The Relevance of Connected Car Features on Brand Loyalty and Customer Satisfaction

Madalena Lobo Antunes de Matos e Noronha

Dissertation written under the supervision of Professor Pedro Tavares

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Abstract

Every day, we are becoming more connected. Our phones have become the ultimate connectivity device, and soon, the car will follow in the same footsteps. The future car will be more sophisticated and tailored to consumers, becoming an extension of our smartphones. Connectivity will be an essential source of value creation for brands, as it may generate revenue, optimise costs, and overall increase and improve the driver experience.

This dissertation explores the relevance of connected car features to brand loyalty and customer satisfaction.

An extensive literature review was performed to gain knowledge on the topic. Both qualitative and quantitative research were conducted to answer the research question. For the qualitative research, in-depth interviews were conducted. The study aimed to gain insights into the motivations, habits, and attitudes behind purchasing a vehicle and comprehend the role of connected car features in the purchase process. For the quantitative research, an online survey was formulated. The questions focused on the motivations and habits towards purchasing a car, followed by the general perceptions of connectivity features. Most questions used were statements using a 5-point Likert scale regarding the level of importance or agreement with the statement.

The data collected from the research was then imported into the statistical program SPSS and analysed. Along with an analysis of the data, hypothesis testing was also used. From the study of the research conducted, both qualitative and quantitative, it was possible to conclude that connected car features do have a positive impact on customer satisfaction.

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Author: Madalena Lobo Antunes de Matos e Noronha

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Abstrato

Cada vez mais estamos ligados. Os nossos telemóveis tornaram-se o verdadeiro dispositivo de conetividade e, em breve, o carro seguirá o mesmo caminho. O carro do futuro vai ser mais sofisticado e adaptado aos consumidores, tornando-se uma extensão dos nossos smartphones. A conetividade será uma fonte essencial de criação de valor para as marcas, uma vez que pode gerar receitas, otimizar custos e, em geral, aumentar e melhorar a experiência do condutor.

Esta dissertação explora a relevância das características dos automóveis conectados para a lealdade à marca e a satisfação do cliente.

Foi efectuada uma extensa revisão da literatura para obter conhecimentos sobre o tema. Foram efectuadas pesquisas qualitativas e quantitativas para responder à questão de investigação. Para a investigação qualitativa, foram realizadas entrevistas aprofundadas. O estudo teve como objetivo obter informações sobre as motivações, os hábitos e as atitudes subjacentes à compra de um veículo e compreender o papel das funcionalidades dos automóveis conectados no processo de compra. Para a investigação quantitativa, foi elaborado um inquérito As perguntas centraram-se nas motivações e nos hábitos de compra de um automóvel, seguidos das percepções gerais das funcionalidades de conetividade.

Os dados recolhidos na investigação foram depois importados para o programa estatístico SPSS e analisados. Para além da análise dos dados, foi também utilizado o teste de hipóteses. A partir do estudo da investigação efectuada, tanto qualitativa como quantitativa, foi possível concluir que as características dos automóveis conectados têm um impacto positivo na satisfação do cliente.

Título: A relevância das características dos veículos conectados na lealdade à marca e na satisfação do cliente

Autor: Madalena Lobo Antunes de Matos e Noronha

Palavras chave: Conectividade, Indústria automóvel, Carro conectado, Fidelidade à marca, Satisfação do cliente

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1. Introduction

The Automotive industry is undergoing several changes, one of them being that it is becoming more digitalised. As a result, brands must adapt to these changes to survive in the competitive industry and take proper advantage of these changes to gain a competitive advantage.

In addition, every day, we are becoming more connected. Our phones have become the ultimate connectivity device, and soon, the car will follow in the same footsteps. Younger generations are already becoming more dependent on smartphones for their daily lives. The future car will be more sophisticated and tailored to consumers, becoming an extension of our smartphones.

Future trends, such as electrification, autonomous driving, connectivity, and the ability to share driving, will define the future of cars. Connectivity will be an essential source of value creation for brands, as it may generate revenue, optimise costs, and overall increase and improve the driver experience, not to mention the evolving consumer preferences and expectations. Connected car features will allow for a seamless and personalised driving experience. However, connected car features are a recent and evolving technology. Most features are not yet available to consumers, and its adoption has several potential drawbacks, such as security, usability and potentially high costs.

Given the increasing importance of connectivity in the automotive industry, this dissertation explores the research question of the relevance of connected car features to brand loyalty and customer satisfaction. In addition to the research question, four different hypotheses were formulated based on the research question. This is the study of the impact of connected car features on customer satisfaction and brand loyalty and whether they can be considered relevant for brands. This is made possible by studying the perceptions, statements and claims that consumers have made concerning the use of connected car features.

A thorough literature review was conducted to study this topic properly. Various research, academic papers and industry reports were thoroughly analysed. The literature focused on an overview of the automotive industry, future trends, and the impact on vehicle and consumer behaviour. Then, focus on connected cars, what they are, how they work, different features they can include, and potential drawbacks and motivations for their use. Lastly, an understanding of customer satisfaction and brand loyalty, their impact on brand equity, and what is already being witnessed in the automotive industry.

Both qualitative and quantitative research were conducted to answer the research question correctly. For the qualitative research, in-depth interviews were conducted among four different age groups—the research aimed to gain insights into the motivations, habits, and attitudes behind purchasing a vehicle. Additionally, the goal was to comprehend the role of connected car features in the purchase process. Based on the insights of the in-depth interviews and previous research, an online survey was then formulated. The survey was divided into three sections, starting with questions on the motivations and habits towards purchasing a car and then the general perceptions of connectivity features, ending with questions on demographics. Most questions used were statements using a 5-point Likert scale regarding the level of importance or agreement with the statement. The questions in the survey allowed people to express their perceptions towards connected car features, which applications they deem necessary, how they may impact the driver experience, and lastly, potential drawbacks from its adoption. The data collected from the research was then imported into the statistical program SPSS and analysed. Along with an analysis of the data, hypothesis testing was also used.

As previously mentioned, connectivity is an upcoming trend in the automotive industry, becoming more relevant for brands as a potential source of differentiation or even competitive advantage. Additionally, as it is a recently evolving technology, there is little previous research on connectivity features and their relevance to customer satisfaction and brand loyalty. Therefore, it was deemed relevant to focus on connectivity features and, more importantly, explore their impact on the brand's equity.

From the research conducted, both qualitative and quantitative, it was possible to conclude that connected car features do have a positive impact on customer satisfaction. Therefore, it has an impact on brand loyalty. As a result, this dissertation can be deemed relevant in terms of empirical evidence regarding the relevance of connected car features on customer satisfaction and brand loyalty in the automotive industry.

2. Literature Review

This section comprises four topics that cover an analysis of existing literature and theoretical research on the automotive industry, connected cars, brand loyalty, and customer satisfaction.

2.1 Overview of The Automotive Industry

The rise of new technologies, changes in sustainability policies, and consumer preferences are the main contributors to the changes across industries. Digitalisation has revolutionised industries in the past few years, specifically the automotive industry. These transformations will make it so that those navigating the sector will be challenged and must adapt to these changes to succeed (Cornet et al., 2023b). The already competitive industry will become even more competitive. Younger and more tech-savvy generations will lead this transformation (Kuhnert et al., 2017).

Concerning consumer behaviour in the automotive industry, the adoption of electric vehicles is happening at different rates, depending on the individual market. Consumers tend to be more inclined towards hybrid vehicles compared to electric vehicles. The shift to electric vehicles is based on solid consumer perception that it will result in lower costs. There is anxiety surrounding the charging of these vehicles, raising questions about the availability of public charging stations and the challenge of installing home chargers. In general, the driving force behind the choice of a brand relies on the consumer's perception of the product quality (Deloitte, 2023). Consumers expect to bring functionality into their cars with music or even navigation. Bringing these elements that contribute to happiness in the car contributes to a more positive in-car experience. (Wollschlaeger et al., 2015).

The car of the future will be more competent as it will be increasingly more connected and instrumented. This car is electric, autonomous, shared and connected (Kuhnert et al., 2017). Cars can communicate, socialise and collaborate with other things, such as vehicles and infrastructures (Wollschlaeger et al., 2015). In addition, it is also expected that the car will be used more extensively since drivers will travel long distances. Thus, it may lead to the need for replacement or upgrade much sooner—occupants inside the car can receive media services during their journey (Kuhnert et al., 2017)

2.2 Connected Car

A connected car can be defined as an automobile which has devices that can connect to devices within the car itself or with other devices, or even networks and services outside the car, including other cars, the driver's home or office, and other infrastructures (Jadaan et al., 2017). It is a vehicle that is always connected to the Internet to interact with other smart devices on the road and other vehicles (Coppola & Morisio, 2016). Connected cars are expected to change how people perceive and even use their cars. As such, most users will have their cars connected to their homes and offices (Jairaj et al., 2020).

