Chapter 6
Study on Consumer Requirements for Automotive Infotainment Systems

Aswin Sampath Kumar and Tuğrul Daim

6.1 Introduction

The core function of marketing is to discover and stimulate opportunities for firm's output ([1], p. 10). In doing so, market research plays an important role in gathering information that is crucial for making business decisions ([2], p. 36). Market research is extremely important, especially for technology-based companies to understand customer direct and latent needs ([3], p. 1003).

6.1.1 About the Automotive Infotainment Systems Market

Infotainment includes features like radio reception, audio, video, navigation, telematics and a user interface to the infotainment system [4]. Rapid growth in mobile phone adoption and consumer electronics makes the end consumer expect the same features from car infotainment systems. The audio and video content that is being played on the infotainment system is increasing continuously [5]. Due to all these strong requirements, the infotainment market is a very attractive business. In fact, the automotive semiconductors or value in the car is expected to be 40% of the

A. Sampath Kumar
Hamburg, Germany

T. Daim (✉)
Portland, OR, USA
e-mail: tugrul.u.daim@pdx.edu

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car value itself ([6], p. 11). However, the automotive infotainment market has been slow in adopting digital technologies compared to the consumer electronics market. This is attributed to the complicated task of running the personalized settings in a separate environment without affecting the core functionality of the car safety features.

6.1.1.1 Challenges in the Infotainment Value Chain

The Original Equipment Manufacturer (OEM) produces and sells cars to the end consumer. The OEMs face a challenge of rapidly changing demand and expectations from customers [7, 8]. These challenges force OEMs to design cars that are attractive in their market segment with minimum time to market [9, 10]. Since it is difficult to accomplish all this goal in-house, they outsource the certain tasks to Tier-1 suppliers and later integrate this into the production line. This gives them the advantage of low cost, increased efficiency and low labor cost ([11], p. 131). This OEM-supplier relationship helps them to focus on their competency and at the same time promote innovation in product development [12].

Due to rapidly changing requirements and reduced time to market for car manufacturers, Tier-1 AIS suppliers are faced with enormous time pressure. Schneiderman [6] claims that technological advancements have helped in reducing the design cycle time from 60 months to about 24–36 months much faster than 5 years ago. He also mentions about this reduced design cycle as, "placing pressure on system designers to more quickly prototype and demonstrate their designs to original equipment manufacturers (OEMs). The turnaround time for design and development into production for infotainment and driver information systems keeps getting shorter" ([6], p. 12). Additionally, these Tier-1 firms supply for multiple car makers and in multiple platforms. All these factors foster Tier-1 Automotive Infotainment Systems (AIS) companies to maintain a strong relationship with its semiconductor suppliers.

The Tier-2 AIS semiconductor industries are faced with the challenge of knowing in advance the future market requirements, much ahead of the OEMs and Tier-1 companies. Because AIS semiconductor companies face derived demand for their products based on the Tier-1 products demand, they should be able to respond quickly to market changes and have products developed even before the Tier-1 customers face the requirement. Therefore, it becomes important for the Tier-2 AIS semiconductor companies to forecast the market trends in advance to facilitate product development at their level. This also helps them to gain a competitive advantage by differentiating their products and help Tier-1 companies and OEMs to be quick to market.

6.1.2 Background of the Project

According to Porter [13], firms innovate in order to stay ahead of its competitors by differentiating their products and services. This fosters growth in their sales and creates a global competitive advantage. Furthermore, due to the emerging trend of product commoditization [14] in markets, it is important that firms find means to differentiate their service and products to be the successful market leader ([15], p. 312).

As a first step towards product differentiation, it is important that firms have a good understanding of their customer needs ([16], p. 25). This helps them to promote innovation and create value in their products and services offerings [17]. Surprisingly, market research in Business to Business (B2B) is not done quite extensively as done for Business to Consumer marketing (B2C) context ([16], pp. 25–26).

In the B2B market, where firms supplying products to other firms, the demand for the supplying firm products are derived from the immediate customer's product demand ([18], p. 72). The derived demand is stronger for companies which are located at the beginning of the supply chain. Therefore, it is important that these companies not only understand the immediate customer requirement but also do a downstream market research until where the supplier product offering is finally used by the consumer in the value chain is required ([19], p. 3).

6.1.3 Problem Statement

As discussed in Sect. 6.1.1.1, Tier-2 Automotive Infotainment System (AIS) semiconductor companies are faced with a derived demand for their products. They need to have a clear understanding of the evolving market trends and be prepared with products even before the Tier-1 companies realize the need. Therefore, the main research problem of the thesis is

How can automotive infotainment systems semiconductor companies, identify future market requirements and promote their products in their downstream market to be a market leader?

The problem statement demonstrates the needs for AIS semiconductor companies to understand emerging market trends in infotainment systems and help the semiconductor industries to develop products that can be served to their immediate Tier-1 customers. This problem is handled by identifying different market requirements through quantitative and qualitative analysis of customer expectations and requirements at various stages of the value chain. The results will help the company to deliver products that can benefit the Tier-1 AIS suppliers. Consequently, the semiconductor companies can then realize a positive impact on customer retention, loyalty and revenues.

6.1.4 Research Questions

The main research problem stated in Sect. 6.1.3 is broken down into several research questions to better understand the context and streamline the process of research. Each question is examined individually by referring to the related literature for existing theories. The following aspects are considered to define the research questions.

- End consumers vary from each other in various dimensions such as education level, income, geographic location, gender and preferences of the car, etc.
- Various consumer needs create market requirement
- Technical advancements make a huge factor in setting consumer expectations and requirements
- In B2B markets, the supplying firms face derived demand for their goods and have strong collaboration with the immediate customers for new product development.

Based on these aspects, the following research questions are formulated.

- What are the end consumer expectations, preferences for automotive infotainment systems?
- What is the outlook for car radio system? Will it be replaced by personalized music and video contents?
- What are the emerging mega trends and their impacts on automotive infotainment system?

6.1.5 Structure of Thesis

The study is divided into five chapters. The first chapter gives a general background of automotive infotainment systems and challenges in the product development. It explains the purpose of this thesis and outlines the research questions. In the second chapter, extensive literature review is carried out on two main topics. Firstly, literature review on the megatrends and their impact on the automotive industry followed by industry specific trends to automotive infotainment systems are reviewed. Secondly, theories related to consumer expectations followed by the literature review on impact of consumer behavior, followed by specific literature to automotive infotainment systems. The third chapter is about the research methodology used and underlying reasons behind the formulation of a survey questionnaire. The fourth chapter is about the discussion of results. Finally, the project work is concluded in the fifth chapter with certain implications, limitations and outlook of the research.

6.2 Literature Review

It is important that the marketing managers understand the importance of the consumer behavior and it gets crucial at times of recession to understand consumer behavior, to be commercially successful. The task of predicting consumer behavior is very difficult even for experts in the field ([20], p. 76). According to Stávková et al. [21] consumer behavior research facilitates not merely understanding the buyer, it enables understanding the consumer motives and forecasting the future product needs. Therefore, it is important that firms understand consumer behavior and implement their needs in their value creation process [22].

In this chapter, study on global megatrend and later to Industry trends specific to AIS are studied. This is followed by reviews of theories concerning consumer preference and the Kano model of customer satisfaction is studied.

6.2.1 What Is Megatrend Analysis?

It is common for marketers to think immediate trends in the purchase of the products or services over brief time. It is also important that marketers understand the emerging megatrends to be prepared for long time sustainable business ([23], p. 354). Therefore, in the following sections, we will see the definition of megatrends, megatrends impacting the automotive industry and the emerging megatrends in the AIS industry.

6.2.1.1 Definition and Characteristics of Megatrends

The term megatrend was coined by Naisbitt [24] in his work to highlight how the mega trends are transforming our lives. The definition for megatrends is given as "Megatrends are structural movements which go beyond local developments and operate in the technological, economic, political, demographic, social-cultural and environmental domains" ([25], p. 19). Moller [26] identifies three main characteristics of megatrends:

- They occur over an extended period usually over decades.
- Megatrends affect and influence every individual's life.
- Megatrends occur globally; however, the impact of megatrends vary for different areas.

Mittelstaedt et al. [27] proposes three social-science constructs for understanding the megatrends. The first construct is that megatrends arise due to a complex interaction of economic, political, cultural, philosophic and technological factors. Irrespective of the origin they create a significant impact across the globe. The second construct is that megatrends are seismic in time and space; therefore it is

difficult to control the emerging trends. They occur in and influence all walks of our life without any control over it. The final construct is that residuals of the previous megatrend and current circumstances lead to future megatrends.

Throughout the history certain trends emerge in all fields like economy, technology, politics etc. Some of the trends are noisy while many trends have proven to have create impact on society as whole to every individual [28]. The reason for the megatrends are attributed to two main factors firstly due to aspiration, wishes and speculations among every individual and secondly due to serious information, facts and other data that are available ([26], p. 3). The difference between trends and megatrends is that the trends are usually for abbreviated period and megatrends occur over prolonged period in decades.

6.2.1.2 What Are the Merging Global Megatrends?

Gao et al. [29] identified that IT systems pave way for huge megatrend in the field of automotive industry. With the Industry 4.0 and digital revolution, automotive OEMs are facing a drastic change from their traditional methods and are forced to identify the disruptive trends of the future. According to a report by PwC Modly [30], there are five key global megatrends that affect every industry sector which is discussed in detail below.

Changing Demographics

The demographic shift implies the change in the population structure of a specific economy. Changing demography affects the macroeconomic growth and forces the organization to rethink their business model ([31], p. 249). In economies where the population aging is rapid, the income and the labor power of the economy are affected compared to economies where the growing population which can earn and contribute to the future progress ([31], p. 250) ([31], p. 250). In countries like Germany, where the population is aging or stagnating (change in demographics) and the rise of urbanization leads to lack of interest in car ownership ([32], p. 922). Also, this change in demography to an aging population paves way for emerging mega trends of autonomous driving ([32], p. 922).

Shift in Economic Power

According to Modly [30], due to rapid growth in developing countries and saturating markets in developed countries, companies are keen to look for emerging economies. Furthermore, trade development and interconnectivity are rising rapidly compared to the developed nations making them the next big market powers. Due to rising economic conditions of the societies in China and India, automakers see a

huge growth potential in these markets ([30], p. 4). The Chinese markets are poised to have great demand for cars and considering their taste China appears to be a lucrative market for the premium segment for automotive manufacturers. Currently, the local Chinese OEMs are not yet as advanced as those of the developed countries OEM. However, in the future, it is expected that they will grow rapidly and after fulfilling their local needs might expand into other countries [29].

Accelerating Urbanization

According to Modly [30] there will be a large migration of people from rural areas to cities. It poses a great challenge for developed countries and old big cities in the emerging nations to change and adapt to the rapid urbanization ([30], p. 12). Due to the need for more investment in infrastructure and regulatory policies government play a strong role in scrutiny of the automotive sector. Because of the increasing traffic congestion and pollution caused by automobiles, in countries like India the government has already imposed a ban in the city of New Delhi for car commuters to use their car based on odd-even number license plate strategy [33]. All these regulation policies force automakers to consider opportunities beyond traditional market and foster innovation across their value chain ([29], pp. 3–6).

Rise of Technology

Due to continuous development in technology in the field of nanotechnology, biosciences and cognitive sciences possess a large variety of business opportunity. Increasing digitization such as Internet of things, data analytics and artificial intelligence force the automakers to rethink their business model ([30], p. 16). This rapid technology growth aids the "Millennial" thought on ownership. According to ([29], pp. 8–9), Millennials have a high preference towards car-sharing services based on pay as usage. They would like to benefit out of technology, connectivity through smartphone and reduced cost of ownership for their mobility preferences. All these rising needs might pose challenges as well as opportunities for OEMs to re-think their business model. Despite the increasing car-sharing services, Gao et al. [29] predict that the mobility distance per person will not decrease and factors such as wear and tear of existing cars will lead to increase in car consumption but at a slower rate.

Climate Change and Resource Scarcity

According to Pyhäranta [34], European Environment Agency, environment trends are impacted by three subcategories: they are depleting the natural resource, increasing pollution and climate change. Increased usage of resources and fossil fuels makes these resources scarcer. Furthermore, they lead to huge amount of carbon

emission. All these are main drivers for the industry to focus on a more sustainable solution and they impact the way the traditional business operates ([30], p. 20). To support the rapid technological advancement, sustainable and renewable power sources are the main topics. In countries like China, where the pollution is heavy, the government has clearly stated its interest in electric vehicles (EVs). In fact, in Beijing, for a person to drive with conventional petrol or diesel engine he has to participate in a lottery and therefore clearly making the conventional engines as an artifact and a luxury to have feature Gao et al. [29]. All these forces the automakers to enter into the electric vehicles market and it is anticipated to be the future. In a report by Godau [35], It shows the consumers have an interest in the electric car if they could charge fast and perform comparable to the Internal Combustion Engines (ICE). Furthermore, the main barriers are high cost and slow battery charge rate. It is also found in the report that offering incentives and subsidizing the electric cars have played a huge role in adoption in countries like China and Norway. Despite the challenging requirements posed by the consumers, they feel that EVs reduce the environmental impact and there is clearly a great interest from the public to adopt EV for public and private mobility in the future.

6.2.1.3 What Are the Industry Trends Specific to Automotive Infotainment Systems?

The infotainment System is seeing a rapid development in the past decades and competing to that of the consumer electronics trend. The AIS industry is influenced by several factors such as rapid growth in semiconductor technologies, need for personalized services, software defined radio, entry of big smartphone makers and software platforms.

Why Do OEM's Partner with Semiconductor Industry?

