicles is built upon their value propositions and customer relationships.

Our research enables managers to understand what part of their business model to focus on to further improve customer satisfaction. However, it highly depends on the customer segment they plan to target, because as was explained previously, companies that specialize in unique luxury vehicles and those that produce affordable and mass-market cars should focus on different elements of their business models. Nevertheless, this research shows that some similarities may exist in both cases, such as establishing public awareness.
In addition to automakers keeping track of target segments, they should take into consideration enhancing their value propositions or channels, depending if they sell hybrid or electric vehicles, respectively, in order to improve the satisfaction of their customers. On one hand, organizations targeting price-sensitive consumers should pay more attention to value propositions in addition to financial and risk factors, as such clients are limited in terms of their budget and prefer practicality and durability rather than performance or other attributes. On the other hand, firms selling electric vehicles, which target the luxury segment in the market, should focus more on their channels by providing efficient services and after-sales support as their target consumers are willing to pay more money in exchange for receiving unique services with superior support from the company. Such tactics would lead to an increase in sales, strengthening their market position and improving their brand image in emerging economies.

6. Conclusion

The global automobile industry is in dramatic change, caused by development in emerging economies, fast growth of new technologies, and great alteration of consumers’ preferences towards car ownership. In addition, increasing automation, digitization, and new business models made a revolution in the automotive industry. These conditions paved the way to the emergence of companies with disruptive innovative business models such as those selling electric vehicles. We addressed a gap in the extant literature by assessing the effect that disruptive innovation business models have on customer’s satisfaction. Differences between the business models and approaches have been hypothesized to influence customer satisfaction in different ways. Thus, using business model theory, this study developed Electric and Hybrid Vehicle Business Models for Customer Satisfaction. The major findings showed positive relationships between the influence of channels on Electric Vehicle Business Model Customer
Satisfaction as well as between the value propositions on Hybrid Vehicle Business Model

Customer Satisfaction. Electric vehicles tend to use a high-end encroachment strategy with unique channels while targeting luxury customer segments, while producers of hybrid vehicles mainly use low-end encroachment strategy aimed at price-sensitive buyers.

Thus, as global pressure around environmental concerns grows, consumers are becoming more aware of the carbon emissions and more likely to consider buying electric vehicles. Competitors in the automotive industry can provide these vehicles in ways that are convenient for consumers and that are clearly communicated. Disruptive technology can only be successful if it has a clear strategy in gaining market share, a feat that Tesla has so far demonstrated.

In this paper, we investigate customer satisfaction for the business models of a specific type of disruptive innovation, i.e. hybrid and electric vehicles; however, the examination of any type of technology that is new and disruptive in nature is inherently limited due to its newness. It can only be thoroughly examined once its adoption grows. While Tesla, as an example of an electric vehicle, has recently established a ‘Gigafactory’ and commenced building its vehicles in Shanghai, it has not yet established such a strong presence in other emerging economies (WSJ, 2019; CNN, 2019).

Naturally, a large portion of potential customers have not had the opportunity to purchase and our survey responses reflect a range of these future buyers from a wide range of backgrounds. Future research could investigate customer satisfaction in terms of long-term electric and hybrid car users. Moreover, future research projects can be conducted to follow up on the role that high-end encroachment strategies have on business models and their fit with the disruptive innovation theory. Within a few years’ time electric vehicles will expand its plans to enter as an affordable option in the market, fighting to increase its market share, and this merits further investigation.
Finally, given the state of the current economy and the rise in activist movements, it’s becoming more difficult to distinguish how technological push or demand pull might affect disruptive innovations. Since society is embracing - and possibly even expecting - more innovations, time will tell whether electric vehicles and other future entrants will be able to keep up with demand and communicate their value in an efficient and effective way.
7. References


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