Connected cars rely on Vehicle-to-Everything (V2X) connectivity, which involves Vehicle-vehicle (V2V) connectivity, Vehicle-to-Infrastructure (V2I) connectivity, Vehicle-to-pedestrian (V2P) connectivity, Vehicle-to-network (V2N) connectivity (Maria et al., 2017). Vehicle-to-Everything (V2X) communication consists of wireless communication and coordination between vehicles and their environment, that is, communication between vehicles and other entities such as other vehicles, pedestrians, and infrastructure. V2X communications allow drivers to circulate safely, more efficiently and economically (MacHardy et al., 2018)

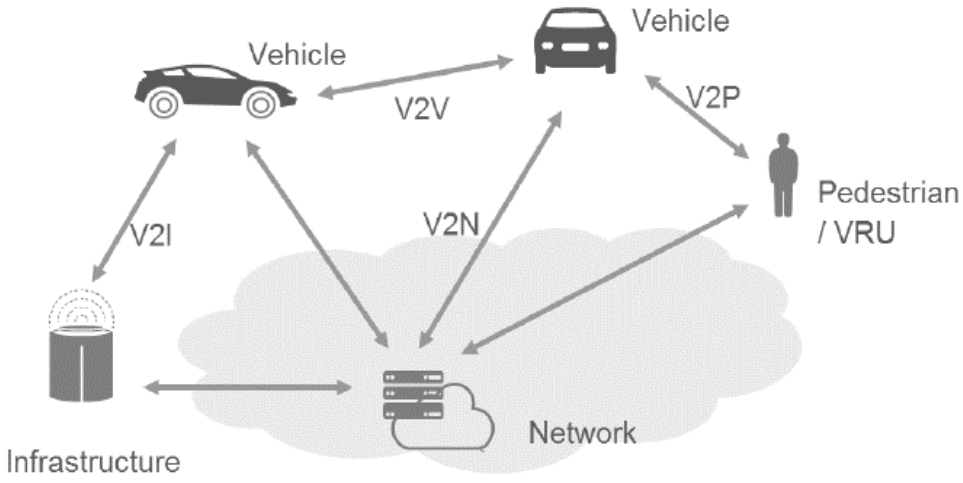

Figure 1. – Illustration of Vehicle-to-Everything (V2X) communications

The significant increase in connectivity and internet consumption is mainly due to the massive increase in time spent on mobile devices. In addition, time spent in the car during commutes has also increased. As a result, consumers expect more digital services outside their cars and

inside. More applications and command interfaces are becoming available on mobile devices. Due to the increased time spent in their car, consumers are willing to complete activities whilst in their cars (Jairaj et al., 2020).

Based on (Jairaj et al., 2020) and (Everis, 2015), the typical features can be divided into the following categories according to their purpose: safety and security, navigation, infotainment, convenience, maintenance, and remote control. The following features are identified in the table below within those categories.

Safety and Security	• Emergency electronic brake • Driver behaviour monitoring • E-call • Stolen vehicle detection • Emergency assistance • Hazard warnings • Failure notifications
Navigation	• Parking management • Smart home/office services • Multimodal route planning
Infotainment	• Music/news/stocks/sports/weather • Video streaming • Gamification/games
Convenience	• Remote diagnostics • EV battery health/charging status and notification • Eco-friendly drive • In-vehicle payment • Parking assistance • Keyless entry
Maintenance	• Predictive maintenance • Insurance telematics
Remote control	• Vehicle locator • Remote vehicle control/monitoring

Table 1. – Examples of connected car features

Drivers have most likely used available connected car features, although they may not recognise them. Consumers have generally shown more interest in features related to the actual driving experience. Specific features such as traffic information and remote services are widely adopted services and, in specific scenarios, can even influence purchase decisions. Since these features are an evolving technology, most existing features still need to be available to drivers. The

availability of these features can also be linked to the price of the vehicle, where premium cars tend to have these features incorporated. More recent features that are considered innovative have a challenging time being adopted, requiring more marketing efforts (NTT Data & Tecknowlogy, 2020).

Research suggests that almost half of European drivers are willing to switch brands to access new or innovative connected car features (Silberg et al., 2023). Younger drivers recognise the more excellent value in connected car features compared to other traditional criteria. New innovative connected car features matter more in their choice of car brand than other criteria, namely engine power (NTT Data & Tecknowlogy, 2020). Other research demonstrates that the level of interest in connected vehicle features is significant, with great interest specifically in maintenance updates, updates regarding traffic and improvement of road safety (Deloitte, 2023).

The main drawbacks expressed regarding the use of connectivity features were related to the need for more usability due to the complexity of using these features, resulting in a bad experience. In addition, there is a notable concern regarding safety concerning data protection and the vehicles being manipulated or hacked. The ownership of these features is also associated with higher additional costs, which most consumers stated they were unwilling to pay for (Jairaj et al., 2020).

The connectivity experience of drivers and passengers is progressively evolving, with significant potential for value creation. Despite recent evolution, connectivity is primarily restricted to smartphones and in-car infotainment (Jairaj et al., 2020). Connectivity will be crucial in using car data to generate revenue, optimise costs and improve the overall safety in driving. Connectivity features are becoming more sophisticated, and in turn, consumer expectations will evolve, thus creating the need to deliver high-level experiences (Betoncello et al., 2018). Consumers are ready for a fully connected in-car experience, increasingly enjoying personalised infotainment, driving assistance and technical help (Silberg et al., 2023). Manufacturers must keep innovating and improving their customer services to maximise the potential of connected features fully.

2.3 Brand Loyalty

Building a strong brand has become a top priority for most organisations as it has been shown to result in several financial rewards and benefits to a firm, including greater customer loyalty. Loyalty has long-term strategic importance, thus crucial to investing, protecting and enhancing it. Brand equity is defined by Aaker (1996) as a selection of assets and liabilities that add or subtract from the value delivered from a product or service to a firm or even the firm's customers. It is a set of assets requiring investment management to create and enhance. Generally speaking, brand equity refers to the marketing effects exclusively attributable to the brand (Keller, 1993). The primary asset categories are Brand Awareness, Brand Loyalty, Perceived quality, and Brand associations. The way these assets create value varies. For these assets and liabilities to support Brand Equity, they need to be connected to the name and symbol of the brand.

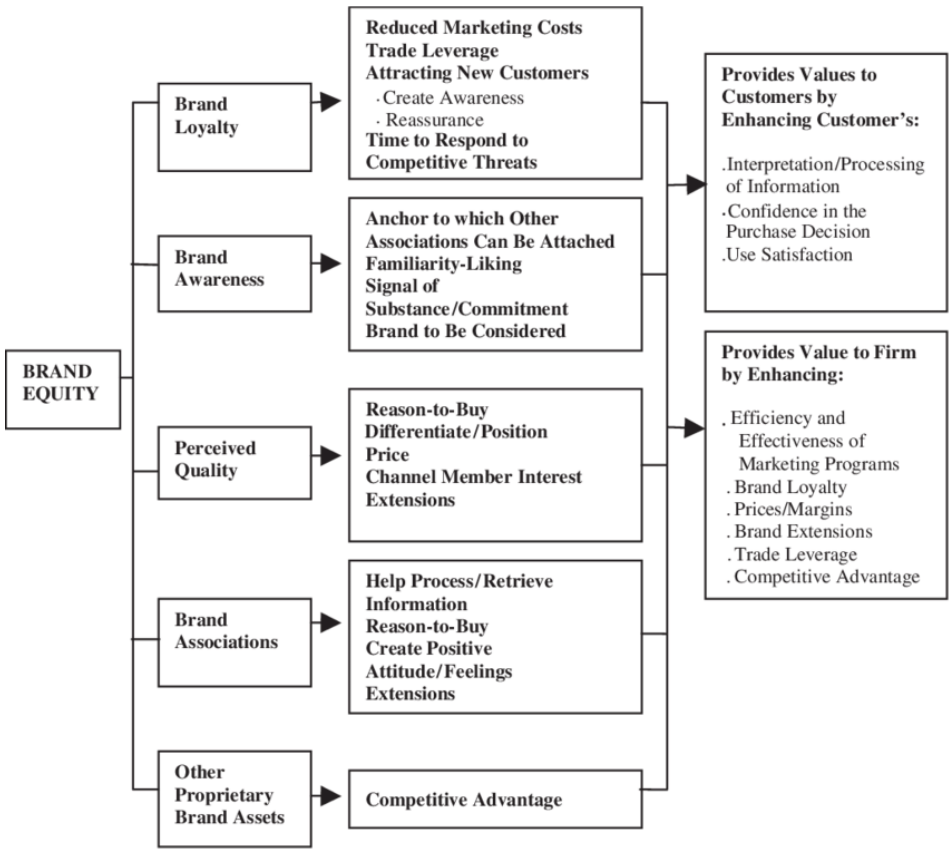

Figure 2. - Brand Equity Model (Source: Building Strong Brands – David A. Aaker 1995)

Brand loyalty is often not included in different concepts of brand equity; however, it is important to include since a brand's value is mainly created by customer loyalty. Recognising brand loyalty as an asset of brand equity helps justify using loyalty programs, which helps enhance brand equity (Aaker, 1996). Besides loyalty programs, brands can also use the

management of their touchpoints, moments in which customers interact with the brand, and ensure that these experiences reinforce loyalty (Aaker, 2010).

There has been a significant amount of attention devoted to the study of brand loyalty, resulting in several different interpretations of the definition of brand loyalty. Jacoby (1971) defines brand loyalty as a purchase decision where several brands are psychologically compared and evaluated on a particular criterion, where the most rewarding brand is ultimately picked. Keller (1993) states that brand loyalty occurs when there are favourable beliefs and attitudes towards a brand, which is then manifested in repeat purchasing behaviour. According to Aaker (2010), loyalty can be based on compelling attributes, an attractive brand personality, or even a set of values with which the individual resonates. Oliver (1999) expressed loyalty as a commitment to persistently repurchase a preferred product or service in the future, resulting in a repetitive repurchasing of the same brand despite situational influence and marketing efforts.

It is vital to distinguish brand loyalty from repeat purchasing behaviour as both may seem similar. Commitment provides a basis to distinguish brand loyalty from other forms of repeat purchasing behaviour (Jacoby, 1971). Brand loyalty is relational, resulting in preferential behaviour towards one brand over other competing brands. It implies a conscious decision with motivations, whereas certain repeat habitual purchase behaviours are due to consumer inertia (Amine, 1998b). Brand loyalty cannot be merely measured or assessed by repeat purchases. True brand loyalty requires the study of consumers' beliefs and intentions when purchasing, specifically throughout the decision-making process (Oliver, 1999).