Clearly, the semiconductor industry has gained a rapid growth due to increasing value of electronic components in a car. According to Abelein et al. [36], the AISs are facing rapid growth and challenges especially from speech recognition, 3D visual processing, and displays which require improved hardware efficiency. Abelein et al. [36], postulates that there is a strong need for clear triangular communication strategy between Tier-1 suppliers, semiconductor providers, and the OEM to achieve high-quality reliable infotainment systems. Understanding the importance of the triangle communication, big OEMs like Audi have initiated a program like Progressive Semiconductor Program (PSCP) ([37], p. 13). The PSCP program aims at building a strong partnership with semiconductor industry to promote research and innovation, to have reduced design life cycle and can operate efficiently like that of the Consumer Electronics Industry. Also, the program ensures

quality and foster research and development alongside the rapidly changing market requirements faced by the OEMs.

How Does Software Defined Radio Influence the Infotainment Market?

The automakers are seeking constant opportunities to expand their car sales into different markets. This makes them globally present in many countries. The main challenge here is the car production happens in a specific country and the car is not necessarily sold in the same country. Therefore, a complex situation arises, because of different radio receptions present in different countries. Especially with the increasing trend of digital radio every country has its own frequency for radio reception and the broadcast technology also varies [38]. Therefore, in order to overcome this problem automakers prefer a technology called Software Defined Radio (SDR) in the infotainment applications, where they can control the decoding of the radio reception based on the software [39]. This strategy helps them to overcome the barrier of hardware limitation to each radio reception standard. As an example of the situation, a car being produced in countries like India uses Digital Radio Mondiale (DRM) as its digital radio standard. However, the car may not be sold in India and gets exported to Europe, where the radio reception is DAB or DAB+ standard. In such a case, the automakers simply flash the Digital Audio Broadcast (DAB) or DAB + firmware into the infotainment for radio reception without having to change the hardware for each car.

What Are the Ongoing Competitions in Software Platform?

The AIS has undergone rapid changes over time. Although the Navigation and Radio systems have been present for a long time in AIS, Ford and Microsoft were the early recognizers of the need for integrating the consumer digital life style into AIS ([40], p. 99). The result of such a collaboration was the Ford SYNC. Later, all the automakers took over this idea and came up with infotainment system software platforms based on Microsoft's Embedded Automobile System or Blackberry's QNX software platform ([41], p. 19). According to Greengard [41], the early infotainment platforms lacked vibrant voice recognition features and were complicated and too clumsy for the consumers to use. Having understood the problem here, smartphone giants like Apple and Google who already have an adequate smartphone user base, released Apple CarPlay and Google's Android Auto to make supplementary in-car entertainment systems ([42], p. 598). The main reason for the success of these smartphone giants in AIS markets is that consumers want to experience all the contents they get on their smartphone with same displays and interfaces that they are familiar with ([41], p. 18). Companies like Google, Apple, Baidu and Amazon all are trying to enter infotainment space so that they could gather data related to driver's

behavior and other car-related information which could be of use directly or to third parties. Because of these easy-to-use and familiar Human Machine Interface (HMI) consumers can operate different cars but in an easy and standardized way ([41], p. 19). Both the Android Auto and the Apple CarPlay are proprietary software prohibiting the OEMs to make any alterations, thus making the automakers lose power over the infotainment software. OEMs are making their own software platforms for creating an ecosystem around a car environment [43]. For example, Ford with SYNC, Toyota with Entune, Nissan with Nissan Connect, Daimler with Mercedes Me, etc. are all independent software platforms from the automakers.

Amidst fierce competition, several open-source platforms also find their way such as GENIVI and Automotive Grade Linux (AGL) which are focused on making the platform more open source and standardized among the automotive manufacturers. Klavmark and Vikingsson [44] investigate different open platforms that are available currently for infotainment applications and they find in their research that GENIVI is most likely to succeed soon considering the backup by a strong alliance in the open-source platform. Also, the AGL platform is also found to be making debut in the market with Toyota Camry being the first adopter of the AGL platform [45].

How Do Personalized Services Personalized Services Change the Future of Car Infotainment?

There is a strong growing demand for personalized apps and entertainment needs. From the consumer behavior point of view, research by Tansik and Routhieaux [46] has shown that music can influence the stress on a human. It can make them feel relaxed. Alam [47] analyzes the trends for the connected car and identifies that all the services offered in a car are getting highly personalized. Personalized apps, music and on-demand content streaming, context-aware systems have an immense potential in the future market. Furthermore, the automakers not only have to invest in technologies to offer personalized content experience; there is an enormous potential for bundling of services by understanding the driver preference. In an interview with Thimmappa [48], Mr. Prahab Deivanayagham Senior director of the connected car at Harman has said that the smartphone penetration and strong ecosystem for app developments have pushed the car consumer into downloading personalized contents. He also claims that the space for app store has already been taken by the silicon giants such as Google and Apple through their Android Auto and CarPlay respectively. There is a strong need for music applications like Spotify, Auto Navi and other apps that are offered in the smartphone environment to be integrated into the AIS.

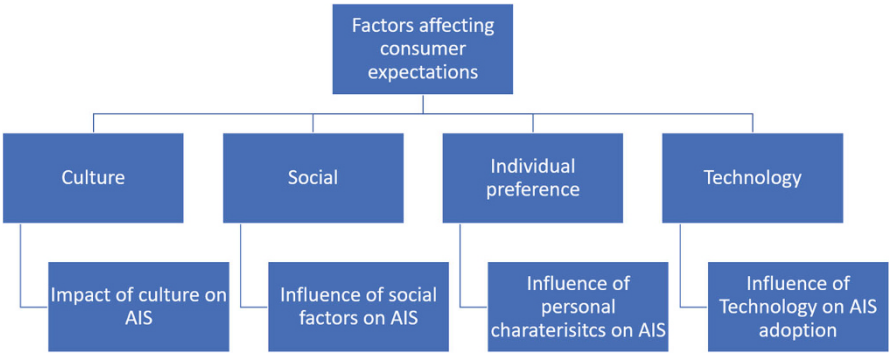

Fig. 6.1 Structure of literature review on consumer needs (own depiction)

6.2.2 *What Are the Factors that Affect Consumer Expectations from Automotive Infotainment Systems?*

Driving is a complex and tedious task that requires uninterrupted attention and coordination of physical, mental, sensory and psychomotor skills ([49], p. 379). There are several reasons for driver distractions leading to accidents ([50], p. 1). According to Stutts et al. [51], driver distractions are caused due to cell phone usage, infotainment controls, etc. Therefore the main purpose of in-car entertainment is to not distract the drivers and at the same time offer certain entertainment to keep them engaged while driving (La [50, 52]). Apart from this, there are numerous factors from related studies that are grouped and discussed in this section under four categories: cultural, social, technology and self-concept. Figure 6.1 shows the structure of the literature analysis carried out based on factors and their influence on AIS.

6.2.2.1 How Do Cultural Factors Influence Consumer Expectation?

Hofstede [53] defines culture as "The collective programming of the mind which distinguishes the members of one category of people from another" ([53], p. 1).

The cultural background of the consumer has an enormous impact on consumer behavior and its importance is growing in consumer market ([54], pp. 163–164). Therefore, it is important to consider the cultural role in consumer behavior and buying intentions.

What Are the Impacts of Culture on Automotive Infotainment Systems?

Several studies have highlighted the importance of culture on designing Human Machine Interfaces (HMIs). In a study conducted by Lindgren [55], to understand

the impact of culture in the design of Advanced Driver Assistance Systems (ADAS) between Chinese and Swedish drivers. It was concluded that it is problematic if culture aspect is eliminated in the ADAS design and Chinese drivers need an adapted version of ADAS considering the driving behavior [55]. A study conducted by Young et al. [56] aims at highlighting the cross-cultural difference in IVI requirements between Australian and Chinese drivers. The study showed that Chinese drivers opted for a highly aesthetic look of the HMI and placed less importance on safety and driver distraction, compared to Australian users. Also, Chinese drivers were not able to understand the abbreviated text in the HMI system compared to Australian drivers ([56], p. 571).

Furthermore, studies show that Chinese drivers can perform simultaneous tasks and therefore require a large amount of information being available to them and prefer greater speed in screen formation, as compared to German or English drivers ([57], pp. 375–376). Another study conducted by Khan et al. [58] focuses on a cross-cultural study between UK and Indian users' HMI preference. It was found that navigation systems and vehicle blue tooths designed for UK drivers' capability for information decoding and visual appeal created a negative impact on the Indian drivers to access the system. These results were measured based on task completion times and error rate. Furthermore, the study concludes that the features that are not a "must-have" feature for UK market are viewed as "must-have" or attractive features in the Automotive HMI systems in Indian market ([58], pp. 59–60). From all these literatures reviewed so far, culture plays a huge role in customer requirements and it is highly important to keep in mind the impact of culture on automotive infotainment systems design and purchase behavior.

6.2.2.2 Why Do Social Factors Play an Important Role in Consumer Expectations?

Social influences are the extent to which members of a society influence the behavior of another member [59]. Burnkrant and Cousineau [60] in their research find that social influence has a significant impact on the buyer's behavior and requirements to products. Social influence on a buyer can generally be referred to as conformity to a group where the buyer tries to reduce the dissonance of the situation ([61], p. 100). Building on this concept of groups, Kotler and Armstrong [62] identify two such types of groups: membership groups and reference groups. Membership group refers to a group that a person belongs to and this has a direct influence on the person's behavior [63]. Reference group serves as a point of comparison for a person who aspires to be a member of such a group. They may or may not have a direct influence on the person. Reference group exposes a person to new behaviors and lifestyles unknown to the person before ([64], p. 341). This is extremely important for marketers who try to influence a person through different reference groups and affect the person's product or brand choices ([62], p. 239).

According to Silvera et al. [65], consumer susceptibility to interpersonal influence is determined by two dimensions: informational and normative component. An

informational component refers to individuals actively seeking for information about products or services before buying them. The normative component refers to individuals need to buy a product for enhancing his social image or conforming to the expectations of others in buying decisions. It is human tendency to strive to be accepted as a part of society. Therefore, their actions are seeking towards them being accepted in a social group ([66], p. 256).

According to Kelman [67], the social influence occurs in three ways: compliance, identification, and internalization. Compliance refers to the acceptance of influence by an individual, where he accepts or conforms to the expectations of an individual or group, to obtain a desirable reaction. This favor enjoyed by the complying individual could be avoiding punishment or receiving a reward ([67], p. 62). Internalization occurs when an individual accepts social influence, by which the person perceives this as a congruent behavior to the system. In other words, the individual perceives the change in behavior could lead to the achievement of the goal in the system ([67], p. 65). Identification takes place when an individual adopts an opinion or behavior as a response to the behavior that is associated with a self-defining relationship to a person or group. Influence through identification helps in maintaining the self-image that a person has a relationship with another person ([67], p. 63). Bang et al. [68] suggests that individuals consider the other person or group thoughts about his action, before indulging in them. Thus, the social pressure influences a person's behavior.

How Does the Social Factors Influence the Consumer Expectations on AIS?

A study conducted by Stave et al. [69] treats ageism as one of the social factors and they try to understand the needs and requirements to be considered for old drivers. It was identified the social needs of old drivers and developed are commendation system to design Advanced Driver Assistance Systems. In another study conducted by Hiscock et al. [70], identifies the psychosocial impacts of possessing a car for autonomy, prestige, and protection. Knobel et al. [71] in their research identify the social needs and propose a model for creating a positive social experience in the car, by means of Clique Trip. According to safety guidelines in the design of automotive HMI design by focus-telematics [72], radio tuning is used as the suggested primary test. In a research by Perez [73], the socially acceptable distraction when driving a car is identified, and the safety implications on infotainment systems design is addressed. A study was conducted to identify the social dilemma of an autonomous vehicle by Bonnefon et al. [74] according to whom the social regulations are to be enforced by the government and people are not willing to adapt their behavior. They also argue that the total utilitarian value should be high if everyone adapted to autonomous driving. According to Waytz et al. [75], it has become a social culture for people to rely heavily on infotainment systems for driving directions and keeping themselves entertained, rather than asking or talking to people.

6.2.2.3 Why Do Socio-Demographic Factors Influence Consumer Expectations?

According to Buente and Robbin [76]), the socio-demographic factors play an important role in informative or entertainment usage. Alcántara-Pilar [77] suggests that socio-demographic factors such as age, gender, household income, education level, race and ethnicity all play a significant role in purchase behavior of consumers. In a research conducted by Howard et al. [78] they find that different socio-demographic groups seek different Internet content behavior. They find that content-seeking behavior varied with age, gender, income and ethnicity of people. Also, it was identified that a customer's motivation to buy is influenced by demographic characteristics of the buyer. Kotler and Armstrong [62] explains the concept of consumer life-cycle stage to marketing explains the changing customer requirements over time. Therefore, marketers must capitalize the changing demand and develop appropriate products. Since demographics of consumer vary widely between different buying situations, a general rule cannot be determined across all industries. Hence marketers in different industries use known heuristics to segment market based on demographics.

6.2.2.4 How Do Socio-Demographic Factors Influence the Consumer Expectations from Automotive Infotainment Systems?

In a study conducted by Stave et al. [69], they identify the needs for AIS for old car drivers. It was shown that the old people care for more respect and easy-to-use interface with the technology that they are familiar. Also, the modern technologies create anxiety and stress on their driving performance. In a study conducted by Lee [79], it is found that young drivers are highly affected by the infotainment technologies leading to more distractions and accidents. Also, the research finds that the young drivers are more open to technology compared to experienced drivers.

In a survey conducted by Schoettle and Sivak [80] about self-driving cars in UK, USA and Australia, used gender, age, driver's education, type of employment and type of car driven as the socio-demographic variables. In the study, it was found that in general, female respondents found the benefit of autonomous cars is more less likely. It was also shown in the study that the young drivers are most likely to use driver assistance compared to old people. The entertainment value expected in a car according to the study was less, while the survey showed that people will be more cautious and still be watching the road for a crash in a self-driven vehicle.

In another study conducted by Sha et al. [81] they showed that Chinese women are more open to premium and niche products and they have a strong interest in owning a small car with many functions compared to large cars. According to Gao et al. [29], millennials do not want to own their own car and are willing to use technology for car sharing and ride sharing services. They expect more personalized contents and services compared to other age groups.