Enhancing loyalty starts with developing the relationship between customers and the brand. A highly loyal customer can be expected to generate a predictive amount of sales and profit streams. As a result, brands that do not have a loyal customer base are usually considered vulnerable (Aaker, 1996). Indirect sources of true brand loyalty may stem from high involvement in the product category and the customers' satisfaction with the brand from previous consumption or use. Customer involvement is often presented as a predecessor of loyalty. Involvement is defined as the perceived importance of a product and the personal relevance that it may have. It has been noted that a high involvement in a product category may lead to an increase in customer loyalty. Both repeat purchases and brand loyalty can result from customer satisfaction. As such, it is impossible to exclusively associate loyalty with satisfaction as it can occur in both instances. However, dissatisfaction is a sufficient motivator to impede consumers' consistent purchasing behaviour, indirectly impacting brand loyalty. Other potential

sources of brand loyalty include perceived differences about alternatives, perceived risk, brand sensitivity and brand attachment (Amine, 1998b).

The main consequences of brand loyalty are the consumers' positive word of mouth or brand support (Amine, 1998b). When entering new markets, the loyalty of existing customers also signifies an entry barrier due to the cost of switching loyalties being expensive. Consumers' confidence in a brand gives them an inclination for their habitual purchase of the brand and resistance to eventual brand switching. Positive word of mouth and brand support may induce new customers to try the brand. A loyal consumer may vigorously defend a particular brand and motivate their relatives to purchase it. Committed consumers provide stability for a brand in times of crisis by defending the brand in adverse situations. In addition, brand loyalty significantly impacts the overall marketing costs, as it is much less costly to retain current customers than to gain and attract new customers. As a result, it is a common, expensive mistake for brands to seek growth through new customers instead of focusing their efforts on existing customers (Aaker, 1996).

Regarding the automotive industry, a study has shown the importance of loyalty and, more importantly, how it can positively impact a brand's market share. Brands achieve loyalty through satisfaction, that is, with their overall performance and their positive image perceptions (Cetin et al., 2016). In addition, product innovation also has a positive impact on all elements of brand equity, more specifically on brand loyalty. Constant product innovation is essential concerning product attributes, appearance, performance, and technological features. Product innovation has a significant role in building a brand's equity (Hanaysha, 2016).

2.4 Customer Satisfaction

Companies often make the mistake of focusing more on their market share than on their customers' satisfaction. If customer satisfaction deteriorates, market share will soon follow the same path. As such, companies need to monitor and improve their level of customer satisfaction since it leads to higher retention and overall better performance (Kotler, 2003b).

Based on Kotler, Armstrong, and Opresnik (2017), customer satisfaction is the extent to which a product's perceived performance matches a buyer's expectations. It is the outcome of a purchase, resulting from the buyer's comparison between the rewards and costs compared to the predicted consequences (Churchill & Surprenant, 1982). Satisfaction can be defined as

someone's feelings of pleasure or disappointment that stem from the relation between the perceived performance of a product or service and expectations (Kotler & Keller, 2021). These expectations can result from previous purchase experiences, advice from friends, public information, and information and promises made by marketers and competitors. Thus, companies must set reasonable expectations not to exceed customers' expectations, resulting in disappointment. Oliver (1999) defined it as pleasurable fulfilment. When a consumer realises that consumption fulfils a need, desire, or goal, this fulfilment is pleasurable.

According to Aaker (1996), customer satisfaction can be viewed as a robust measure of loyalty. Most research suggests that higher customer satisfaction results in greater customer loyalty (Kotler et al., 2017). However, for satisfaction to impact loyalty, there needs to be frequent or cumulative satisfaction Oliver (1999).

Customer satisfaction is relatively high in the automobile industry due to high competition and the need for high-quality alternatives. Customers unsatisfied with their purchase will explore more alternatives to satisfy their problems or needs better. In contrast, a customer who is satisfied with their purchase does not feel the need to solve a problem and, thus, does not need to explore other alternatives. There is a point where customers categorically reduce the number of brands in their evoked set of preferred brands due to an evaluation of costs and benefits. Although customers may purchase vehicles less often when compared to other non-durable goods, customers do use them regularly. The decision-making process when purchasing a vehicle tends to be more extensive and expensive due to its infrequent nature. Automobile satisfaction then leads to a more minor consideration set, reducing the possibility of brand-switching behaviours. Research shows a positive effect of satisfaction on loyalty, more significantly when consumers are delighted. Even though customers may be moderately satisfied, they may consider other alternatives offering higher satisfaction. In the automobile industry, product quality is a central determinant of customer satisfaction with their vehicles. The main criteria that can used to evaluate the functional and technical quality of the vehicle are driving comfort, performance, practicality, artistry, and reparability (Herrmann et al., 1997).

3. Research Question

The literature review provides a necessary background for a more detailed analysis of connectivity in the automotive industry and, more concretely, its eventual impact on different elements of brand equity, such as customer satisfaction and brand loyalty. As a result, the objective of this dissertation will focus on exploring the following research question:

Research Question: *Are connected car features relevant for customer satisfaction and brand loyalty?*

3.1 Main Research Hypothesis

Centred on the literature review, it was suggested that younger generations are more inclined and have shown more interest in connected car features. Moreover, it was also recognised that younger generations value connected car features more than other traditional criteria for their brand choice. Therefore, the first hypothesis is:

H1: *Younger generations are more likely to be interested in switching to a brand with the latest connectivity features*

Focusing on consumer behaviour in the automotive industry, consumers are becoming more demanding regarding their in-car experience. Consumer expectations evolve as connected car technology develops, creating the need for high-level experiences. In addition, consumers want a more interactive, fully connected car experience. Hence, there is a possible link between how consumers perceive their driver experience with connectivity features and their eventual satisfaction with the brand due to connectivity features. Therefore, consumers need to relate connected car features with enhanced driver experience, which will, in turn, positively impact how they perceive them and contribute towards their satisfaction with a brand. So, the second hypothesis is:

H2: *There is a positive relationship between consumers' perceptions of connected car features enhancing the driver experience and connected features contributing to their satisfaction with a brand*

As previously mentioned**,** consumers are giving more importance to criteria such as connected car features when deciding between brands to purchase. Hence, consumers' importance to connectivity features will drive their preference when selecting a brand to acquire, specifically, their preference for a brand with connected features versus a brand without.

H3: *What drives consumers' preference for brands with connected car features is the importance given to these features*

As previously stated, there is a significant association between previous customer experience and brand loyalty, in which positive customer satisfaction may lead to repeat purchase behaviours. As a result, given the possible importance of customer satisfaction on brand loyalty, the last hypothesis is intended to study the possible relationship between consumer satisfaction with their experience with the connected car features present in their cars and then the likelihood that they will consider the same car brand when purchasing a new car.

H4: *There is a positive relationship between consumers' being satisfied with the connectivity features in their car and the likelihood that they will consider their current brand when purchasing a new car*

4. Data and Methodology

This chapter describes the methodology adopted to address the research question and the data analysis methods. The aim is to investigate whether connected car features are relevant to brands in the automotive industry as potential factors that contribute to customer satisfaction and, as a result, to brand loyalty.

4.1 Research Design

Both qualitative and quantitative research was conducted to investigate this topic. Doing so allows the data collection to occur sequentially to grasp the research question better. Utilising different types of research provides a better understanding of the research problem (Creswell, 2003). In addition, qualitative research can identify variables that should be included in quantitative research behaviour (Nunan et al., 2020). Thus, two studies were designed using qualitative and quantitative research to obtain the necessary information to address the research question adequately.

4.1.1 Qualitative Research

Qualitative research involves an exploratory design using a smaller sample to provide deeper insights and understanding. This type of research can be applied flexibly, enabling participants to express their thoughts whilst observing their behaviour (Nunan et al., 2020).

The first study conducted was in-depth interviews online, using Zoom, and in person. The use of in-depth interviews as a study was deemed appropriate as it allowed for uncovering underlying motivations and attitudes on a specific topic (Nunan et al., 2020). In-depth-interviews were chosen instead of focus groups because the number of participants needed for a focus group would be superior. Due to the difficulty of finding individuals to participate in the study because of possible hesitation, conducting in-depth interviews was considered. The interview was divided into three sections, starting with the general motivations and habits for purchasing a car, then attitudes towards the product, service, and innovation, and lastly, the attitudes and perceptions towards connectivity features. The interview was composed of 11 questions in total (Appendix 1).

This study aimed to explore the motivations, habits, and attitudes behind purchasing a vehicle and then focus on more specific questions associated with the product, service, and innovation. In addition, the goal was to comprehend what kind of role in-car connectivity features have in the purchase process of a vehicle, how these are eventually perceived, and the degree of familiarity within the different age groups. As previously mentioned, connected car features are evolving and becoming more complex, so most people still need to be fully aware of the extent of these features. Thus, it is essential to understand what kind of knowledge different age groups have and what kind of importance they associate with these features.

4.1.2 Quantitative Research

Quantitative research consists of using formal standard questions and predetermined response options in questionnaires to a large number of respondents. This type of research is conducted to follow up on the insights collected during the qualitative research (Hair et al., 2016). Doing so allows for the eventual tabulation and comparison of responses among the study participants (Kolb, 2008).

In the second study, an online survey was conducted to explore further the insights collected during the first study. Compared to other methods, an online survey was chosen due to the low costs associated with its implementation and the functional capabilities of website technologies, allowing for time-efficient data collection (Hair et al., 2016).

The survey comprised three sections with 15 questions, starting with the motivations and habits towards purchasing a car, then the general perceptions of connectivity features, and lastly, demographics (Appendix 2). The questions were primarily statements, using a 5-point Likert scale regarding importance, agreement, or familiarity. The first section of the survey emphasises previous questions made in the quantitative research, which are the critical attributes when thinking about a car. Regarding the section focusing on the perceptions of connectivity features, the questions are focused on understanding the level of importance associated with the connectivity features, either in terms of their application or the features themselves. In addition to the level of importance, the questions also centre on the attitudes towards connectivity features, specifically the eventual impact that it may have on the driver experience, consumer satisfaction, and brand switching. Lastly, the final section of the survey closes with questions concerning the participants' demographics.

After the survey's design, it was made available on Qualtrics, an online survey software. The platform was chosen due to its previous familiarity, accessibility, and affordability.

4.2 Data Collection

Qualitative and quantitative research were produced to analyse the possible relevance of connected car features. This dissertation's primary data sources are in-depth interviews and an online survey. Primary data originates from the researcher to properly address the research question (Nunan et al., 2020). In addition to primary data, secondary data was also collected previously to the collection of primary data. Academic literature, industry reports, and other sources were analysed, resulting in the collection of insights that helped formulate and structure the primary data collection.

4.2.1 Qualitative Research

In-depth interviews were conducted with four different age groups to better understand consumer's motivations and attitudes when purchasing a new car.

The target group for the research was composed of four clusters. The clusters were defined according to demographic segmentation, more specifically, age. The clusters are comprised of the following age groups: 18-24 years old, 25-34 years old, 35-44 years old and 45 and over. Each cluster has five participants, resulting in 20 participants in total. Regarding the participant's gender, it was important for each cluster to be balanced and not predominately one gender. All the participants who participated in the study live in Portugal and reside in the Lisbon area.

4.2.2. Quantitative Research

An online survey was formulated to quantify and better understand the insights produced by the in-depth interviews.

The survey was anonymous and had no restrictions on participation. The participants of the survey were recruited through various social media platforms. The survey was accessible on Qualtrics for 14 days, from the 28th of October, 2023, to the 11th of November, 2023.

After the survey was closed on Qualtrics, 233 answers were collected. The data was then imported into the statistics software IBM SPSS, the statistical tool designated to analyse the data. It was necessary to clean the data to guarantee accuracy, as some respondents did not fully answer the survey. As a result, the sample size was composed of 228 participants, given that

the survey was accessible to all, with no restrictions allowing for the possibility of collecting a higher number of answers.

The sample is primarily female, 80.7%, 18.4% male, and 0.9% preferred not to answer. On average, the participants are primarily between 35 years old and over, with a full-time job and a monthly income between 1,500 to 2,000€ (Appendix 3).

5. Results and Analysis

This chapter focuses on the results and the analysis of the data collected from the qualitative and quantitative research. In addition to the analysis of the research, different hypothesis tests were conducted.

5.1 Qualitative Research

As mentioned in Chapter 4, in-depth interviews were conducted with four different age groups to better understand consumers' motivations and attitudes when purchasing a vehicle. The clusters were determined by age; as such, the compositions were 18-24 years old, 25-34 years old, 35-44 years old, and 45 and over. In total, there were five participants for each cluster. The insights were recorded and summarised in a table according to each cluster (Appendix 4).

Regarding the 18 – 24-year-old group, the main takeaway was their price sensitivity and lack of information and knowledge when purchasing a vehicle. The leading factor to consider when acquiring a vehicle is price due to having a low budget. In addition, other attributes mentioned were product and technology features, such as GPS and an entertainment system for music. Several brands are considered based on personal experience and research. Participants showed no sense of loyalty to a particular brand, showing more willingness to try different brands according to their specific needs. It was expressed that having a vehicle provides flexibility and comfort, especially compared to public transportation. The product attributes mentioned by all participants as being most relevant were design and comfort. When asked how important it was to have the latest technology and connectivity options, the participants voiced it was somewhat significant since using connectivity features improves the overall driver experience. However, it was unnecessary compared to other attributes, as it was associated with higher prices. Concerning the role of connectivity features in the decision process, participants voiced that it did not have such a significant role, as there were more important factors to consider, such as price and car consumption. The essential connectivity features are those related to mobility management.

For the 25–34-year-old group, price and the best value for money were the main attributes to ponder when purchasing a vehicle. Various brands would be considered in the purchase process of a vehicle, including the current brand, as a consequence of experience and satisfaction. The ownership of a car allows for a better balance between work and personal life, being that it provides convenience and comfort. The main relevant attribute of a vehicle is safety with design

and comfort. Possessing the latest technology and connectivity features is somewhat important, as some features such as GPS and parking sensors are necessary. Participants recognised that connectivity features improve overall safety when driving. Throughout the purchase process, connectivity features play somewhat of a role due to their contribution towards the driver experience in terms of safety and comfort. Although it is ultimately not seen as a necessity for most participants. The most relevant features were related to safety and driver assistance, where brands associated with these were seen as innovative but with higher prices.

Concerning the 35-44-year-old group, the main attributes to consider when purchasing a vehicle are price, quality, design, and brand reputation. The current brand would be considered in the purchase process due to previous experience. However, there is a willingness to look for a better deal even if that is not the current brand. The main relevant attributes of a vehicle are comfort and fuel efficiency. There is a particular importance in having the latest technology, as it is associated with improving safety. Therefore, connectivity features have somewhat of a role in the purchase decision as they contribute to safety and comfort. Brands associated with connectivity features are technologically advanced and have a good reputation.

Lastly, the 45-year-old and over group considers brand reputation and value for money when purchasing a vehicle. As for the purchase process, a few brands would be considered, including the current brand, due to reliability and good experience. The main relevant characteristic of a vehicle is design. The latest technology and connectivity features are moderately valued due to their contribution to practicality and safety. However, connectivity features do not have a crucial role in the purchase decision, as there are more high-priority factors to consider. Connectivity features related to driver assistance are seen as being essential. Brands that are associated with these features are those that are known for being reliable and have good design and value.

In general, no significant value or importance was associated with using connectivity features in vehicles. When asked which brands are linked with connectivity features, several participants stated there was no particular brand since it is present in all brands. Subsequently, there is a possibility that certain connectivity features that are expected to be present in a vehicle can be viewed as vulgar features. As such, it is valuable to try and understand the impact of the non-inclusion of these features on the brand and which of these features are possibly viewed as being non-essential. Given that connectivity features are a recently evolving technology, there is also the possibility that participants are not fully aware of the extent of these features, as they are not present in all vehicle models and/or are not yet fully available. Additionally, to the questions in the interview guide, a few participants were also asked what features they would

like to have in their current vehicles that they do not already have. Most answers were related to parking assistance, safety assistance, and infotainment. Concerning any eventual apps they would enjoy having in their car, all participants mentioned WhatsApp and Spotify. Younger participants voiced interest in having YouTube present and other video streaming options.
In contrast, older participants considered apps like Twitter, Email, Reminders, Waze, Home banking and Sports live score updates. In this case, the use of Spotify and Waze is already somewhat common but requires the user to have their phone and a cable to connect to the car. Therefore, it is helpful to understand consumers' current knowledge of connectivity features and the eventual importance associated with these features. Thus, it can be that participants did not identify connectivity features as being important in the purchase process due to their lack of familiarity and knowledge of the subject matter.

5.2 Quantitative Research

5.2.1 Descriptive Statistics

An online survey was formulated in order to investigate the research question further. The survey's sample size was 233; however, to guarantee the accuracy of the data, it was necessary to clean the data. Consequently, the sample size was reduced to 228 participants (Appendix 5). The main features considered necessary when thinking about a car were safety, comfort, and meeting customer needs. Interpreting the perceptions of connected car features through the level of agreement in the given statements, it was expressed that participants believe that all brands should have connectivity features in their cars. In addition, it was also expressed that connectivity features contribute towards customer satisfaction with the brand. Participants also showed a degree of brand loyalty, as they would most likely consider their current brand when purchasing a new car. Concerning the importance of connectivity features in their car, it was conveyed that it was overall somewhat important. Participants were generally familiar with the topic of connectivity features, having most likely already used these features in a car before.
As for the more critical applications of connectivity features, safety and navigation were the most important. This can be explained by those categories being the most used. In contrast, consumers may not be as familiar with the other applications, so do not associate great importance with them. Specific features that are considered necessary are emergency assistance, emergency electronic brakes, failure notifications, hazard warnings, and stolen vehicle detection. Features which were not considered necessary were video streaming and

gaming. Focusing on the driving experience with connectivity features, it was said to become more convenient, easier, and safer. The main potential drawbacks of adopting these features were cyber security, added costs, and usability. The overall response was neutral for eventual interest in switching to a brand with the latest connectivity features, with no significant disinterest or interest.

5.2.2 Hypothesis Testing

In order to conduct the necessary hypothesis testing, a 5%-significance level (95% confidence interval) was considered for the analysis.

Hypothesis 1

Given that younger generations have shown significant interest in technology, impacting their brand choice, the hypothesis that younger generations are more likely to be interested in switching to a brand with the latest connectivity features has been stated.

The null hypothesis is that age does not influence the interest in switching to a brand with the latest connectivity features, meaning there is no association between age and interest in switching brands.

H0: Interest in switching brands is independent of age

Ha: Interest in switching brands is related to age

To test the following hypothesis, a crosstabulation table was computed to understand how the two variables are related (Kolb, 2008). Based on the data collected from the survey (Appendix 5, Table 1: Cross Tabs), it can be noted that within the age group 18- 24 years old, 39.5% are interested, and 7,0% are interested in switching brands. For the 25 – 34-year-old age group, 31,4% are interested, and 17,1% are interested in switching.

The Chi-square test is used to determine whether there is a statistically valid relationship between the two variables (Kolb, 2008). Considering that the p-value of the Chi-Square test is 0,275 ($X2(20)> = 23,287$, $p = 0,275$), we are not able to reject the null hypothesis since the significance is more significant than $\alpha = 0,05$ (Appendix 5, Table 2: Chi-Square Tests) As such, the hypothesis that younger generations are more likely to be interested in switching to a brand with the latest connectivity features is not supported, there is no relationship between the interest in switching to a brand with the latest connectivity features and age. Therefore, we can

also conclude that the age of the potential consumer does not potentially influence the likelihood of switching to a brand with the latest connectivity features.