6.2.2.5 Why Does Individual Factors Play an Important Role in Influencing Consumer Expectations?

The consumer purchase behavior is highly attributed to the individual self-concept and the identity of the product, that is, the brand, usefulness, and value that is involved in purchasing [82]. Consumer-buying individual factors is complex and involves numerous factors grouped as lifestyle, motivation, perceptions, and personality [83].

Lifestyle

The lifestyle of an individual goes beyond his social class and personality by the way of personal profiles that are interacting in the environment ([62], p. 146). According to Ghangurde [40] a consumer's lifestyle is highly influenced by digital technology in communication and entertainment markets. This lifestyle forces the AIS manufacturers to adapt the technologies quickly and be up to date as in consumer electronic goods. A market research conducted by Microsoft along with FITCH indicates that the need for safety, music and navigation is increasing. It was also observed by Microsoft that consumer requirement for smart connectivity is strongly growing due to the lifestyle influence ([40], p. 100).

Motivation

According to Ryan and Deci [84], Self-Determination Theory (SDT) was introduced to analyze the reasons and intended goals towards certain activities. The SDT classifies two types of motivation as intrinsic and extrinsic motivation. When people engage in an activity voluntarily due to self-interest and enjoy the actions it is called autonomous or intrinsic motivation. This is due to fact that the people are not forced or controlled to be involved in an action. On the other hand, when people are subject to control or forced into performing a certain action it is called controlled or extrinsic motivation ([85], p. 334). Thus, in simpler words, it can be inferred that intrinsic is the internal force that drives an action and extrinsic is the external pressure leading to certain action. When people experience positive feeling, it leads to a positive effect on intrinsic motivation and if they experience negative feeling it has an adverse effect on motivation.

Yalch and Brunel [86] suggest using Maslow's theory of motivation to understand the consumer needs and to product design and characteristics. In the study, it was shown that the consumer needs are the fundamental motivation involved in product purchase. Depending on the level of needs that are satisfied, consumers motivation varies from bottom to top of Maslow's pyramid. Therefore, it is the purpose of the marketer to understand the motivation of the buyer and convey it to them.

Perceptions

Zeithaml [87] identifies the consumer perceptions involved in purchase decisions attributed to three main factors such as perceived price, value and quality. Perceived quality is the level of excellence or superiority offered by the product or service as judged by the consumer. The objective and the perspective qualities are different in the sense that objective quality is verifiable to the characteristics of the product. The perceived quality is the subjective interpretation of the quality of the product by individuals ([87], p. 4). Extending the concept of perception, Chang and Hsiao [4] conducted a research on consumer intentions in buying a car based on the perception of value from the infotainment system. According to Chang and Hsiao [4] perceived value is the consumer's judgment of car infotainment system based on the perceptual benefits he receives to the sacrifice that needs to be made involved in car purchase given as

$$Percieved\ Value = \frac{Percieved\ Benefits}{Percieved\ Sacrifice}$$

Perceived benefits have two components as shown in the model. Davis [88] developed Technology Acceptance Model (TAM) and coined the term perceived usefulness in this model. Perceived usefulness is the benefit that some beliefs to enjoy on adopting the IT systems. If the consumers perceive that the technology used in the systems prove to enhance the safety of driving function then it is termed as perceived driving safety. For example, in an automotive environment, there are features like night-driving assistance or belts or airbags that improve the perception of safety functions and increase the value of the product to consumers ([4], p. 4155).

Perceived sacrifice involves two major components. Perceived risk is the customer view of risk involved due to their behavior leading to unforeseeable or detrimental outcomes [89]. When consumers must pay price for the product they make a financial sacrifice leading to reduced value of the product. All the perceived benefits components lead to positively perceived value on the consumer perceptions and all the perceived sacrifice components lead to negatively perceived value on the consumer perceptions [4].

Zheng et al. [90] conducted a research to understand the subjective appearance to perceived usability of car infotainment systems. The study was done by using 15 different infotainment systems images and was made to evaluate by experts of HMI design. It was found in the study that the subjective appearance had an influence on the perceived usefulness. Also, a more professional and organized interface design will increase the perceived usefulness of the infotainment systems ([90], p. 544).

Personality

Personality is a self-concept that refers to the characteristics that an individual possesses which distinguish him from others ([62], p. 146). Personality is not the same as the cognitive aspect or an individual's abilities and skills. It is explained by the concept of Traits ([91], p. 147). The influence of consumer personality on buying behavior was explored by Evans [92]. The research was focused on understanding, the choice of the car a consumer makes between Ford or Chevrolet reflecting on the individual's personality. However, there was no sufficient data sample to prove the hypothesis.

Research conducted by Kuehn [93] demonstrated that affiliation and dominance were two dimensions that could be used to predict the personal characteristics. Westfall [94] studied the personality difference among the owners of standard, compact and convertible cars. The study was based on Thurstone's Temperament Schedule to measure seven characteristics such as active, vigorous, impulsive, dominant, stable, sociable and reflective ([94], pp. 35–36). The study found that there was no significant personality difference between standard and compact car users. However, the convertible owner's personality was different from others. The convertible owners were more sociable, active, impulsive, vigorous and dominant compared to other car owners ([94], p. 37).

Sha et al. [81] conducted research about the Chinese premium car market and found that the middle-class people have an ardent desire to buy premium cars, as cars stand for the social status reflecting their values and personality. The study also suggests that to be successful in the China premium car market automakers must have high-end infotainment systems and other driving assistance systems.

6.2.2.6 What Are the Theories that Explain the Influence of Technology on Consumer Expectations?

Technology plays a vital role in consumer purchase intentions. To understand the acceptance of the technology and the intentions behind purchase decisions Theory of Reasoned Actions (TRA), Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM) are widely used in the literature.

Theory of Reasoned Action

The Theory of Reasoned Action (TRA) was developed to understand consumer behavioral intention by Ajzen and Fishbein [95]. TRA is a cognitive model that is used to address the core issue of why consumers are willing to engage in a certain behavior ([96], p. 124). Because of its high predictability, TRA is used by marketers to understand the consumer behavioral intentions and behaviors ([96], p. 125).

According to Gentry and Calantone [97], attitude towards a behavior is most likely due to the buyers favorable or unfavorable reaction (evaluation, appraisal, etc.) for a given behavior. Normative beliefs consider the element of being approved or disapproved by referent persons or groups on exhibiting a given behavior. Bang et al. [68] suggest that every individual evaluates the various consequences for his decision and considers all the available course of action to him before engaging in a certain behavior. Individuals are said to favor behaviors (i.e., believe inactions), that have desirable outcomes for them. Madden et al. [98] describe that the beliefs held by an individual can be divided into two types namely, behavioral beliefs and normative beliefs. Behavioral beliefs are thought to be the root cause of a person's attitude towards performing a behavior and normative beliefs are thought to affect the subjective norms influencing a person to perform a behavior. However, the TRA model is suited only for volitional situations where the behavior is predicted by intentions. Therefore, the TRA will be a limited to situations where a person has a control of the action he is willing to perform ([99], p. 1174).

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) [100], is an extension of the TRA which can handle the TRA's limitation in dealing with consumer behavior with nonvolitional control ([99], p. 1175). Like TRA, the main antecedent for behavior is the intention of an individual. The intention is presumed to capture the motivation of a person, the effort extended and the will power of a person towards the behavior ([100], p. 181). According to ([101], p. 42) in addition to *subjective norms* and *intentions* to perform specific actions, TPB includes another construct to predict behaviors that are nonvolitional called *perceived behavioral control* (PBC). Paul et al. [96] state that there are three predictors to intentions: attitude to behavior, subjective norm and PBC. Madden et al. [98] claim that the PBC is the extra variable that is added to TPB which has a direct impact on the behavior and also an indirect impact on the behavior through the intentions. Madden et al. [98] suggest that the direct effect of perceived behavioral control over the final behavior has two types. First is that when there is an element of nonvolitional control on the behavior and second is when the perceptions of an individual's control accurately match with the person's behavior. It is clear that few researchers believe that TPB can be used to model the technology acceptance or rejection by consumers considering their decision making and behavior.

Technology Acceptance Model

Technology plays a very big role in the consumer behavior. The adoption of new technologies by consumers was modelled using Technology Acceptance Model (TAM) introduced by Davis [88]. TAM is widely used for technology influence on consumers, their willingness to adopt or reject technologies ([102], p. 244).

The TAM is yet another adaptation of the theory of reasoned action, widely used in the field of information systems to model consumer behavior [102, 103]. Davis [88] developed this theory to explain the computer acceptance among users.

The original TAM had four variables to determine the adoption rate of technologies. The theory introduces two perception variables namely, perceived usefulness and perceived ease of use. Perceived usefulness is belief of a person about the usage of the product and significant improvement in the performance experienced by the user. Perceived ease of use identifies the amount or extent of effort needed to use a product or service ([88], p. 320). The other two variables are attitude towards use and behavioral intention towards use. However, According to Hong et al. [104], TAM only predicts the adoption of technology, but does not provide a means to find the continued usage of the technology.

How Does the Technology Factors Influence Consumer Expectations from AIS?

The Information and Communication Technology is growing rapidly. Consumers have adapted to high smartphone and computer usage. Therefore, they expect the same features to be present in the AIS [5]. Osswald et al. [105] suggest that Technology Acceptance Model cannot be used directly to assess car environment because it doesn't use contextual information. So, they proposed three issues that need to be addressed in the context of a car. Firstly, the information system is contextual, that is, related driving speeds, fuel level and other assisting information. Secondly, the driver is faced with constrained space for accessing interface, and further, it is complicated by the driving and moving environment in the car. Thirdly, the assistance systems create anxiety among people as they need to be more reliable. This model can be used to assess the technology acceptance of consumer in the car, considering the moving environment, anxiety. Another study by Bennakhi and Safar [106] explores the usage of voice control system in a car. It is suggested that the voice control might not be a workable solution in the car, considering the noisy environment around and the development of the technology itself is not reliable yet. The technology that is inside is lagging compared to what is expected by the driver. Reinstating this author claims that "... the point where the driver does not even have to touch his smartphone while driving seems a bit of a far cry" ([106], p. 1060). In another study conducted by Aziz [107], it is found that the technology anxiety causes people to lose trust on the brand. Also, brand loyalty can be increased by lowering the technology anxiety among consumers. Pakusch et al. [108] find that technology has played a huge role in shifting the consumer behavior from ownership to usership attitude. This change in attitude also puts a huge demand in consumers to stay connected to each other via highly secured networks. Thus, the digital technologies are highly adopted by the consumers and they pave way for megatrends—such as car sharing in the automobile sector. The age of the target market places a huge role in marketing. Millennial or Generation Y people have a lot of difference in their

attitude and have grown in an era of social media and digital technology. They have high expectations and require more variety for low cost [109]. Especially in countries like China, where the smartphone adoption is very high, people use "Autonavi" a Chinese app which is much accurate and exceeding voice-driven capabilities compared to automaker-installed infotainment systems. This puts a large pressure on the car OEMs to succeed in the premium Chinese car market ([81], p. 11).

6.2.3 Kano Model of Product Requirements

Kano [110], proposed the Kano model which has three attributes to specify the product requirement in meeting the customer satisfaction. First are the *must-be requirements*. These comprise the basic criteria that the product is supposed to fullfill. Not having these features will lead to dissatisfaction and any innovations that are made on top without meeting these *Must-Be Requirements* are not successfully received by the customers. These feature requirements are not explicitly stated by customers but inherently expected to be met ([111], pp. 30–31).

The second attribute to the Kano model are the *one-dimensional requirements*, that are explicitly demanded by the customers. It refers to direct fulfillment of requirement, which is proportional to the satisfaction. More these requirements are fulfilled the satisfaction increase and the vice versa holds ([111], pp. 30–31).

The third attribute comprise the *attractive requirements*, which is a highly influential factor on the customer satisfaction level. The features of this are not explicitly stated and expected by the consumer. Therefore, this is highly optional, in the sense that not fulfilling it will not create dissatisfaction. However, the more attractive the features are to the customer the more they highly differentiate the product and have an exponential influence on customer satisfaction. These features enhance the perceived value and satisfaction of the customers.

There are two other attributes, *indifferent quality elements* and *reverse quality elements*. While the features of the former are those that do not change any satisfaction level irrespective of whether the features or added or not, the latter refers to inverse proportionality with fulfillment of features ([112], p. 2).

In general, the Kano model helps the product developers to understand the product requirement by understanding the product needs faced by customers hence improving the satisfaction of customers. Since product requirements differ for different customers, the three Kano attributes discussed guarantees in increasing the utility expectations of all the customer groups ([111], p. 30). Shukla et al. [113] have used the Kano model integrated with Quality Function Deployment (QFD) for passenger cars and have highlighted the benefits of this combination.

Thus, the literature concerning the concept of megatrends and their impact on the automotive industry was review followed by industry specific trends for AIS was reviewed. Furthermore, consumer behavior theory and the factors behind consumer expectations and product requirements for automotive infotainment systems were reviewed.

6.3 Research Methodology and Theoretical Framework

The main aim of this chapter is to elaborate the conceptual development of the research framework adopted to perform this study. This approach helps to outline the strategy that needs to be taken to achieve the goal of the thesis. Different research methodologies that are widely used in the context of marketing are discussed. This is followed by elaboration of how the research was performed along with the underlying reasoning are explained. Finally, the sample size and the statistical properties of the collected data sample are explained.

6.3.1 Overview of Research Methods

6.3.1.1 Qualitative Research

Exploratory studies are a first step in research, which helps to identify if the actual research problem is important. This also helps to save money and saves further human effort if the problem itself is found to be not so important. Primarily, the exploration studies rely heavily on qualitative techniques. Qualitative techniques involve conducting interviews with experts in the field to understand their perspectives difficulties and to gather their opinion on emergence of the research topic itself. Therefore it can be seen that the primary goal of qualitative research is to understand the perspectives of the experts in the way they experience in reality [114]. According to Blumberg et al. [115] the literature search and expert interviews are the two most extensively used exploratory research techniques.

6.3.1.2 Quantitative Research

Most empirical studies involve the quantitative research technique which involves collection of data ([116], pp. 1139–1140). To collect he data questionnaires are developed, to gain the perspectives, intentions, to analyze the underlying trends and also to find the consumer requirement [117]. The questionnaires are sent to be distributed and filled in by a target audience. The filled response serves as the basic data for the research analysis.

The questionnaires developed can be open ended to answer, the audience can answer each question with their own text. This provides more insights and the text rich answers allowing the responder to describe in detail ([118], p. 831). Another type of questionnaire is called close-ended questionnaire. In this approach each question is given with all possible answers that are to be given and typically the user is expected to choose one of the options for each question.

According to Baruch and Holtom [116] both the techniques have their own advantages and disadvantages. The advantage of the open-ended questionnaire is

that they help to gather more information and honest feedback by keeping anonymity of the response. However, the biggest problem is analyzing the text rich response for hundreds and thousands of responses. An open-ended response also faces the subjective interpretation problem of the research ([118], pp. 830–831). A close-ended questionnaire overcomes this problem as the audience are only allowed to choose only options for questions. This makes the analysis much easier and make use of statistic techniques. However, it faces a problem if the options are not sufficient and the responder has something else to answer. Thereby it limits the amount of information that can be potentially gathered. In formulating a close-ended questionnaire the researcher should think of all possible answers and must be easily understood by the target audience.

6.3.1.3 Methodology to Identify Product Requirements

There are several methods applicable to identify product requirement of consumers. Griffin and Hauser [119] highlight the facts that nearly 20–30 customer feedbacks on homogeneous products are sufficient to determine 90–95% of all the requirements. It is important to dig deeper into customer problems rather than just looking merely on their desire ([111], p. 31). Cooper and Dreher [120] has categorized different techniques that are used for finding out the Voice of Customers (VoC). In this study, a survey is carried out to identify top product requirements of infotainment system.

The second most crucial step is to construct questionnaires that require response from the consumers. Questions should focus on the underlying usage pattern, customer wishes, their usage pattern and preference to deeply understand the problems faced by them. It is important in formulating such questionnaire where the technical solutions are not being addressed directly to consumer. This has two advantages: the first is that responder can understand and perceive the benefit of product solution and secondly, it also doesn't restrict the creativity of engineers in offering solution to the problem faced by consumer in the product ([111], p. 31).

After the questionnaire is prepared, the questions should be targeted to consumers who are potential target of our product usage. When questionnaires are asked to be filled by consumers directly, it is cost efficient as it involves using digital media. However, since consumers need clarity on understanding and avoiding misinterpretation explanations are to be provided to consumer. The data are collected and finally analysis is performed.

6.3.2 Developing Questionnaires

A questionnaire is a standardized framework which contains a series of question and possible relevant options and scales that respondents can fill with answers they perceive are right. The construction of a questionnaire comprises of established

measurement scales such as Likert scale and using them as an aid by the respondents to communicate information, which serves as collected as raw data for further analysis. The questionnaire developed for this thesis consists of our main topics and questions that require response under them.

6.3.2.1 General In-Car Entertainment Requirement

This section is about general in-car entertainment sources and features for passengers. It is important to understand the usage pattern and preference for in-car entertainment among the passengers. People travelling in a car, both the driver and the passengers resort to some source of entertainment in the car. Some of the entertainment sources are listening to music via radio and personalized music contents for drivers and passengers. However, other sources of entertaining activities are magazines and newspapers and web browsing, which applies primarily to the passengers and not to drivers. Furthermore, it is important to understand how the drivers or the passengers like to play the music content from the infotainment system. There are several sources for playing music in a car ranging from radio, CD/DVD players, USB stick, mobile phone streaming and Internet streaming ([121], p. 452). Additionally, virtual reality gears are seeing high penetration in the consumer market. However, the problem of virtual reality is that it cannot be used for moving vehicles as it leads to motion sickness [122]. Hock et al. [123] have proposed a car VR for entertainment in car. Furthermore, social networking plays a huge impact on our day-to-day life, such as Facebook, WhatsApp, etc. [124]. Considering all these factors the following questions are formulated:

Q1: What are the primary sources of entertainment in a car?
Q2: How do users prefer to play music or video contents in future cars?
Q3: Which infotainment functions are to be present in future cars?

Interacting with the system consists of controlling or giving input to the system and display features. Ng et al. [125] has studied the impact of various input controls on infotainment systems for button, knobs and dials over the driver distraction. Studies conducted by Pickering et al. [126], Parada-Loira et al. [127] have shown the usefulness of hand gesture control for car infotainment systems. Furthermore, voice assistance technologies are seeing rapid development with artificial intelligence and speech recognition advancements which are rapidly finding their way into the infotainment systems [128]. Infotainment system are packed with lots of technologies and information, so careful selection of vital information and presenting to them is a key aspect ([129], p. 41). There are various display technologies such as flat display screens, curved display screens [130], 3D display screens [131], Heads Up Display (HUD) [130] and augmented reality [132] for cars. Therefore, it is important to study which of these technologies are most expected by the consumer; hence the following questions are formulated:

Q4: How do users prefer to control their car infotainment system?
Q5: Which display features are expected in their car?

Meschtscherjakov et al. [133] propose classification of car into three regions, driver area, front area and area for studying the infotainment features. Car infotainment systems can be a single system or it can include offering separate entertainment for each passenger. In the case of single entertainment only one system is present and all the passengers and the driver have to use the same system. Due to legal requirements and practical distraction all the entertainment features such as reading, gaming cannot be made available as they distract the drivers ([133], pp. 105–106). So, it is important to understand the willingness of the consumer to purchase cars with single common entertainment system or individual entertainment experience in a car.

Q6: Do users prefer single common entertainment or individual entertainment systems in a car?

Hsiao et al. have studied the purchase intention of car based on the significance of infotainment features. Rebuilding the idea, it is important to identify the influence of automotive infotainment features on car purchase decisions. So to get subjective opinion to rank feature importance, a five-point Likert scale is used in this thesis [134]).

Q7: How important are the infotainment system features, when you decide to buy a new car?

6.3.2.2 Analysis of Car Radio

In this section consumer preference for radio listening and the features they expect to have while listening to broadcast radio is studied. Broadcast radio has been a popular source of entertainment in a car ever since the introduction of the car radio by Ford in 1922 ([135], p. 233). One of the major problems with radio communication devices are the availability of frequency [136]. So different radio standards are being adopted around the world, such as AM/FM radio, and new digital radio standards such as HD radio, DAB and DRM [38]. As a first step in product requirements for radio listening, it is important to understand the underlying reason of radio listening in a car. La Reyner and Home [52] have studied the effect of radio listening in keeping the drivers from sleeping during driving. Furthermore, there are several studies that has been carried out in understanding the effect of radio listening in car [51, 72]. However, in this thesis the focus is kept on finding out the underlying reasons that attract radio listening in car over personalized entertainment content.

Q8: What are the underlying reasons behind car radio listening over personalized content?

Because of the continuous improvement in the broadcast radio reception technologies and new radio standards, several features and benefits can be offered to consumers [137, 138]. Several features such as background scanning, live recording, display of program name and traffic information are available through broadcast radio reception [139]. Additionally, it is important to understand where do users

listen to radio, so that in areas of weak coverage, Broadcast radio listening can be combined with Internet blending to ensure seamless reception [140]. Therefore, following questions are asked to understand what features are important for the users:

Q9: What are the important radio features users would like to have in car radio?
Q10: Where do users prefer to listen to broadcast radio in car?

According to Phan and Daim [141], Mobile services are widely used for music and video applications. Therefore, with high penetration of smartphones it is still a matter of economic value to consumers to adopt smartphone with Internet ([142], p. 2925). To understand whether the Internet streaming will replace broadcast radio applications, following question is framed.

Q11: If Internet is present in the car, will there be a for need broadcast radio?

6.3.2.3 Impact of Sharing Economy on Automotive Infotainment System

Due to the rapid growth and condensation of people around cities "Urban Mobility" is an important topic being discussed around the globe ([143], p. 276). According to Zenobia et al. [144], new artificial markets are developing due to problem with parking and traffic management in smart cities. Dias et al. [145] classifies broadly car sharing in to three forms. First is the car sharing, which is usually within the city limits where people can rent a car for short hours and drop them where they want to. Best examples for this are "Car to go" and "Drive now" business model. Second is the car rentals, usually done for over a complete day or for long distance travels. Some of the best examples for this are the "Sixt" and "Europacar". The third form of sharing economy is the ride sharing or carpooling, where often a ride is shared by multiple passengers who are planning to travel to the same destination. Since in this thesis, the focus is on cars it is important to understand the impact of these emerging trends and how infotainment systems can help in these business models. In order, to understand the consumer preference for future mobility and understand the underlying intentions following question are framed:

Q12: What are the single person, future mobility based on distance they want to cover?
Q13: When do consumers use car-sharing service?

Bellos et al. [146] have discussed about the product lines and business model surrounded by the car-sharing economy. However, in this thesis it is important to understand the user expectations in a car-sharing model. So, the following questions were formed to understand the user preference:

Q14: How do users prefer personalized entertainment experience when using a car sharing or rental service?
Q15: What infotainment features are important when choosing a car sharing service?

6.3.2.4 Impact of Autonomous Driving on Automotive Infotainment System

Autonomous driving or self-driving vehicles are a popular topic that are looked on as a solution for future mobility to overcome traffic congestion [143]. Autonomous driving itself comes in five different levels ([80], p. 2). In this thesis, it is of utmost interest to deal with level 4, where the vehicles are completely autonomous and managing all the safety critical features. It is of importance to understand the adoption of autonomous driving and focus on services that the consumers might be interested to avail in the new extra time they have while travelling in autonomous cars. This question is crucial to understand the importance of entertainment value in the car for future markets:

Q16: *What are the reasons people wanting to adopt self-driving cars?*
Q17: *What do the consumers like to do in the newly found free time in an autonomous car?*

6.3.3 Survey Methodology and Data Collection

The questionnaires which were discussed in Sect. 6.3.2 were deployed for survey using Google Forms, a web-based tool for survey deployment. The survey questionnaire is shown in Appendix. The survey was shared online over social media such as LinkedIn, Facebook and via E-mails to reach the respondents. The survey was designed as self-explanatory. The first section consists of the purpose and a brief introduction to respondents about the topic of survey. The language of the survey was in English. Also, there were no incentives provided for the respondents to fill the survey. Details about the respondent's gender, employment status, residential region and type of the car they own were collected for analysis.

The total response of the survey was 376 out of which two responses were uncomplete making it not useful for the analysis. Therefore, 374 responses are eligible for the analysis. The marginal error rate for the total result is ±5.07% with 95% confidence interval. The marginal error rate for countries are India is ±6.9%, Europe: ±8.4% and North America: ±20% at 95% confidence interval.

6.3.3.1 Profile of Respondents

The nature of the data collected is majority from India and Europe. Other regions apart from India, Europe and North America are categorized into "Others." In order to understand the profile of the respondent from each region cross-tab analysis was performed. Table 6.1 shows the cross-tab analysis of gender-region. It can be seen that over all male respondents (74.3%) were higher compared to female respondents (25.7%). As seen from Table 6.2, The majority of the respondents were 18–30 years

Table 6.1 Gender-region cross tab analysis

			Region				
			India	Europe	North America	Others	Total
Gender	Male	Count	154	98	20	6	278
		% within gender	55.4%	35.3%	7.2%	2.2%	100.0%
		% within region	76.2%	71.5%	80.0%	60.0%	74.3%
	Female	Count	48	39	5	4	96
		% within gender	50.0%	40.6%	5.2%	4.2%	100.0%
		% within region	23.8%	28.5%	20.0%	40.0%	25.7%
Total		Count	202	137	25	10	374
		% within gender	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.2 Age group-region cross tab analysis

			Region				
			India	Europe	North America	Others	Total
Age group	Less than 18 years	Count	2	0	0	0	2
		% within age group	100.0%	0.0%	0.0%	0.0%	100.0%
		% within region	1.0%	0.0%	0.0%	0.0%	0.5%
	18–30 years	Count	146	110	18	7	281
		% within age group	52.0%	39.1%	6.4%	2.5%	100.0%
		% within region	72.3%	80.3%	72.0%	70.0%	75.1%
	31–40 years	Count	38	16	3	1	58
		% within age group	65.5%	27.6%	5.2%	1.7%	100.0%
		% within region	18.8%	11.7%	12.0%	10.0%	15.5%
	41–50 years	Count	10	5	1	1	17
		% within age group	58.8%	29.4%	5.9%	5.9%	100.0%
		% within region	5.0%	3.6%	4.0%	10.0%	4.5%
	51–60 years	Count	3	4	1	1	9
		% within age group	33.3%	44.4%	11.1%	11.1%	100.0%
		% within region	1.5%	2.9%	4.0%	10.0%	2.4%
	61 years and above	Count	3	2	2	0	7
		% within age group	42.9%	28.6%	28.6%	0.0%	100.0%
		% within region	1.5%	1.5%	8.0%	0.0%	1.9%
Total		Count	202	137	25	10	374
		% within age group	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

of age group (75.7%). This is followed by the age group 31–40 years (15.5%).The demands and requirements of these age group are valid for the future market requirements as it denotes their aspirations of future consumers for the infotainment market. From Table 6.4, it can be seen that (32.4%) of the respondents don't have a car. This is followed by people owning midsize cars (29.9%) and compact cars (16.6%). Table 6.3 shows that about (47.9%) of the respondents are working in a private organization followed by students (28.9%).

6.4 Results and Discussion

In this chapter analysis on the survey data will be discussed (Table 6.4).

6.4.1 Statistical Analysis

6.4.1.1 Reliability Analysis

Reliability of the scale was carried out using reliability analysis. Cronbach alpha values that are greater than 0.60 were seen to be accepted for this research. The reliability analysis was carried out for questionnaires that used Likert-scale for ranking. In the Likert scale 1 denotes for "Extremely Important," 2 stands for "Important," 3 denotes "Neutral," 4 denotes "Less Important," 5 denotes "Not at all Important." All the values are acceptable as shown in Table 6.5.