Hypothesis 2

Considering the growing relevance of driver experience for consumers, the hypothesis that there is a positive relationship between consumers' perceptions of connected car features enhancing the driver experience and connected features contributing to their satisfaction with a brand was stated.

The null hypothesis is that there is no association between the two variables, meaning the correlation coefficient equals 0.

H0: $p = 0$

Ha: $p \neq 0$

In order to measure the strength of a linear relationship between these two variables (Hair et al., 2016), a correlation using the Pearson r statistic between the two variables was conducted (Appendix 6, Table 3: Correlations).

Analysing the data from the table, we can see that the Pearson correlation coefficient (r) for the two variables is 0,710, which is statistically significant ($p < 0{,}01$ for a one-tailed test). As such, it is possible to reject the null hypothesis that there is no significant correlation between the two variables. The Pearson correlation coefficient (r) measures the degree of linear association between two variables and varies from -1 to 1 (Hair et al., 2016). Since the correlation coefficient (r) for the two variables is 0,710, we can assume a strong positive correlation between the two variables.

Hypothesis 3

A linear regression model was simulated to understand what drives consumers to prefer a brand with connectivity features versus a brand without them. In this case, the dependent variable is the preference for brands with connectivity features, and the independent variables considered are the importance, familiarity, and previous satisfaction with connectivity features.

The null hypothesis is that any changes in the independent variables have no significant effect on the dependent variable.

H0: = 0

Ha: ≠ 0

Being that a simple linear regression model can be defined as the following equation:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Where Y= dependent variable, X is the independent variable, β_0 is the intercept of the line, and β_1 is the slope (Nunan et al., 2020b).

The R- Square percentage shows the percentage of variation in one variable (the dependent variable) that is explained by another variable (the independent variable) (Hair et al., 2016). Observing the Model Summary table (Appendix 6, Table 4: Model Summary), we can observe that the value 0,495 tells us that our independent variables can explain 49,5% of the variance in our dependent variable.

Now, analysing the ANOVA table (Appendix 6, Table 5: ANOVA), the F-ratio indicates the statistical significance of the regression model (Hair et al., 2016). The null hypothesis is that there is no relationship between the two variables. In this case, $p < 0{,}01$, which is less than the level of significance ($\alpha = 0{,}05$), meaning that we can reject the null hypothesis, and so the regression model is statistically significant.

The coefficients table (Appendix 6, Table 6: Coefficients) indicates whether the variables contribute statistically significantly to the model. Analysing the strength of each variable in the model, we can see that the level of importance ($\beta = 0{,}657$) has a more significant impact on the model compared to the other two variables. In addition, we can observe that there is a negative correlation between the experienced level of satisfaction and the preference for brands with connected car features ($\beta = -0{,}038$), meaning that the level of satisfaction has a negative impact on whether the consumer will prefer a brand with connected car features. Observing the column Unstandardised coefficients, we can write the following regression equation:

$$Y = 0{,}731 + 0{,}699\,(level\ of\ importance) + 0{,}098\,(level\ of\ familiarity) - 0{,}042\,(previous\ experience)$$

Understanding the intercorrelations among the independent variables is essential for analysing the multicollinearity (Nunan et al., 2020b). Examining the coefficients table (Appendix 6, Table 6: Coefficients), we can see that the Tolerance > 0,40 and the VIF < 2,5 for all the variables. Now, looking at the collinearity diagnostics table (Appendix 6, Table 7: Collinearity Diagnostics), we can also observe that the Condition index (CI) > 0,5 for all the variables. Given these results, we can deduce that no collinearity is present among our independent variables.

Hypothesis 4

Considering the growing importance of customer satisfaction and brand loyalty in the automotive industry, the hypothesis states that there is a positive relationship between consumers being satisfied with the connectivity features in their cars and the likelihood of them considering their current brand when purchasing a car.

The null hypothesis is that there is no association between the two variables, meaning the correlation coefficient equals 0.

H0: $p = 0$

Ha: $p \neq 0$

In order to measure the strength of a linear relationship between these two variables (Hair et al., 2016), a correlation using the Pearson r statistic between the two variables was conducted (Appendix 6, Table 8: Correlations).

When analysing the data from the table, we can see that the Pearson correlation coefficient (r) for the two variables is 0,164, which is statistically significant given that $p = 0{,}006$ ($p < 0{,}01$ for a one-tailed test). As such, it is possible to reject the null hypothesis that there is no significant correlation between the two variables. The Pearson correlation coefficient (r) can measure the degree of linear association between two variables and varies from -1 to 1 (Hair et al., 2016). Since the correlation coefficient (r) for the two variables is 0,164, we can assume that there is a positive, although weak, relationship between the two variables.

6. Conclusions

In this final chapter, the main conclusions from the research conducted, as well as the limitations, will be discussed. In addition to this, future research will also be mentioned and suggested.

6.1 Main Conclusions

This dissertation analyses the relevance of connected car features to customer satisfaction and brand loyalty. Given the number of participants in the quantitative research and qualitative research, it is not possible to make significant conclusions.

Throughout the research, no significant importance was associated with connected car features, which the lack of familiarity and knowledge can explain. In addition, the features which were considered to be important were mainly associated with improving the driver experience in terms of safety, as safety was considered to be an essential feature when buying a car. It can be explained by previous familiarity and satisfaction with these features, as safety and navigation are the most commonly used applications. Other applications were possibly not considered as necessary due to the lack of experience and use of these.

There was also significant brand loyalty regarding their current car brand. No significant interest was expressed in switching to a brand with the latest connectivity features. More concretely, it was impossible to accept H1 (*Younger generations are more likely to be interested in switching to a brand with the latest connectivity features)* in which younger generations would be more willing to switch to a brand with the latest connectivity features. Regarding H2 (*There is a positive relationship between consumers' perceptions of connected car features enhancing the driver experience and connected features contributing to their satisfaction with a brand)*, it was possible to verify a solid positive relationship between the perception of connectivity features enhancing driver experience and connectivity features contributing to customer satisfaction with the brand. For H3 (*What drives consumers' preference for brands with connected car features is the importance given to these features),* the main significant driver towards the preference for a brand with the latest connectivity features was the level of importance given to these features. It was also possible to identify that the current experience with connectivity features has a negative relationship with the preference for a brand with the latest features; however, it was less significant than the level of importance. Lastly, for H4

(*There is a positive relationship between consumers' being satisfied with the connectivity features in their car and the likelihood that they will consider their current brand when purchasing a new car)*

it was also possible to verify a positive relationship between the level of satisfaction with connectivity features in their current car and their likelihood of considering their current car brand in the next purchase.

In general, there was no notable importance associated with connected car features. However, there was a considerable association between consumers' perceptions of connectivity features enhancing driver experience and their contribution towards customer satisfaction. In addition, the possible role of satisfaction with connected car features when considering a brand to purchase was also made apparent. Consumers' perceptions of the importance of connectivity features are essential in their preference for a brand with the latest technology. As such, the more importance recognised in these features results in a higher preference for the latest technology. Overall, connected car features have been identified as enhancing the driver experience and impacting customer satisfaction with the brand. However, regarding brand loyalty, there was no association with potential brand switching to experience the latest technology. In addition, based on the previous literature review conducted, customer satisfaction is not a direct source of brand loyalty, as it is hard to distinguish whether it leads to repeat purchase behaviours or actual brand loyalty (Amine, 1998b). Brand loyalty should not be seen merely as repeat purchase behaviours but also as consumers' beliefs, intentions, and attitudes during the decision-making process (Oliver, 1999*).* Therefore, it is possible to say that connected car features are relevant for customer satisfaction, which can lead to possible indirect implications for brand loyalty.

6.2 Limitations and Future Research

The conclusions of this dissertation were made through the analysis of both quantitative and qualitative research. When collecting and analysing the data, several limitations arose due to the research conducted. The number of participants who participated in the in-depth interviews was not substantial, given the difficulty in convincing and motivating people to participate in the study. Additionally, the participants come from similar social and economic backgrounds, thus insinuating a possible lack of diversity.

Regarding the online survey and the number of participants, the sample size is not a statistically significant representation of the population as a whole. As a result, it is not possible to make impactful conclusions. The participants from the survey were primarily female and adults over the age of 45, meaning that the sample itself was not balanced and so was biased. The platform used to create the survey, Qualtrics, was also limited in terms of functionality, as access was only to the standard features. Additionally, it was not considered mobile-friendly, especially in questions with several options, which eventually impacted the number of participants and the sample size of the data.

As previously mentioned in the literature review, it is not possible to associate customer satisfaction directly with brand loyalty, as there is no clear distinction between repeat purchase behaviours and brand loyalty. Customer satisfaction can be viewed as a possible indirect source of brand loyalty. Thus, it can be seen as a possible limitation, as it is unclear whether customer satisfaction leads to brand loyalty or repeat purchase behaviours (Amine, 1998b).

Moreover, as connected car features are evolving, as well as consumer preferences, future research should focus on trying to understand which features specifically are essential to guarantee customer satisfaction with the brand, which can eventually stimulate consumers to switch brands, and which features are possibly considered to be vulgar features that do not add any value. Additionally, focus on understanding the possible impact of new upcoming features.

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8. Appendix

Appendix 1: Interview guide

Introduction

Hello and thank you for participating in this interview. I'm Madalena and I'm going to be conducting this interview today. Please feel free to share your honest opinion on every topic of the discussion, as there are no right or wrong answers. If you have any questions, please do not hesitate to ask them; otherwise, we can start by explaining the subject of today's interview.