6.4.1.2 Analysis of Responses to Questionnaire

It can be seen from the Table 6.6 that overall personalized music and video contents such as private music collection or custom music and video tracks are preferred as the most important sources for entertainment in a car. This is followed by radio listening which is the second-best alternative to people. Within Europe, radio is the most preferred source of entertainment whereas, in India personalized contents are preferred more. Frequency of responses from Europe are high for radio compared to Indian respondents. Females (46.3%) prefer radio compared to males (41.5%).

Table 6.8 shows that music and videos can be played using various devices and shows the preferred devices through which consumers like to enjoy the music or video in a car. As seen in Table 6.7 Indians prefer to play contents from USB Sticks (21.9%) over Europeans (13.8%). However mobile phone integrations is the most preferred device to play contents on the infotainment in a car. This proves the high penetration of smartphones into consumers and a main device for integration in infotainment systems (Table 6.8).

Table 6.3 Employment status-region cross-tab analysis

			Region				
			India	Europe	North America	Others	Total
Car type	Don't have a car	Count	59	58	2	2	121
		% within car type	48.8%	47.9%	1.7%	1.7%	100.0%
		% within region	29.2%	42.3%	8.0%	20.0%	32.4%
	Compact car	Count	36	21	3	2	62
		% within car type	58.1%	33.9%	4.8%	3.2%	100.0%
		% within region	17.8%	15.3%	12.0%	20.0%	16.6%
	Midsize car	Count	61	37	10	4	112
		% within car type	54.5%	33.0%	8.9%	3.6%	100.0%
		% within region	30.2%	27.0%	40.0%	40.0%	29.9%
	Large car	Count	10	6	3	0	19
		% within car type	52.6%	31.6%	15.8%	0.0%	100.0%
		% within region	5.0%	4.4%	12.0%	0.0%	5.1%
	Executive car	Count	5	2	0	1	8
		% within car type	62.5%	25.0%	0.0%	12.5%	100.0%
		% within region	2.5%	1.5%	0.0%	10.0%	2.1%
	Luxury car	Count	5	2	2	0	9
		% within car type	55.6%	22.2%	22.2%	0.0%	100.0%
		% within region	2.5%	1.5%	8.0%	0.0%	2.4%
	Sports car	Count	1	2	0	0	3
		% within car type	33.3%	66.7%	0.0%	0.0%	100.0%
		% within region	0.5%	1.5%	0.0%	0.0%	0.8%
	MUV	Count	1	0	1	1	3
		% within car type	33.3%	0.0%	33.3%	33.3%	100.0%
		% within region	0.5%	0.0%	4.0%	10.0%	0.8%
	SUV	Count	12	6	3	0	21
		% within car type	57.1%	28.6%	14.3%	0.0%	100.0%
		% within region	5.9%	4.4%	12.0%	0.0%	5.6%
	Mini car	Count	12	3	1	0	16
		% within car type	75.0%	18.8%	6.3%	0.0%	100.0%
		% within region	5.9%	2.2%	4.0%	0.0%	4.3%
Total		Count	202	137	25	10	374
		% within car type	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.4 Car type-region cross-tab analysis

			Region				
			India	Europe	North America	Others	Total
Employment status	Self-employed	Count	24	3	1	1	29
		% within employment status	82.8%	10.3%	3.4%	3.4%	100.0%
		% within region	11.9%	2.2%	4.0%	10.0%	7.8%
	Government employee	Count	20	8	0	0	28
		% within employment status	71.4%	28.6%	0.0%	0.0%	100.0%
		% within region	9.9%	5.8%	0.0%	0.0%	7.5%
	Working in private organizations	Count	118	50	8	3	179
		% within employment status	65.9%	27.9%	4.5%	1.7%	100.0%
		% within region	58.4%	36.5%	32.0%	30.0%	47.9%
	Part time	Count	2	7	1	0	10
		% within employment status	20.0%	70.0%	10.0%	0.0%	100.0%
		% within region	1.0%	5.1%	4.0%	0.0%	2.7%
	Student	Count	24	67	12	5	108
		% within employment status	22.2%	62.0%	11.1%	4.6%	100.0%
		% within region	11.9%	48.9%	48.0%	50.0%	28.9%
	Currently not employed	Count	11	2	1	1	15
		% within employment status	73.3%	13.3%	6.7%	6.7%	100.0%
		% within region	5.4%	1.5%	4.0%	10.0%	4.0%
	Retired	Count	3	0	2	0	5
		% within employment status	60.0%	0.0%	40.0%	0.0%	100.0%
		% within region	1.5%	0.0%	8.0%	0.0%	1.3%
Total		Count	202	137	25	10	374
		% within employment status	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.5 Summary of reliability analysis

	Mean	Std. deviation	Number of items	Cronbach's alpha if item deleted
How important are the infotainment system features, when you decide to buy a new car?	2.05914	0.91	372.000	0.666
Rank the features according to their importance for you when choosing car sharing or rental service? [Radio system]	2.16129	1.05	372.000	0.675
Rank the features according to their importance for you when choosing car sharing or rental service? [Navigation]	1.55914	0.83	372.000	0.704
Rank the features according to their importance for you when choosing car sharing or rental service? [Internet connectivity in car]	2.225806	1.16	372.000	0.609
Rank the features according to their importance for you when choosing car sharing or rental service? [Common entertainment for all passengers]	2.655914	1.15	372.000	0.625
Rank the features according to their importance for you when choosing car sharing or rental service? [Separate entertainment for each passenger]	3.389785	1.20	372.000	0.685

Table 6.6 Source of entertainment-region (Q1) cross-tab analysis

			Region				
			India	Europe	North America	Others	Total
Sources of entertainment	Radio	Count	114	111	15	8	248
		% within Q1	46.0%	44.8%	6.0%	3.2%	
		% within region	35.6%	53.4%	37.5%	57.1%	
	Personalized music and video contents	Count	159	81	19	4	263
		% within Q1	60.5%	30.8%	7.2%	1.5%	
		% within region	49.7%	38.9%	47.5%	28.6%	
	Television	Count	9	3	2	1	15
		%within Q1	60.0%	20.0%	13.3%	6.7%	
		% within region	2.8%	1.4%	5.0%	7.1%	
	Web browsing	Count	22	9	3	1	35
		% within Q1	62.9%	25.7%	8.6%	2.9%	
		% within region	6.9%	4.3%	7.5%	7.1%	
	Newspaper and magazines	Count	16	4	1	0	21
		% within Q1	76.2%	19.0%	4.8%	0.0%	
		% within region	5.0%	1.9%	2.5%	0.0%	
Total		Count	320	208	40	14	582

Percentages and totals are based on responses

Table 6.7 Summary of cross-tab analysis (Q2), devices used for entertainment-region

			Region				
			India	Europe	North America	Others	Total
Devices used for entertainment in car	Using internet profiles on infotainment system	Count	101	72	10	6	189
		% within Q2	53.4%	38.1%	5.3%	3.2%	
		% within region	22.3%	23.1%	19.6%	26.1%	
	Connect mobile phone to infotainment	Count	120	100	20	7	247
		% within Q2	48.6%	40.5%	8.1%	2.8%	
		% within region	26.5%	32.1%	39.2%	30.4%	
	Connect virtual reality gears (oculus) to infotainment system	Count	37	20	4	0	61
		% within Q2	60.7%	32.8%	6.6%	0.0%	
		% within region	8.2%	6.4%	7.8%	0.0%	
	CD/DVD	Count	15	20	2	1	38
		% within Q2	39.5%	52.6%	5.3%	2.6%	
		% within region	3.3%	6.4%	3.9%	4.3%	
	USB stick or memory card	Count	99	43	3	4	149
		% within Q2	66.4%	28.9%	2.0%	2.7%	
		% within region	21.9%	13.8%	5.9%	17.4%	
	Broadcast radio	Count	52	47	7	3	109
		% within Q2	47.7%	43.1%	6.4%	2.8%	
		% within region	11.5%	15.1%	13.7%	13.0%	
	Broadcast TV	Count	19	5	4	1	29
		% within Q2	65.5%	17.2%	13.8%	3.4%	
		% within region	4.2%	1.6%	7.8%	4.3%	
	Laptop	Count	10	5	1	1	17
		% within Q2	58.8%	29.4%	5.9%	5.9%	
		% within region	2.2%	1.6%	2.0%	4.3%	
Total		Count	453	312	51	23	839

Percentages and totals are based on responses

The HMI part of the AIS consists of the way consumers like to control the AIS and the display features that the system provides. This is important to understand how consumer expect to enjoy videos in a car. A respondent summary for preferred way of controlling the AIS is shown in Table 6.9. Indians have the maximum preference for voice assistance (50%) compared to Europeans (36.5%). The second-most highly opted for feature is the touch screen control. Controlling with buttons and knobs are still preferred by Europeans (16.1%) compared to Indians (5%).

Table 6.8 Summary of cross tab analysis (Q3), functionalities expected in infotainment-region

			Region				
			India	Europe	North America	Others	Total
Functions expected in car	Music	Count	158	125	20	10	313
		% within Q3	50.5%	39.9%	6.4%	3.2%	
		% within region	31.1%	35.6%	32.8%	41.7%	
	Videos	Count	90	50	13	4	157
		% within Q3	57.3%	31.8%	8.3%	2.5%	
		% within region	17.7%	14.2%	21.3%	16.7%	
	Business utilities	Count	63	57	7	0	127
		% within Q3	49.6%	44.9%	5.5%	0.0%	
		% within region	12.4%	16.2%	11.5%	0.0%	
	Shopping	Count	24	15	3	1	43
		% within Q3	55.8%	34.9%	7.0%	2.3%	
		% within region	4.7%	4.3%	4.9%	4.2%	
	Games	Count	40	11	4	2	57
		% within Q3	70.2%	19.3%	7.0%	3.5%	
		% within region	7.9%	3.1%	6.6%	8.3%	
	Web browser	Count	73	56	9	4	142
		% within Q3	51.4%	39.4%	6.3%	2.8%	
		% within region	14.4%	16.0%	14.8%	16.7%	
	Social - network-ing platforms	Count	60	37	5	3	105
		% within Q3	57.1%	35.2%	4.8%	2.9%	
		% within region	11.8%	10.5%	8.2%	12.5%	
Total		Count	508	351	61	24	944

Percentages and totals are based on responses

As shown in Table 6.10 summary of preference for expectations in the display system of the infotainment. Europeans are more likely to expect flat display screens (34.8%), whereas the Indians are more likely to opt for curved display screens (28.6%). In Europe and America, the most preferred display is the flat screen. Heads-up displays are preferred more in North America (31.6%) followed by Europe (19.1%).

Respondents were asked about the preference on the type of infotainment system they would like to have. The frequency of the responses is shown in Table 6.11. India (60.4%) and North America (68%) prefer a single common system for the whole car. It is the opposite case in Europe where the respondents have mentioned to have a separate entertainment system for each passenger of the car (54%).Table 6.12 shows the importance of infotainment systems in making decisions while buying a car. Overall infotainment plays a significant role in making decisions for car purchase. It is also seen that for Indian respondents AIS features are marked more frequent for “Extremely Important” compared to Europe.

Table 6.9 Summary of crosstab analysis (Q4), preference for controlling the infotainment system-region

			Region				
			India	Europe	North America	Others	Total
How do you prefer to control the infotainment system of your car?	Touch screen	Count	62	43	6	5	116
		% within Q4	53.4%	37.1%	5.2%	4.3%	100.0%
		% within region	30.7%	31.4%	24.0%	50.0%	31.0%
	Buttons, knobs and switches	Count	10	22	4	0	36
		% within Q4	27.8%	61.1%	11.1%	0.0%	100.0%
		% within region	5.0%	16.1%	16.0%	0.0%	9.6%
	Voice assistance	Count	101	50	12	4	167
		% within Q4	60.5%	29.9%	7.2%	2.4%	100.0%
		% within region	50.0%	36.5%	48.0%	40.0%	44.7%
	Human gestures	Count	18	19	3	0	40
		% within Q4	45.0%	47.5%	7.5%	0.0%	100.0%
		% within region	8.9%	13.9%	12.0%	0.0%	10.7%
	Remote control	Count	11	3	0	1	15
		% within Q4	73.3%	20.0%	0.0%	6.7%	100.0%
		% within region	5.4%	2.2%	0.0%	10.0%	4.0%
Total		Count	202	137	25	10	374
		% within Q4	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Respondents were asked for reasons to listen to radio while driving car. The results are shown in Table 6.13. In all the regions the most frequent response was "No need to choose song each time while driving car." The second-most frequent response for India is for live traffic updates and weather while in Europe the second-most frequent response is for the news and talk shows that are played on the radio.

Features that are expected by the consumers each have different business car underlying them. From Table 6.14, respondents from India have opted for "Display name of the program along with song title and artist name" as the first option (26.4%). The same goes for Europe with 29.6% opting for that feature. Europeans (27.3%) prefer to "select radio stations by name" compared to the Indians (23.2%). Indians (18.5%) also most likely prefer to the feature "Ability to record, pause and play the program" compared to Europeans (8.8%).

From Table 6.15, respondents have indicated clearly that they listen radio both within cities and in the motorways. This implies that offering solutions for radio reception is of importance where radio coverage is weak. Therefore, new innovations such as IP blending and seamless reception techniques stand a great chance for user adoption.

Table 6.10 Summary of crosstab analysis (Q5), preference for display feature in the Infotainment System-Region

			Region				
			India	Europe	North America	Others	Total
Display technologies preferred in car	Flat display screens	Count	73	71	12	6	162
		% within Q5	45.1%	43.8%	7.4%	3.7%	
		% within region	25.4%	34.8%	31.6%	54.5%	
	Curved display screens that fit nice on your dashboard	Count	82	45	9	2	138
		% within Q5	59.4%	32.6%	6.5%	1.4%	
		% within region	28.6%	22.1%	23.7%	18.2%	
	3D display screen	Count	60	17	3	0	80
		% within $q5	75.0%	21.3%	3.8%	0.0%	
		% within region	20.9%	8.3%	7.9%	0.0%	
	Heads up display (wind shield display)	Count	43	39	12	0	94
		% within $q5	45.7%	41.5%	12.8%	0.0%	
		% within region	15.0%	19.1%	31.6%	0.0%	
	Augmented reality	Count	29	31	2	3	65
		% within $q5	44.6%	47.7%	3.1%	4.6%	
		% within region	10.1%	15.2%	5.3%	27.3%	
	None of the above	Count	0	1	0	0	1
		% within $q5	0.0%	100.0%	0.0%	0.0%	
		% within region	0.0%	0.5%	0.0%	0.0%	
Total		Count	287	204	38	11	540

Percentages and totals are based on responses

Table 6.11 Summary of Responses for crosstab analysis (Q6), preferred type of infotainment system-region

			Region				
			India	Europe	North America	Others	Total
How do you like to have your entertainment system in car?	Individual entertainment system	Count	80	74	8	5	167
		% within Q6	47.9%	44.3%	4.8%	3.0%	100.0%
		% within region	39.6%	54.0%	32.0%	50.0%	44.7%
	Common entertainment system	Count	122	63	17	5	207
		% within Q6	58.9%	30.4%	8.2%	2.4%	100.0%
		% within region	60.4%	46.0%	68.0%	50.0%	55.3%
Total		Count	202	137	25	10	374
		% within Q6	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.12 Summary of cross tab analysis (Q7), importance of AIS features when making car buying decisions-region

			Region				
			India	Europe	North America	Others	Total
How important are the infotainment system features, when you decide to buy a new car?	Extremely important	Count	78	14	8	0	100
		% within Q7	78.0%	14.0%	8.0%	0.0%	100.0%
		% within region	38.6%	10.4%	32.0%	0.0%	26.9%
	Important	Count	95	71	14	6	186
		% within Q7	51.1%	38.2%	7.5%	3.2%	100.0%
		% within region	47.0%	52.6%	56.0%	60.0%	50.0%
	Neutral	Count	20	33	2	3	58
		% within Q7	34.5%	56.9%	3.4%	5.2%	100.0%
		% within region	9.9%	24.4%	8.0%	30.0%	15.6%
	Less important	Count	7	11	1	1	20
		% within Q7	35.0%	55.0%	5.0%	5.0%	100.0%
		% within region	3.5%	8.1%	4.0%	10.0%	5.4%
	Not at all important	Count	2	6	0	0	8
		% within Q7	25.0%	75.0%	0.0%	0.0%	100.0%
		% within region	1.0%	4.4%	0.0%	0.0%	2.2%
Total		Count	202	135	25	10	372
		% within Q7	54.3%	36.3%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.13 Summary of cross tab analysis (Q8), reasons for listening to radio in car-region

			Region				
			India	Europe	North America	Others	Total
Why do you listen to radio when in car?	No need to choose songs each time while driving	Count	131	103	17	7	258
		% within Q8	50.8%	39.9%	6.6%	2.7%	
		% within region	30.8%	35.3%	33.3%	30.4%	
	News program and local events update	Count	106	87	12	6	211
		% within Q8	50.2%	41.2%	5.7%	2.8%	
		% within region	24.9%	29.8%	23.5%	26.1%	
	The talk shows that are hosted on radio program	Count	53	30	7	6	96
		% within Q8	55.2%	31.3%	7.3%	6.3%	
		% within region	12.4%	10.3%	13.7%	26.1%	
	For live traffic and weather updates	Count	117	69	13	4	203
		% within Q8	57.6%	34.0%	6.4%	2.0%	
		% within region	27.5%	23.6%	25.5%	17.4%	
	Commercials	Count	19	3	2	0	24
		% within Q8	79.2%	12.5%	8.3%	0.0%	
		% within region	4.5%	1.0%	3.9%	0.0%	
Total		Count	426	292	51	23	792

Percentages and totals are based on responses

Table 6.14 Summary of cross tab analysis (Q9), features expected for broad cast radio listening-region

			Region				
			India	Europe	North America	Others	Total
What are the important radio features you would like to have in your car?	Select radio stations by name	Count	115	96	16	6	233
		% within Q9	49.4%	41.2%	6.9%	2.6%	
		% within region	23.2%	27.3%	27.1%	26.1%	
	Display name of the program along with song title and artist name	Count	131	103	17	7	258
		% within Q9	50.8%	39.9%	6.6%	2.7%	
		% within region	26.4%	29.3%	28.8%	30.4%	
	Automatic traffic updates when driving your car	Count	127	98	17	6	248
		% within Q9	51.2%	39.5%	6.9%	2.4%	
		% within region	25.6%	27.8%	28.8%	26.1%	
	Receive text or images form the radio station about news report	Count	31	24	3	2	60
		% within Q9	51.7%	40.0%	5.0%	3.3%	
		% within region	6.3%	6.8%	5.1%	8.7%	
	Ability to record, pause and play the program	Count	92	31	6	2	131
		% within Q9	70.2%	23.7%	4.6%	1.5%	
		% within region	18.5%	8.8%	10.2%	8.7%	
Total		Count	496	352	59	23	930

Percentages and totals are based on responses

Table 6.15 Summary of crosstab analysis (Q10), to where people listen to radio in car

			Region				
			India	Europe	North America	Others	Total
Where do you prefer to listen to broadcast radio in car?	Within cities	Count	28	17	3	3	51
		% within Q10	54.9%	33.3%	5.9%	5.9%	100.0%
		% within region	13.9%	12.4%	12.0%	30.0%	13.6%
	Motorways	Count	24	17	2	1	44
		% within Q10	54.5%	38.6%	4.5%	2.3%	100.0%
		% within region	11.9%	12.4%	8.0%	10.0%	11.8%
	Everywhere	Count	141	99	17	6	263
		% within Q10	53.6%	37.6%	6.5%	2.3%	100.0%
		% within region	69.8%	72.3%	68.0%	60.0%	70.3%
	Will not listen radio	Count	9	4	3	0	16
		% within Q10	56.3%	25.0%	18.8%	0.0%	100.0%
		% within region	4.5%	2.9%	12.0%	0.0%	4.3%
Total		Count	202	137	25	10	374
		% within Q10	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.16 Crosstab analysis for need for radio system if car internet is available

			Region				
			India	Europe	North America	Others	Total
If you have internet in your car, would you still need broadcast radio?	Yes	Count	148	97	17	6	268
		% within Q11	55.2%	36.2%	6.3%	2.2%	100.0%
		% within region	73.3%	70.8%	68.0%	60.0%	71.7%
	No	Count	54	40	8	4	106
		% within Q11	50.9%	37.7%	7.5%	3.8%	100.0%
		% within region	26.7%	29.2%	32.0%	40.0%	28.3%
Total		Count	202	137	25	10	374
		% within Q11	54.0%	36.6%	6.7%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

Respondents were asked the question "If you have Internet in your car, would you still need broadcast radio?". Table 6.16 shows the responses which clearly indicate that people still expect broadcast radio reception in their car.

It can be seen from Table 6.17 that single person future mobility plans clearly indicate that Indian respondents do not prefer public transport for all distances except for a 501–1000 km distance (35.6%). First option being own car (47.5%) and car sharing (24.8%) is a second-best viable option for distances <50 km. However, in the case of Europe public transport (42.2%) is mostly preferred for a distance <50 km, followed by own car (37%). For distances of 51–100 km own car is the most preferred by Indians (47.5%), Europeans (44.4%) and North Americans (52%). Also for 51–100 km distances Europeans are most likely to use ride-sharing service (17.8%) compared to Indians (12.4%). Also, car sharing is preferred as a second alternative to own car and the car sharing is preferred more likely by Indian respondents than European respondents. Clearly for distance >1000 km Airplane is the most preferred mode of transport. Indians are most likely interested in using car as mode of transport except for a distance of 501–1000 km.

Respondents were asked "*When would they use car sharing services?"* From Table 6.18 Indian respondents chose the maximum for daily commutation to work followed by when there are no public transport facilities. European respondents have chosen the maximum of "Never" followed by no public transport facility. Same applies to North America. Overall no proper public transport drives the car sharing and followed by most people don't want to use otherwise.

Table 6.19 shows the summary of responses to "*How do you prefer to have your personalized entertainment experience when using a car sharing or rental service*?". To which clearly all the respondents want to achieve through mobile phone followed by not to have any personalized infotainment experience every time they use car-sharing service. The least frequent response for India, Europe and North America was to have personalized experience using Internet.

Table 6.17 Summary of responses for Q12, single person future mobility based on distance

Distance to be covered (km)	Mode of transport	India	Europe	North America	Others	Total
<50	Own car (%)	47.5	37.0	56.0	33.3	43.9
	Car sharing (%)	24.8	17.0	12.0	16.7	20.9
	Car rental (%)	4.0	1.5	0.0	0.0	2.7
	Ride sharing (carpooling) (%)	8.4	3.0	4.0	0.0	5.9
	Public transport (%)	13.9	42.2	28.0	33.3	25.7
	Aero plane (%)	1.5	0.7	0.0	0.0	1.1
51–100	Own car (%)	47.5	44.4	52.0	41.7	46.5
	Car sharing (%)	21.8	14.1	24.0	16.7	19.0
	Car rental (%)	9.4	9.6	0.0	8.3	8.8
	Ride sharing (carpooling) (%)	12.4	17.8	16.0	0.0	14.2
	Public transport (%)	8.9	14.8	8.0	16.7	11.2
	Aero plane (%)	0.0	0.7	0.0	0.0	0.3
101–500	Own car (%)	48.0	34.1	52.0	16.7	42.2
	Car sharing (%)	8.4	5.9	12.0	0.0	7.5
	Car rental (%)	9.4	9.6	0.0	8.3	8.8
	Ride sharing (carpooling) (%)	12.4	17.8	16.0	0.0	14.2
	Public transport (%)	8.9	14.8	8.0	16.7	11.2
	Aero plane (%)	0.0	0.7	0.0	0.0	0.3
501–1000	Own car (%)	29.2	17.0	32.0	8.3	24.3
	Car sharing (%)	0.0	0.0	0.0	166.7	5.3
	Car rental (%)	10.4	9.6	28.0	0.0	11.0
	Ride sharing (carpooling) (%)	4.0	5.2	4.0	0.0	4.3
	Public transport (%)	35.6	32.6	4.0	25.0	32.1
	Aero plane (%)	13.4	34.1	28.0	50.0	23.0
>1000	Own car (%)	24.8	11.9	16.0	8.3	19.0
	Car sharing (%)	3.5	0.7	4.0	0.0	2.4
	Car rental (%)	8.4	4.4	12.0	0.0	7.0
	Ride sharing (carpooling) (%)	1.5	1.5	0.0	0.0	1.3
	Public transport (%)	6.4	5.9	8.0	8.3	6.4
	Aero plane (%)	55.4	77.0	60.0	66.7	63.9

Percentages shown are calculated within region

Respondents were asked "*Rank the features according to their importance for you when choosing car sharing or rental service?*". Table 6.20, shows the summary of responses. Across all the regions respondents have chosen the maximum for navigation system as extremely important. Radio systems are "Extremely important" to North Americans (32%) compared to Indians (28.7%) and Europeans (28.1%).

Table 6.18 Summary of crosstab analysis for Q13, car sharing use cases-region

			Region				
			India	Europe	North America	Others	Total
When do you use car sharing service?	Never	Count	45	55	9	4	113
		% within Q13	39.8%	48.7%	8.0%	3.5%	
		% within region	15.6%	29.4%	18.0%	33.3%	
	Daily travel to work	Count	66	9	6	1	82
		% within Q13	80.5%	11.0%	7.3%	1.2%	
		% within region	22.9%	4.8%	12.0%	8.3%	
	Business trip to new cities	Count	24	13	6	0	43
		% within Q13	55.8%	30.2%	14.0%	0.0%	
		% within region	8.3%	7.0%	12.0%	0.0%	
	Family vacation	Count	38	17	7	3	65
		% within Q13	58.5%	26.2%	10.8%	4.6%	
		% within region	13.2%	9.1%	14.0%	25.0%	
	Single person vacation	Count	26	26	6	1	59
		% within Q13	44.1%	44.1%	10.2%	1.7%	
		% within region	9.0%	13.9%	12.0%	8.3%	
	No public transport option	Count	65	48	8	3	124
		% within Q13	52.4%	38.7%	6.5%	2.4%	
		% within region	22.6%	25.7%	16.0%	25.0%	
	Socialize with people	Count	24	19	8	0	51
		% within Q13	47.1%	37.3%	15.7%	0.0%	
		% within region	8.3%	10.2%	16.0%	0.0%	
Total		Count	288	187	50	12	537

Percentages and totals are based on responses

Internet connectivity in the car is also extremely important for Indians (40.1%) compared to Europeans (19.3%). Common entertainment systems are "Extremely Important" for Indians (24.8%) compared to Europeans (7.4%) and North Americans (4%). Separate individual entertainment systems are "Important" to Indians (21.3%) compared to Europeans (9.6%) and North Americans (4%). Overall it can be seen that for Indians (22.3%) and Europeans (24.4%) individual entertainment systems are not expected in car-sharing services.

Respondents were asked "*If you were to ride in a completely self-driving vehicle, what would you do in your newly found free time in the car?*". From Table 6.21, Indian respondents have chosen "Enjoy the scenery" (24.2%) followed by "being entertained" (19.3%) was chosen. However, the European respondents have also chosen "Enjoy the scenery" (19.2%) and "Being productive" (19.2%) with business utilities more compared to Indian respondents (16.0%).