Today, we are going to talk about the process of buying a vehicle, as well as possible motivations and factors that are considered important during this course. Later, we will focus more on attributes associated with the product, services, and innovation. Lastly, we will talk about connected car features. If there are no questions, then we shall proceed with the first section of the interview.

General motivations/habits for purchasing a car

1. When you want to buy a car, what are the main motivations and characteristics you take into consideration? (brand reputation, brand loyalty, avoiding risks, price, convenience, value for money, specific rational needs, design, trend, product features, technology, innovation, environment).

2. If you are/were in a position to buy a car, how many brands would you consider? Would you consider your actual car brand? (why?).

3. How does your car fit into your daily lifestyle and routine? (e.g., for what purposes do you use your car?).

4. How would you describe the customer journey when purchasing a new car? (e.g., time-wise, level of information, people involved, touchpoints, ...).

Attitudes on product/services/innovation

5. When you think about the vehicle/product, which attributes are relevant for you? (which characteristics do you consider to be must-haves when deciding which car to purchase?).

6. When you think about the services associated with the vehicles, which attributes are relevant for you?

7. When you think about innovation in the automobile industry, which attributes are relevant for you?

8. How important is it to have the latest technology and connectivity options in a car, and why?

Perceptions of connectivity features

9. What kind of role do connectivity features play when deciding to purchase a car?

10. How would you describe the types of connectivity features that are essential to you? (e.g., mobility, entertainment, safety, driver assistance, vehicle management, ...).

11. Which brands do you think have these characteristics and features, and why?

Closing comments and thank you

That brings us to the end of the interview. Thank you for your participation, and please let me know if you have any questions.

Appendix 2: Online survey

Section 1: Motivations/habits for purchasing cars

1. Rank the following attributes on the level of importance when thinking about a car

	Not very important	Somewhat unimportant	Indifferent	Somewhat important	Very important
Design					
Comfort					
Size					
Quality					
Fuel efficiency					
Connectivity features					
Safety					
Eco-friendly					
Reliable					
Engine					
Innovation					
Brand reputation					
Technical services assistance					

2. Rank the following attributes on the level of importance when thinking about a product/vehicle

	Not very important	Somewhat unimportant	Indifferent	Somewhat important	Very important
Adequate and efficient					
Safe and reliable					
Clear and easy to understand					
Tailor-made/personalised					
Innovative					
Different/Unique					
Value for money					
Meets customer needs					
Adapts quickly to change.					

Section 2: General perceptions of connectivity features

3. Rank the following statements according to the level of agreement or disagreement

	Highly disagree	Disagree	Neutral	Agree	Highly agree
I believe connectivity features enhance the driver experience.					
I associate connectivity features with higher prices.					
If I am satisfied with the connectivity features in my car					
I am more likely to consider my current car brand when purchasing.					
Having connectivity features contributes towards customer satisfaction with the brand.					
I believe that all brands should have connectivity features in their cars.					
I do not understand the importance or benefit of having connectivity features.					
When deciding between two options, I will prefer the brand that has connectivity features in their vehicles.					

4. How important is it to have connectivity features in your car?

Not very important	Somewhat unimportant	Indifferent	Somewhat important	Very Important

5. How familiar are you with connectivity features in cars?

Unfamiliar	Somewhat unfamiliar	Neutral	Somewhat familiar	Familiar

6. Have you used a car with connectivity features?
   (__) Yes
   (__) No
   (__) I do not think so
   (__) I have no idea

7. Rank the following applications of connectivity features according to level of importance

	Not very important	Somewhat unimportant	Indifferent	Somewhat important	Very Important
Safety and Security					
Navigation					
Infotainment					
Convenience					
Maintenance					
Remote control					

8. Rank the following vehicle features according to level of importance

	Not very important	Somewhat unimportant	Indifferent	Somewhat important	Very Important
Emergency electronic brake					
Driver behaviour monitoring					
E-call					
Stolen vehicle detection					
Emergency assistance					
Hazard warnings					
Failure notifications					
Parking management					
Smart home/office services					
Multimodal route planning					
Music/news/stocks/sports/weather					
Video streaming					
Games					
Remote diagnostics					
EV battery health/charging status and notifications					
Eco-friendly drive					
In-vehicle payment					
Keyless entry					
Predictive maintenance					
Insurance telematics					
Vehicle Locator					
Remote vehicle control/monitoring					

9. Rank the following statements according to the level of agreement or disagreement

	Highly disagree	Disagree	Neutral	Agree	Highly agree
Driving becomes safer with connectivity features.					
The driving experience becomes more convenient with connectivity features.					
Driving becomes easier with connectivity features.					
Driving becomes more unsafe with connectivity features (there are more distractions)					
Driving becomes more fun with connectivity features.					

10. Rank the following attributes according to the level of impact on the adoption of connectivity features

	Very Low	Low	Neutral	High	Very High
Added costs					
Privacy concerns					
Cyber security					
Features don't add value.					
Usability					

11. How interested are you in switching to a brand which has the latest connectivity features?

Very uninterested	Uninterested	Neutral	Interested	Very interested

Section 3: Demographics

12. What is your gender?
    (__) Female
    (__) Male
    (__) Non-binary/ third gender
    (__) Prefer not to say

13. How old are you?
    (__) Under 18 years old
    (__) 18 – 24 years old
    (__) 25 – 34 years old
    (__) 35 – 44 years old
    (__) 45 years old and over
    (__) Prefer not to say

14. What is your current professional situation?
    (__) A student without a job
    (__) A student with a job
    (__) Full-time job
    (__) Part-time job
    (__) Unemployed
    (__) Retired

15. What is your monthly income? (If you are a student without a job, please select the amount of money that you have available each month.)
    (__) < 500 €
    (__) 501 € - 1,000 €
    (__) 1,001 € - 1,500 €
    (__) 1,501 € - 2,000 €
    (__) 2,001 € - 2,500 €
    (__) > 2,501 €
    (__) Prefer not to sa

Appendix 3: Survey demographics

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	42	18.4	18.4	18.4
	Female	184	80.7	80.7	99.1
	Prefer not to say	2	0.9	0.9	100.0
	Total	228	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 18 years old	7	3.1	3.1	3.1
	18 - 24 years old	43	18.9	18.9	21.9
	25 - 34 years old	35	15.4	15.4	37.3
	35 - 44 years old	66	28.9	28.9	66.2
	45 years old and over	75	32.9	32.9	99.1
	Prefer not to say	2	0.9	0.9	100.0
	Total	228	100.0	100.0	

Professional situation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A student without a job	35	15.4	15.4	15.4
	A student with a job	12	5.3	5.3	20.6
	Full-time job	163	71.5	71.5	92.1
	Part-time job	7	3.1	3.1	95.2
	Unemployed	8	3.5	3.5	98.7
	Retired	3	1.3	1.3	100.0
	Total	228	100.0	100.0	

Monthly income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 500 €	28	12.3	12.3	12.3
	501 € - 1,000 €	26	11.4	11.4	23.7
	1,001 € - 1,500 €	39	17.1	17.1	40.8
	1,501 € - 2,000 €	53	23.2	23.2	64.0
	2,001 € - 2,500 €	19	8.3	8.3	72.4
	> 2,501 €	43	18.9	18.9	91.2
	Prefer not to say	20	8.8	8.8	100.0
	Total	228	100.0	100.0	

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
What is your gender?	228	1	4	1.83	0.439
How old are you?	228	1	6	3.72	1.216
What is your current professional situation?	228	1	6	2.78	0.955
What is your monthly income?	228	1	7	3.96	1.836
Valid N (listwise)	228				

Appendix 4: Table summary of in-depth interviews

	QUESTIONS										
AGE GROUPS	Q1.	Q2.	Q3.	Q4.	Q5.	Q6.	Q7.	Q8.	Q9.	Q10.	Q11.
18 - 24 YO	price, design, overall quality, technology, product features	multiple brands, brand reputation is quite important	usually use public transportation, but provides flexibility and convenience especially for longer trips and in occassions where there is no public transportation	very time consuming, overall long process, extensive research and information retrieval, opinions from family and friends, visit to the dealerships	good design, comfort, size, quality	convenience, easy access and options	fuel effiency (car consumption), safety, electric cars (fully and hybrids)	somewhat important, contributes to comfort and makes life easier	not a big role	entertainment, safety, mobility	a few brands - Tesla, Audi, BMW and Mercedes
	decently priced car, cheaper side depending on income, would want a japanese brands because of past experience and considering them to be most reliable	would consider a few brands, mostly japanese and german brands due to perceptions of higher quality and personal experience	travel to work or shopping, possibly for longer trips	overall the process can be seen as being exhausting and stressful, involves a high level of information and different methods both online and offline to compare different car models, extensive research involved	car consumption, the interior and comfort, good infotainment system (preferably not touch screen but still has a screen for GPS and bluetooth)	their avaliability, how helpful they are, and how convenient	fuel effiency (car consumption), safety, electric cars (fully and hybrids)	somewhat important, contributes to comfort and makes life easier, but not necessarily needed, does not need to be inculded to get from point A to point B	not a big role	GPS (mobility management), entertainment (music), safety and driver assistance	Most brands already have them in current cars (association to higher costs with having these features)
	price /quality ratio, low budget income would look for the best characteristics within the budget	consider several brands, try to see which brands provide the best quality for a lower price, do an extensive comparison research	heavily rely on it to go from work to home, without the hassle of public transportation	gathering information, online or contacting experts, asking people for opinions, seeing and testing the car	car consumption, number of seats and doors for comfortable driving, features such as GPS, car play and parking assistant	the avaliability of the services, how fast and how will they solve a problem	technological innovations that help with driving safety and comfort, such as carplay	not very important, used to having cars that don't have the latest technology, associate features with higher prices	not a big role - thinks price and car consumption are more important, but when considering two brands it could be a factor to consider	GPS or anykind of GPS display - mobility management	VW for having a good price/quality ratio, being a safe car that has several features
	brand reputation, price (tighter budget), convenience, value for money, design, product features and technology, eco-friendly options	a few brands, not very brand loyal, depends on needs and lifestyle, choose according to features, design and tech offerings	provides flexibility and freedom, integral part of active lifestyle, for commuting or running errands	online research, social media, discussion with family and friends, takes some time, see online reviews, visit dealerships	design, technology, innovative features	convenience, easy access and options	electric vehicles, autonomous driving, smart connectivity features	important - enhances overall driving expereince	big role - improves driving experience, easier and more enjoyable	entertainment, safety, mobility	a few brands - tesla, audi, BMW and Mercedes, known for their technology and innovative features