Table 6.19 Summary of cross tab analysis for Q14, personalization of infotainment system in car sharing services

			Region				
			India	Europe	North America	Others	Total
How do you prefer to have your personalized entertainment experience when using a car sharing or rental service?	Using internet profile	Count	31	24	6	4	65
		% within Q14	47.7%	36.9%	9.2%	6.2%	100.0%
		% within region	15.3%	18.0%	24.0%	40.0%	17.6%
	Using mobile phone	Count	108	70	10	3	191
		% within Q14	56.5%	36.6%	5.2%	1.6%	100.0%
		% within region	53.5%	52.6%	40.0%	30.0%	51.6%
	No personalization needed	Count	63	39	9	3	114
		% within Q14	55.3%	34.2%	7.9%	2.6%	100.0%
		% within region	31.2%	29.3%	36.0%	30.0%	30.8%
Total		Count	202	133	25	10	370
		% within Q14	54.6%	35.9%	6.8%	2.7%	100.0%
		% within region	100.0%	100.0%	100.0%	100.0%	100.0%

6.4.2 Statistical Significance of the Demographic Effects

Table 6.22 shows the one-way ANOVA results that are significant with respect to regions. There is statistically significant difference between infotainment features in buying decisions for the car and the region determined. Europeans differ statistically significantly from Indians and North Americans in the infotainment features for buying decisions. Also, statistically significant difference is seen in Table 6.22 for the infotainment features that are expected in car-sharing services. Indians prefer to have Internet connectivity in the car compared to the Europeans. Overall Indians find the infotainment features to be very important in car-sharing services compared to Europeans.

Table 6.23 shows the one-way ANOVA results that are significant with respect to the car type being used by the respondents. There is statistically significant difference between having navigation and common entertainment for all passengers, when using car-sharing services and the car type the respondents own. Respondents who have compact cars are less likely to emphasize on the navigation feature in car-sharing services. Also, compact car owners are less likely to emphasize on a common entertainment system for all passengers.

Table 6.24 shows the one-way ANOVA results that are significant with respect to employment status. There is statistically significant difference between infotainment features in buying decisions for the car and the region. Self-employed and government employees are more likely to be influenced by the infotainment features

Table 6.20 Summary of responses for Q15, features expected from AIS when using car sharing or rental service

		India	Europe	North America	Others	Total
Radio	Extremely important (%)	28.7	28.1	32.0	0.0	27.8
	Important (%)	48.0	37.8	40.0	58.3	44.1
	Neutral (%)	13.9	24.4	16.0	16.7	17.9
	Less important (%)	5.0	5.2	4.0	8.3	5.1
	Not at all important (%)	4.5	5.9	8.0	0.0	5.1
Navigation	Extremely important (%)	56.9	60.0	72.0	50.0	58.8
	Important (%)	34.7	28.1	20.0	33.3	31.3
	Neutral (%)	6.4	7.4	8.0	0.0	6.7
	Less important (%)	1.0	2.2	0.0	0.0	1.3
	Not at all important (%)	1.0	3.7	0.0	0.0	1.9
Internet connectivity	Extremely important (%)	40.1	19.3	36.0	16.7	31.6
	Important (%)	35.6	31.9	28.0	50.0	34.2
	Neutral (%)	16.8	24.4	28.0	8.3	20.1
	Less important (%)	5.0	11.1	8.0	8.3	7.5
	Not at all important (%)	2.5	14.8	0.0	0.0	6.7
Common entertainment	Extremely important (%)	24.8	7.4	4.0	8.3	16.6
	Important (%)	34.2	21.5	44.0	33.3	30.2
	Neutral (%)	27.7	40.0	48.0	16.7	33.2
	Less important (%)	9.4	13.3	4.0	25.0	11.0
	Not at all important (%)	4.0	19.3	0.0	0.0	9.1
Individual entertainment	Extremely important (%)	9.4	3.7	12.0	0.0	7.2
	Important (%)	21.3	9.6	4.0	16.7	15.8
	Neutral (%)	28.7	29.6	48.0	25.0	30.2
	Less important (%)	22.3	24.4	24.0	33.3	23.5
	Not at all important (%)	18.3	34.1	12.0	8.3	23.3

Percentages shown are calculated within region

Table 6.21 Summary of responses Q17, cross tab analysis for region-using the free time created by self-driving cars

			Region				
			India	Europe	North America	Others	Total
If you were to ride in a completely self-driving vehicle, what would you do in your newly found free time in the car?	Sleep	Count	45	52	7	3	107
		% within Q17	42.1%	48.6%	6.5%	2.8%	
		% within region	9.2%	13.0%	11.1%	10.3%	
	Being productive (work/school work)	Count	78	77	10	3	168
		% within Q17	46.4%	45.8%	6.0%	1.8%	
		% within region	16.0%	19.2%	15.9%	10.3%	
	Being social (talk with friend, chatting)	Count	74	63	12	6	155
		% within Q17	47.7%	40.6%	7.7%	3.9%	
		% within region	15.2%	15.7%	19.0%	20.7%	
	Being entertained (music, videos, games)	Count	94	74	14	9	191
		% within Q17	49.2%	38.7%	7.3%	4.7%	
		% within region	19.3%	18.5%	22.2%	31.0%	
	Enjoy the scenery	Count	118	77	10	5	210
		% within Q17	56.2%	36.7%	4.8%	2.4%	
		% within region	24.2%	19.2%	15.9%	17.2%	
	Be cautious and still watch the road	Count	78	58	10	3	149
		% within Q17	52.3%	38.9%	6.7%	2.0%	
		% within region	16.0%	14.5%	15.9%	10.3%	
Total		Count	487	401	63	29	980

Percentages and totals are based on responses

Table 6.22 Results of one-way ANOVA for regions

Question	F	Sig.	India	Europe	North America	Others
How important are the infotainment system features, when you decide to buy a new car?	15.571	0.000	1.81	2.44	1.84	2.5
Rank the features according to their importance for you when choosing car sharing or rental service? [Internet connectivity in car]	16.315	0.000	1.94	2.71	2.08	2.1
Rank the features according to their importance for you when choosing car sharing or rental service? [Common entertainment for all passengers]	18.321	0.000	2.34	3.15	2.52	2.7
Rank the features according to their importance for you when choosing car sharing or rental service? [Separate entertainment for each passenger]	8.776	0.000	3.19	3.74	3.2	3.4

Table 6.23 Results of one-way Anova for car type

Question	Sig	F	Don't have car	Compact car	Midsize car	Large car	Executive car	Luxury car	Sports car	MUV	SUV	Mini car
Rank the features according to their importance for you when choosing car sharing or rental service? [Navigation]	0.018	2.27	1.55	1.94	1.39	1.53	1.38	1.56	1.67	1.33	1.38	1.75
Rank the features according to their importance for you when choosing car sharing or rental service? [Common entertainment for all passengers]	0.044	1.95	2.93	2.47	2.62	2.84	2.38	1.89	2.00	2.67	2.24	2.69

Table 6.24 Results of One-way ANOVA for employment status

Question	Sig.	F	Self employed	Government employee	Working in Private organizations	Part time	Student	Currently not employed	Retired
How important are the infotainment system features, when you decide to buy a new car?	0.000	5.62	1.72	1.54	2.01	1.90	2.31	2.73	1.60
Rank the features according to their importance for you when choosing car sharing or rental service? [Common entertainment for all passengers]	0.001	3.672	2.83	1.86	2.59	2.60	2.93	2.80	2.40
Rank the features according to their importance for you when choosing car sharing or rental service? [Separate entertainment for each passenger]	0.000	4.739	3.31	3.86	3.17	3.20	3.74	3.60	2.00

compared to students and those currently not employed in the infotainment features for buying decisions. Furthermore, there is statistically significant difference in the expectation of the entertainment system such as a single common entertainment system or an individual entertainment system. Government employees are more likely to expect common infotainment features when using a car-sharing service.

6.5 Conclusion

This thesis work examines the consumer expectations from the automotive infotainment system. A comprehensive literature analysis was used to identify the megatrend studies. It was founded that several global megatrends such as changing demographics, shifting in economic power where now economic focus is turned towards BRICS nations were studied. Furthermore, the rapid urbanization, technological advancements and environment-friendly solutions were found to be the main megatrend drivers. Later on, literature concerning the impact of global megatrends on AIS market were studied. It is found that, the OEMs benefit by partnering with the automotive semiconductor industry. Also the benefits of SDR platforms were studied. Clearly there is a strong competition in the infotainment software platforms, where mobile phone giants such as Google and Apple are aggressively competing to gain the market share. Also, there are several open-source platforms that are widely being developed in order to foster open-source innovation.

The literature review was also used to identify the factors that influence the consumer expectations from AIS. Consumer expectations are broadly dependent on cultural, social, demographics, technology adoption and lifestyle factors. Several theories that explains these behaviors were studied. Also, literatures that examined these mentioned factors specific to AIS were reviewed.

One of the main objective of the thesis was to conduct a market survey to determine the features that are expected by the consumers in the AIS. To achieve this a questionnaire was developed, with the explanation for underlying reasons to each question was discussed. The survey responses were analyzed mainly for the European and Indian markets. However, since the questionnaire was distributed in open platforms, responses for North America and other countries were also present. The main findings from the survey are that the influence of infotainment features on buying decision is more in India compared to Europe. The second important finding is that the features that are expected from the infotainment systems on a car-sharing or rental service is different across the regions. Indians are most likely to expect Internet connectivity in car-sharing services and generally see infotainment features to be very important in car-sharing services compared to Europeans.

Consumers still places a lot of importance on the car radio system. Though personalized music and video contents are preferred a lot, radio systems can be still seen as not completely replaceable in the near future. Also, Europeans see a strong requirement for radio systems compared to Indians who prefer personalized music and video contents. The features that are expected for the radio system are the

display name of the programs and selecting the radio stations by their name. Also, Indians are most likely to expect the feature for recording the broadcast radio programs. Additionally, it can be seen that radio is listened to widely within cities and also in motorways, so in places where radio signals are weak, the features such as IP-blending technology for seamless reception have a good future.

The other findings are that voice assistance is the most preferred way of controlling the AIS and flat display screen are preferred. It was shown that the car still remains as the preferred mode of transport for future mobility. It was found that in future with completely self-driven cars people expect features for entertainment and productivity features in the car to make use of free time.

As future research it is proposed to collect more data from people of different age groups and more female participants. Also, the analysis could become more significant if large samples are collected from North America to get statistically significant results if the survey is focused on this region and China.

Appendix: Survey Questionnaire

In-Car Entertainment

In this section, consumer preference for infotainment features that they would like to have in their future car are studied.

1. What is your primary source of entertainment in car?* (multiple responses possible)

   (a) Radio
   (b) Personalized music and video contents
   (c) Television
   (d) Web browsing
   (e) Newspaper and magazines
   (f) Others

2. How do you like to play music or video in car?* (multiple response possible)

   (a) Using Internet profiles on infotainment system
   (b) Connect mobile phone to infotainment unit
   (c) Connect virtual reality gears (Oculus) to infotainment system
   (d) CD/DVD
   (e) USB stick or memory card
   (f) Broadcast radio
   (g) Broadcast TV
   (h) Laptop

3. What following functions, you would like to have in your new car?* (multiple responses possible)

   (a) Music
   (b) Videos
   (c) Business utilities
   (d) Shopping
   (e) Gaming
   (f) Web browser
   (g) Social networking platforms

4. How do you prefer to control the infotainment system of your car?* (only one response possible)

   (a) Touch screen control
   (b) With buttons, knobs and switches
   (c) Voice assistance
   (d) With human gestures
   (e) Remote control

5. What display feature you prefer to have in your car for experiencing videos? * (multiple responses possible)

   (a) Flat display screen
   (b) Curved display screens that fit nicely on your dashboard
   (c) 3D display screen
   (d) Heads-up display (wind shield display)
   (e) Augmented reality
   (f) Others

6. How do you like to have your entertainment system in car? * (only one response possible)

   (a) Individual entertainment system for each passenger
   (b) Single entertainment system for all passengers

7. How important are the infotainment system features, when you decide to buy a new car? * (only one response possible)

   (a) Extremely important
   (b) Important
   (c) Neutral
   (d) Less Important
   (e) Not at all important

Car Radio

In this section, analysis of consumer behavior for listening to radio in the car and radio features they would like to have is studied:

8. Why do you listen to radio when driving? * (multiple responses possible)
   (a) No need to choose songs each time while driving
   (b) News program and local events
   (c) The talk shows that are hosted on radio program
   (d) For live traffic and weather updates
   (e) Commercials
9. What are the important radio features you would like to have in your car? * (multiple responses possible)
   (a) Select radio station by their name and not by the radio station frequency number
   (b) Display name of the program along with song title and artist name
   (c) Automatic traffic updates when driving your car
   (d) Receive text or images form the radio station about news report
   (e) Ability to record, pause and play the program
   (f) Others
10. Where do you prefer to listen to broadcast radio in car? * (only one response possible)
   (a) Within cities
   (b) In motorways (highways)
   (c) Both within cities and motorways
   (d) I do not listen to radio
11. If you have Internet in your car, would you still need broadcast radio? * (only one response possible)
   (a) Yes
   (b) No

Impact of Sharing Economy on Infotainment Systems

In this section consumer preference for future mobility and their entertainment experience in sharing economy is studied.

Sharing economy is an economic model in which individuals are able to borrow or rent assets owned by someone else:

1. Car sharing means renting a car for shorter period of time, usually by hours whenever needed.

2. Car rental means renting a car for longer period of time, usually on a day basis.
3. Ride sharing (carpooling)—the concept of sharing space within a given vehicle along with other people (e.g., blabla car).

12. Please mark your preference for single person, future mobility based on the distance you want to cover? * (only one response possible for each row)

	Own car	Car sharing	Car rental	Ride sharing	Public transport	Airplane
<50 km						
50–100 km						
100–501 km						
501–1000 km						
>1000 km						

13. When do you use car-sharing service? * (multiple responses possible)

(a) Never
(b) Daily travel to work
(c) Business trip to new cities
(d) Family vacation
(e) Single-person vacation
(f) No public transport options
(g) Socialize with people
(h) Others

14. How do you prefer to have your personalized entertainment experience when using a car-sharing or rental service? * (only one response possible)

(a) Using an Internet profile (e.g., Facebook, Google accounts)
(b) Using mobile phone
(c) I do not want to have personalized setting in shared or rental car

15. Rank the features according to their importance for you when choosing car sharing or rental service?* (only one response possible for each row)

	Very important	Important	Neutral	Less important	Not at all important
Radio system					
Navigation					
Internet connectivity in the car					
Common entertainment for all passengers					
Separate entertainment for each passenger					

Autonomous Cars

Fully autonomous or completely self-driven cars are cars that will control all safety-critical functions for the entire trip and do not require human intervention at all.