	QUESTIONS										
AGE GROUPS	Q1.	Q2.	Q3.	Q4.	Q5.	Q6.	Q7.	Q8.	Q9.	Q10.	Q11.
25 - 34 YO	price, best value for price, manual or automatic, carplay, parking sensors, not electric, overall needs to be comfortable and safe	wouldn't consider that many brands, accessible brands, brands that are familiar or have used previously	to get to places, far away places, to avoid possibly losing time and public transportation, it is more convenient	long process, limited information would resort to a family member for help, use internet and websites to see current models and design the car, would see in person before buying (important to sit inside and see everything)	safe, comfortable to drive, the interior itself is not that important in terms of the design itself, needs to have a good price to value relationship	convenient, helpful, supportive	safe, comfortable and sustainable driving	somewhat important, contributes to the safety and comfort aspect of driving	somewhat of a role - especially regarding the phone mirroring option is seen as a huge need, can't see owing a car without it	types that are most important would be driver assistance and entertainment	more tech savy brands such as Tesla, but also Opel and Citroen due to familiarity of those brands
	price, fuel consumption/efficiency, safety, brand reputation, as well as modern technology and design	all options, unique demands and budget, consider the current brand being used for being reliable, great experience, open mind to consider different brands given circumstances and preferences	dependable transportation, balance obligations, used for transport between home and university as well as personal life, adds to convenience and flexibility to maximize time	initial research, information collection, test drive, negotiation, and financing. It can vary in length, and contain several touchpoints such as online and dealerships, encounters with salespeople, as well as input from family and friends	reliability, safety, fuel efficiency, budget, size and overall space	maintenance, repairs, warranty, roadside assistance, financing options, customer support	sustainability and design, new developments in technology that promote environmentally responsible practices, cutting-ed design that combines both aesthetics with eco-conscious elements	not very important, although it does improve driving experience, characteristics such as safety, reliability and sustainability are more important. Favour these technologies as long as it complements these aspects without increasing the overall price	somewhat of a role - improve safety and operating costs, they play an important role in car purchasing choice, improves overall affordability and safety	safety and driver assistance are considered to be critical, networking solutions for more efficient vehicle management and maintenance, reducing costs	Volvo - is well known for its attention to safety, Hyundai great combination of safety features and vehicle management systems for value for money, Tesla with modern driver assistance systems
	brand, brand reputation, possible risks, price vs. quality as it is seen as a long term investment	Would consider a few brands, such as Mercedes and Volvo, would try and see cheaper options if possible, Opel could be an option	Use it to get around to get to work and home, especially to save time and not use public transportation, overall more convenient and comfortable when compared to public transportation	long process with a lot of information, especially to decide and retrieve as much information as possible, ask for different opinions from friends and family besides the sales person	environmentally friendly, safety, size, overall quality	convenient, maintenance, roadside assitance	sustainability, innovation, design and safety	somewhat important - but not necessary, as it is associated with higher costs. It can however improve the overall driving experience	not a big role - other criteria and factors have a bigger role in comparison	safety and driver assistance, as well as navigation and possibly infotainment in regards to music, more specifically spotify	More tech advanced brands, brands which are usually more expensive (premium brands)
	value for money and convenience, certain product features such as Bluetooth and GPS are essential to have, consider an electric or hybrid car to be more environmentally friendly	consider several brands, not that knowledgeable so there are no preferences nor any idea about which brands are overall considered to be better	Living in the city, don't find the immediate need to have a car, however when travelling outside the city to other parts of the country or when travelling abroad, it can be a necessity. For the current lifestyle, public transport is enough	long process with a lot of information, especially to decide and retrieve as much information as possible, ask for different opinions from friends and family besides the sales person	environmentally friendly, good safety features, good GPS and sound system with Bluetooth	their avaliability, how helpful they are, and how convenient	environmentally friendly, innovations that help with driving and comfort	somewhat important - helpful and useful to have, however needs to be accessible in terms of prices, would rather save money and not have the options	not a big role - other than bluetooth and good safety features	safety and driver assistance, as well as mobility management and entertainment for good sound and bluetooth for music	Most brands already have them in current cars (association to higher costs with having these features)

	QUESTIONS										
AGE GROUPS	Q1.	Q2.	Q3.	Q4.	Q5.	Q6.	Q7.	Q8.	Q9.	Q10.	Q11.
35 - 44 YO	brand reputation, convenience, good price to quality ratio, good design, comfortable interior	would consider a few brands, the brand that they currently own mostly	use it daily, to get to work and run errands, also for longer trips and holidays	long, would go to a car dealership to see what they have and what are current offers, go online and see different websites and offers, consult people eventually for opinions and advice, overall high level of information, important to see the car and test drive	good deal price wise, quality, safety, comfortable interior, easy to drive, low gas consumption, 7 seats to fit more people	super avaliable, helpful, convenient	safe, comfortable driving, car design, less pollution	somewhat important, as it contributes to a safer and more comfortable drive	somewhat of a role - already very used to using these features and couldn't see driving without it	driver assistance, mobility, safety, entertainment	brands that has some familiarity such as Jeep and DS, those currently offer those features and is pretty satisfied
	reliability, safety, price (needs to fit with the budget), fuel consumption, size, design, infotainment systems and safety features, fuel-efficient and eco- friendly	would consider a few brands, maybe 2-3 brands, would consider the current brand as there is experience there, been satisfied and is comfortable sticking with it	integral part of daily life, commuting to work and running daily errands, travelling, crucial for flexibility	quite extensive, involves a lot of research, both online and through conversations with family/friends and experts, test drive is important, visit multiple dealerships, overall lengthy process depends on how fast it is to find the right fit	safety, reliability, fuel efficiency, good infotainment system, driver assistance systems and comfort	convenient, several options, supportive, comprehensive waranty	safety features, fuel efficiency, eco-friendly technologies, electric vehicles and autonomous driving	important - enhance the overall driving experience, improves safety, entertainment and convenience making the more enjoyable	significant role - important for staying connected, entertained and efficient whilst on the road	safety, entertainment, driver assistance and vehicle management	Toyota, Honda, Tesla and Volvo good reputation for incorporating these features in their vehicles
	eco-friendly, price, brand reputation, design, brand loyalty	would consider several brands, looking for the best deal in terms of prices	usually walk or use public transport, would be more for holidays or weekends away	long process, limited information would resort to a family member for help, use internet and websites to see current models and design the car, would see in person before buying (important to sit inside and see everything)	reliable, eco-friendly, innovative, good design, comfortable	super avaliable, helpful, convenient	safety, eco-friendly, fuel efficiency	important - enhance the driving experience, maximizes fuel efficiency, overall more safety on the road	not a big role - not very important	safety, vehicle management, entertainment	more tech savy brands such as Tesla, BMW, Mercedes
	brand reputation, reliability, price and safety	would consider a few brands, probably 2-3, would consider current brand	Use it daily, to get to work, go to the gym, important part of everyday life	long process, extensive research, and resort to family for help, use the internet and dealerships for information, need to see the car in person before purchasing	safety, reliability, fuel efficiency, good infotainment system	available, convenient, insurance, supportive, several options	eco-friendly, technology, comfort and design	somewhat important, as it contributes to a safer, more comfortable and even more affordable drive	somewhat of a role - already use some connectivity features in present car, but unsure if they need more advanced features	safety, entertainment, driver assistance and vehicle management	most brands already have these features in their cars, more tech savvy brands or more expensive brands have newer more innovative features

	QUESTIONS										
AGE GROUPS	Q1.	Q2.	Q3.	Q4.	Q5.	Q6.	Q7.	Q8.	Q9.	Q10.	Q11.
45 and over	brand reputation, value for money, design, but mostly the experience with the brand	consider a few brands, actual car brand, happy with the brand and the car, Peugeot because of a good reputation level of equipment, VW because of the electric and design	fits perfectly in routine, routine doesn't demand a better car	long process, consider several touchpoints both online and offline, would resort to friends or people with more knowledge in the case of doubts or for opinions on the subject	must be practical, economic, using good and renewable materials in the car itself, comfortable and low maintenance	convenient, helpful, supportive	design / aerodynamics, car consumption, noise reduction /isolation, driving secutiry, comfort in general	It is not that important to have the latest technology	does not have a big role	mobility, entertainment, safety, driver assistance (not necessarily all features)	The kind of technology needed is mostly present in most car brands, considered o be basic features nowadays
	brand reputation, brand, price, design/style, sustainability (needs to be hybrid or more)	consider a few brands, all german brands, landrover and jaguar	leisure and company trips, don't use it to go to work	consider some information, personal experience from buying cars previously plays a big role, don't do extensive research, most information from the dealerships and the salespeople	good design, comfort, interior styling, dashboard layout	convenient, helpful, supportive	technology, battery technology, engine technology	very important to have the latest technology	not a big role - not very important	vehicle management, driver assistance, dashboard design/display	All german brands, maserati and aston martin
	practicality, reliability, brand reputation, price, convenience, value for money, product features and technology, safety and efficiency, fuel efficient	a few brands, consider current brand because of reliability and good expereince	essential part of daily routine, commuting to work, running errands, traveling, offers flexibility and convenience	long process, online research and talking to people, visit dealerships for test drives	reliability, safety, fuel efficiency, practicality	easy options, convenience, reliable, reasonable costs	enhance safety and fuel efficiency, hybrid and electric options	important - value technology that enhances practicality and safety	significant role - in terms of safety and convenience	safety, entertainment, vehicle management	brands such as honda and toyota
	price, value for money, technology, design, brand reputation	consider a few brands, 2 to 3 brands, would consider actual car brand because it has high quality and a reasonable price, good value for money	usually walk to work, use car to run errands to the supermarket or shopping, or for travelling and holidays for longer distances	long term high investment, takes time, evaluate several options, finding a trustworthy dealership	reliability, design, secondary market appreciation	easy options, fair price, convenient, accessible	safety, low maintenance low fuel consumtion	not that important	not a big role - but something that is considered in the decision making process and during the purchase	safety, driver assistance, entertainment	VW, BMW, Mercedes, german brands are usually reliable, have a good design, good value

Appendix 5: Descriptive Statistics

Descriptive Statistics

Q1	N	Minimum	Maximum	Mean	Std. Deviation
Design	228	1	5	4.06	0.780
Comfort	228	2	5	4.58	0.554
Size	228	1	5	3.94	0.816
Quality	228	2	5	4.50	0.674
Fuel efficiency	228	1	5	4.40	0.759
Connectivity features	228	1	5	3.74	0.886
Safety	228	3	5	4.81	0.464
Eco- friendly	228	1	5	4.04	0.872
Reliable	228	2	5	4.49	0.660
Engine	228	1	5	4.04	0.798
Innovation	228	1	5	3.58	0.806
Brand reputation	228	1	5	3.55	0.963
Technical services assistance	228	1	5	4.07	0.898
Valid N (listwise)	228				

Q2	N	Minimum	Maximum	Mean	Std. Deviation
Adequate and efficient	228	2	5	4.29	0.680
Safe and reliable	228	2	5	4.64	0.564
Clear and easy to understand	228	1	5	4.11	0.835
Tailor-made / personalized	228	1	5	2.96	0.992
Innovative	228	1	5	3.53	0.836
Different/Unique	228	1	5	2.89	1.062
Value for money	228	2	5	4.39	0.691
Meets customer needs	228	1	5	4.34	0.742
Adapts quickly to change	228	1	5	3.73	0.837
Valid N (listwise)	228				

Q3	N	Minimum	Maximum	Mean	Std. Deviation
I believe connectivity features enhance the driver experience	228	1	5	3.86	0.849
I associate connectivity features with higher prices	228	1	5	3.73	0.950
I am satisfied with the connectivity features in my car	228	1	5	3.62	0.929
I am likely to consider my current car brand when purchasing a new car	228	1	5	3.91	0.876
Having connectivity features contributes towards customer satisfaction with the brand	228	1	5	3.89	0.808
I believe that all brands should have connectivity features in their cars	228	1	5	3.94	0.922
I don't understand the importance or benefit of having connectivity features	228	1	5	2.28	1.160
When deciding between two options, I will prefer the brand that has connectivity features in their cars	228	1	5	3.64	1.025
Valid N (listwise)	228				

Q4	N	Minimum	Maximum	Mean	Std. Deviation
Importance of having connectivity features in your car	228	1	5	3.85	0.964
Valid N (listwise)	228				

Q5	N	Minimum	Maximum	Mean	Std. Deviation
Familiarity with connectivity features	228	1	5	3.79	0.977
Valid N (listwise)	228				

Q6	N	Minimum	Maximum	Mean	Std. Deviation
Have you ever used a car with connectivity features?	228	1	5	4.25	1.030
Valid N (listwise)	228				

Q7	N	Minimum	Maximum	Mean	Std. Deviation
Safety and Security	228	1	5	4.38	0.756
Navigation	228	1	5	4.28	0.859
Infotainment	228	1	5	3.53	0.922
Convenience	228	1	5	3.76	0.796
Maintenance	228	1	5	4.15	0.767
Remote control	228	1	5	3.50	1.004
Valid N (listwise)	228				

Q8	N	Minimum	Maximum	Mean	Std. Deviation
Emergency electronic brake	228	1	5	4.37	0.811
Driver behaviour monitoring	228	1	5	3.88	0.943
E-call	228	1	5	3.78	1.022
Stolen vehicle detection	228	1	5	4.35	0.773
Emergency assistance	228	1	5	4.54	0.705
Hazard warnings	228	1	5	4.29	0.719
Failure notifications	228	1	5	4.36	0.759
Parking management	228	1	5	3.66	1.065
Smart home/office services	228	1	5	3.21	0.946
Multimodal route planning	228	1	5	3.64	0.935
Music/news/stocks/sports/ weather	228	1	5	3.85	1.027
Video streaming	228	1	5	2.40	1.076
Games	228	1	4	1.83	0.938
Remote diagnostics	228	1	5	3.60	1.128
EV battery health/charging status and notifications	228	1	5	4.11	0.884
Eco-friendly drive	228	1	5	4.06	0.881
In-vehicle payment	228	1	5	3.09	1.071
Parking assistance	228	1	5	3.61	1.153
Keyless entry	228	1	5	3.36	1.084
Predictive maintenance	228	1	5	3.89	0.879
Insurance telematics	228	1	5	3.38	0.943
Vehicle Locator	228	1	5	3.86	1.008
Remote vehicle control/monitoring	228	1	5	3.55	0.977
Valid N (listwise)	228				

Q9	N	Minimum	Maximum	Mean	Std. Deviation
Driving becomes safer	228	1	5	3.82	0.849
Driving becomes more convenient	228	1	5	4.14	0.717
Driving becomes easier	228	1	5	3.92	0.869
Driving becomes more unsafe with connectivity features	228	1	5	2.96	1.112
Driving becomes more fun	228	1	5	3.64	0.935
Valid N (listwise)	228				

Q10	N	Minimum	Maximum	Mean	Std. Deviation
Added costs	228	1	5	3.83	0.792
Privacy concerns	228	1	5	3.65	0.905
Cyber security	228	1	5	3.84	0.876
Features don't add value	228	1	5	2.99	1.026
Usability	228	1	5	3.78	0.771
Valid N (listwise)	228				

Q11	N	Minimum	Maximum	Mean	Std. Deviation
Interest in switching to a brand which has the latest connectivity features	228	1	5	3.23	1.055
Valid N (listwise)	228				

Appendix 6: Hypothesis Testing

Hypothesis 1

How interested are you in switching to a brand which has the latest connectivity features? * How old are you? Crosstabulation

		Age						Total
		Under 18 years old	18 - 24 years old	25 - 34 years old	35 - 44 years old	45 years old and over	Prefer not to say	
Interest in switching to a brand which has the latest connectivity features	Very uninterested	0	6	2	3	5	0	16
	Uninterested	1	4	10	13	10	0	38
	Neutral	3	13	6	25	23	1	71
	Interested	1	17	11	22	31	1	83
	Very interested	2	3	6	3	6	0	20
Total		7	43	35	66	75	2	228

Table 1: Cross Tabs

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.287[a]	20	0.275
Likelihood Ratio	22.689	20	0.304
Linear-by-Linear Association	0.058	1	0.810
N of Valid Cases	228		

a. 15 cells (50.0%) have expected count less than 5. The minimum expected count is .14.

Table 2: Chi-Square Tests

Hypothesis 2

Correlations

		Connectivity features contribute towards customer satisfaction with the brand	Connectivity features enhance the driver experience
Connectivity features contribute towards customer satisfaction with the brand	Pearson Correlation	1	.710**
	Sig. (1-tailed)		0.000
	N	228	228
Connectivity features enhance the driver experience	Pearson Correlation	.710**	1
	Sig. (1-tailed)	0.000	
	N	228	228

**. Correlation is significant at the 0.01 level (1-tailed).

Table 3: Correlations

Hypothesis 3

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.704[a]	0.495	0.489	0.733	1.860

a. Predictors: (Constant), previous satisfaction, importance, familiarity

b. Dependent Variable: preference for a brand with connectivity features

Table 4: Model summary

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	118.176	3	39.392	73.328	<.001[b]
	Residual	120.333	224	0.537		
	Total	238.509	227			

a. Dependent Variable: preference for a brand with connectivity features

b. Predictors: (Constant), previous satisfaction, importance, familiarity

Table 5: ANOVA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	0.731	0.281		2.599	0.010		
	importance	0.699	0.057	0.657	12.257	0.000	0.783	1.277
	familiarity	0.098	0.057	0.093	1.700	0.091	0.753	1.329
	previous satisfaction	-0.042	0.054	-0.038	-0.785	0.434	0.955	1.047

a. Dependent Variable: preference for a brand with connectivity features

Table 6: Coefficients

Collinearity Diagnostics[a]

Model		Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	importance	familiarity	previous satisfaction
1	1	3.884	1.000	0.00	0.00	0.00	0.00
	2	0.062	7.909	0.00	0.22	0.08	0.57
	3	0.033	10.864	0.07	0.38	0.92	0.00
	4	0.021	13.508	0.92	0.40	0.00	0.43

a. Dependent Variable: preference for a brand with connectivity features

Table 7: Collinearity Diagnostics

Hypothesis 4

Correlations

		Satisfied with the connectivity features in their car	Likely to consider current car brand in a purchase
Satisfied with the connectivity features in their car	Pearson Correlation	1	.164**
	Sig. (1-tailed)		0.006
	N	228	228
Likely to consider current car brand in a purchase	Pearson Correlation	.164**	1
	Sig. (1-tailed)	0.006	
	N	228	228

**. Correlation is significant at the 0.01 level (1-tailed).

Table 8: Correlations