16. What do you like the most about completely self-driving cars? * (multiple response possible)

    (a) Provides extra free time
    (b) No need to learn about driving a car
    (c) Reduces the stress due to driving
    (d) Good solution for physically challenged people

17. If you were to ride in a completely self-driving vehicle, what would you do in your newly found free time in the car? * (multiple response possible)

    (a) Sleep
    (b) Being productive (work/school work)
    (c) Being social (talk with friend, chatting)
    (d) Being entertained (music, videos, games)
    (e) Enjoy the scenery
    (f) Be cautious and still watch the road

Demographic Details

In this section, please provide your demography details in order to perform the study. Since this study is conducted on a whole group and not an individual, your names are not necessary. So, feel free to give your details.

18. Gender * (only one response possible)

    (a) Male
    (b) Female

19. Age group * (only one response possible)

    (a) Less than 18 years
    (b) 18 to 30 years
    (c) 31 to 40 years
    (d) 41 to 50 years
    (e) 51 to 50 years
    (f) 61 years and above

20. Which region do you live? * (only one response possible)

    (a) India
    (b) Europe

(c) North America
(d) South America
(e) China
(f) Others

21. What type of car you drive frequently? * (only one response possible)

(a) I do not have a car
(b) Compact/small cars
(c) Midsize cars
(d) Large cars
(e) Executive cars
(f) Luxury cars
(g) Sport cars
(h) Multipurpose vehicle (MPV)
(i) SUV
(j) Mini cars

22. What is your current employment status? * (only one response possible)

(a) Self-employed
(b) Employed in the government
(c) Employed full time in a private organization
(d) Employed part time
(e) Student
(f) Currently not employed
(g) Retired

* Questions marked star are compulsory to answer

References

1. Kotler, P., & Levy, S. J. (1969). Broadening the concept of marketing. *Journal of Marketing, 33*(1), 10–15.
2. McCullough, D. (1998). Web-based market research: The dawning of a new age. *Direct Marketing-Garden City, 61*, 36–38.
3. Slater, S. F., & Narver, J. C. (1998). Customer-led and market-oriented: Let's not confuse the two. *Strategic Management Journal, 19*, 1001–1006.
4. Chang, T.-S., & Hsiao, W.-H. (2011). 'Consumers' automotive purchase decisions: The significance of vehicle-based infotainment systems. *African Journal of Business Management, 5*(11), 4152.
5. Lo Bello, L. (2011). The case for ethernet in automotive communications. *ACM SIGBED Review, 8*(4), 7–15.
6. Schneiderman, R. (2013). Car makers see opportunities in infotainment, driver-assistance systems [special reports]. *IEEE Signal Processing Magazine, 30*(1), 11–15.
7. Beske, P., Koplin, J., & Seuring, S. (2008). The use of environmental and social standards by German first-tier suppliers of the Volkswagen AG. *Corporate Social Responsibility and Environmental Management, 15*(2), 63–75.

8. Rouibah, K., & Caskey, K. R. (2003). Change management in concurrent engineering from a parameter perspective. *Computers in Industry, 50*(1), 15–34.
9. Tang, D., & Qian, X. (2008). Product lifecycle management for automotive development focusing on supplier integration. *Computers in Industry, 59*(2), 288–295.
10. Volpato, G. (2004). The OEM-FTS relationship in automotive industry. *International Journal of Automotive Technology and Management, 4*(2–3), 166–197.
11. Morris, D., Donnelly, T., & Donnelly, T. (2004). Supplier parks in the automotive industry. *Supply Chain Management: An International Journal, 9*(2), 129–133.
12. Prostean, G., Volker, S., & Hutanu, A. (2017). Change management methodologies trained for automotive infotainment projects. In *IOP Conference Series: Materials Science and Engineering*.
13. Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: The Free Press.
14. Rangan, V. K., & Bowman, G. T. (1992). Beating the commodity magnet. *Industrial Marketing Management, 21*(3), 215–224.
15. Zolkiewski, J., Turnbull, P., Ulaga, W., & Eggert, A. (2006). Relationship value and relationship quality: Broadening the nomological network of business-to-business relationships. *European Journal of Marketing, 40*(3/4), 311–327.
16. Hart, S. (1987). The use of the survey in industrial market research. *Journal of Marketing Management, 3*(1), 25–38.
17. Pemberton, J., Mavin, S., Coakes, E., & Smith, P. (2007). Developing communities of innovation by identifying innovation champions. *The Learning Organization, 14*(1), 74–85.
18. Hillebrand, B., & Biemans, W. G. (2011). Dealing with downstream customers: An exploratory study. *Journal of Business & Industrial Marketing, 26*(2), 72–80.
19. Hintze, S. (2014). *Value chain marketing: A marketing strategy to overcome immediate customer innovation resistance*. New York: Springer.
20. Furaiji, F., Łatuszyńska, M., & Wawrzyniak, A. (2012). An empirical study of the factors influencing consumer behaviour in the electric appliances market. *Contemporary Economics, 6*(3), 76–86.
21. Stávková, J., Stejskal, L., & Toufarová, Z. (2008). Factors influencing consumer behaviour. *Zemedelska Ekonomika-Praha, 54*(6), 276.
22. Lewis, M. (2005). Incorporating strategic consumer behavior into customer valuation. *Journal of Marketing, 69*(4), 230–238.
23. Varey, R. J. (2013). Marketing in the flourishing society megatrend. *Journal of Macromarketing, 33*(4), 354–368.
24. Naisbitt, J. (1982). *Megatrends: Ten new directions transforming our lives*. New York: Warner.
25. Turkington, R., van Kempen, R., & Wassenberg, F. (2017). *High-rise housing in Europe: Current trends and future prospects* (Housing and urban policy studies) (Vol. 28). Delft: DUP Science.
26. Moller, K.-J. (2012). *A critical review of the megatrends and their implications for procurement*. Enschede: University of Twente.
27. Mittelstaedt, J. D., Shultz, C. J., Kilbourne, W. E., & Peterson, M. (2014). Sustainability as megatrend: Two schools of macromarketing thought. *Journal of Macromarketing, 34*(3), 253–264.
28. D'Amato, A. (1998). Megatrends in the use of force. *The Law of Armed Conflict: Into the Next Millennium, 71*, 1–16.
29. Gao, P., Hensley, R., & Zielke, A. (2014). A road map to the future for the auto industry. *McKinsey Quarterly, 10*, 1–11.
30. Modly, T. (2016). Five megatrends and their implications for global defense and security. *PwC Report on Megatrends*, 1–27.
31. Lorenzo, F., & Zunino, G. (2016). Macroeconomic effects of demographic change: Contributions from a long-term perspective. *Demographic Change in Uruguay*, 249–277.

32. Geldmacher, W., & Plesea, D. A. (2016). SWOT analysis and evaluation of a driverless carsharing model. In *European Conference on Innovation and Entrepreneurship* (p. 921).
33. Chhabra, E. (2016). *Can odd even curb Delhi pollution? Here's what locals are tweeting* [Online]. Retrieved September 29, 2017, from, https://www.npr.org/sections/goatsandsoda/2016/01/11/462307304/can-oddeven-curb-delhi-pollution-heres-what-locals-are-tweeting
34. Pyhäranta, E. (2013). *Finnish shipping requirements in 2025-a megatrend approach*.
35. Godau, D. (2017). '*Beyond the car', Capgemini consulting, cars online* (pp. 1–35).
36. Abelein, U., Lochner, H., Hahn, D., & Straube, S. (2012). Complexity, quality and robustness-the challenges of tomorrow's automotive electronics. *Design Automation & Test in Europe Conference & Exhibition (DATE), 2012*, 870–871.
37. Hellenthal, B. (2012). Power electronics-key to the next level of automotive electrification. In *2012 24th International Symposium on Power Semiconductor Devices and ICs (ISPSD)* (pp. 13–16).
38. Bagharib, A. S. & Tan, R. K. C. (2005). Digital radio revolution—The future is here!'. In *Reading: Published by Radio Asia Conference Broadcast Asia, Singapore*.
39. Sethi, A. (2014). *Trends in automotive infotainment* [Online]. Retrieved September 29, 2017, from http://www.edn.com/design/automotive/4434612/Trends-in-Automotive-Infotainment
40. Ghangurde, M. (2010). Ford SYNC and Microsoft windows embedded automotive make digital lifestyle a reality on the road. *SAE International Journal of Passenger Cars-Electronic and Electrical Systems, 3*, 99–105.
41. Greengard, S. (2015). Automotive systems get smarter. *Communications of the ACM, 58*(10), 18–20.
42. Athanasopoulou, A., Bouwman, W., Nikayin, F. A. & de Reuver, G. A. (2017). The disruptive impact of digitalization on the automotive ecosystem: A research agenda on business models, platforms and consumer issues. In *29th Bled eConference* (pp. 597–604).
43. Feijoo, J. I., & Gomariz, G. A. (2015). New challenges on crossplatform digital. *International Journal of Interactive Multimedia and Artificial Intelligence, 3*(2), 26–32.
44. Klavmark, A., & Vikingsson, T. (2015). *Study on open source in-vehicle infotainment (IVI) software platforms*. Gothenburg: University of Gothenburg.
45. Cunningham, W. (2017). *Will Linux make the new Toyota Camry a better car?* [Online]. Retrieved September 29, 2017, https://www.cnet.com/roadshow/news/will-linux-make-the-new-toyota-camry-a-better-car/
46. Tansik, D. A., & Routhieaux, R. (1999). Customer stress-relaxation: The impact of music in a hospital waiting room. *International Journal of Service Industry Management, 10*(1), 68–81.
47. Alam, M. (2016). *The top five trends for the connected car in 2016* [Online]. Retrieved September 29, 2017, from https://techcrunch.com/2016/01/02/the-top-five-trends-for-the-connected-car-in-2016/
48. Thimmappa, C. (2017). *Car infotainment trends for 2017: Interview with Prathab D of Harman* [Online]. Retrieved September 29, 2017, from https://blog.gaadikey.com/car-infotainment-trends-2017/
49. Young, K., Regan, M., & Hammer, M. (2007). Driver distraction: A review of the literature. In *Distracted Driving* (pp. 379–405). Sydney, NSW: Australasian College of Road Safety.
50. Ranney, T. A., Garrott, W. R., & Goodman, M. J. (2001). NHTSA driver distraction research: Past, present and future. In *17th International Technical Conference on the Enhanced Safety of Vehicles*.
51. Stutts, J., Feaganes, J., Reinfurt, D., Rodgman, E., Hamlett, C., Gish, K., et al. (2005). Driver's exposure to distractions in their natural driving environment. *Accident Analysis & Prevention, 37*(6), 1093–1101.
52. Reyner, L., & Home, J. A. (1998). Evaluation of 'in-car'countermeasures to sleepiness: Cold air and radio. *Sleep, 21*(1), 46–51.
53. Hofstede, G. (1994). The business of international business is culture. *International Business Review, 3*(1), 1–14.
54. Kacen, J. J., & Lee, J. A. (2002). The influence of culture on consumer impulsive buying behavior. *Journal of Consumer Psychology, 12*(2), 163–176.

55. Lindgren, A., Chen, F., Jordan, P. W., & Zhang, H. (2008). Requirements for the design of advanced driver assistance systems—the differences between Swedish and Chinese drivers. *International Journal of Vehicle Design, 2*(2), 41–54.
56. Young, K. L., Rudin-Brown, C. M., Lenné, M. G., & Williamson, A. R. (2012). The implications of cross-regional differences for the design of in-vehicle information systems: A comparison of Australian and Chinese drivers. *Applied Ergonomics, 43*(3), 564–573.
57. Heimgärtner, R. (2007). Towards cultural adaptability in driver information and-assistance systems. In *International Conference on Usability and Internationalization* (pp. 372–381).
58. Khan, T., Pitts, M., & Williams, M. A. (2016). Cross-cultural differences in automotive HMI design: A comparative study between UK and Indian users' design preferences. *Journal of Usability Studies, 11*(2), 45–65.
59. Venkatesh, V., & Brown, S. A. (2001). A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges. *MIS Quarterly, 25*, 71–102.
60. Burnkrant, R. E., & Cousineau, A. (1975). Informational and normative social influence in buyer behavior. *Journal of Consumer Research, 2*(3), 206–215.
61. Jahoda, M. (1959). Conformity and independence: A psychological analysis. *Human Relations, 12*(2), 99–120.
62. Kotler, P., & Armstrong, G. (2010). *Principles of marketing*. London: Pearson.
63. Siegel, A. E., & Siegel, S. (1957). Reference groups, membership groups, and attitude change. *The Journal of Abnormal and Social Psychology, 55*(3), 360.
64. Escalas, J. E., & Bettman, J. R. (2003). You are what they eat: The influence of reference groups on consumers' connections to brands. *Journal of Consumer Psychology, 13*(3), 339–348.
65. Silvera, D. H., Lavack, A. M., & Kropp, F. (2008). Impulse buying: The role of affect, social influence, and subjective wellbeing. *Journal of Consumer Marketing, 25*(1), 23–33.
66. DeWall, C. N., & Bushman, B. J. (2011). Social acceptance and rejection the sweet and the bitter. *Current Directions in Psychological Science, 20*(4), 256–260.
67. Kelman, H. C. (1961). Processes of opinion change. *Public Opinion Quarterly, 25*(1), 57–78.
68. Bang, H.-K., Ellinger, A. E., Hadjimarcou, J., & Traichal, P. A. (2000). Consumer concern, knowledge, belief, and attitude toward renewable energy: An application of the reasoned action theory. *Psychology & Marketing, 17*(6), 449–468.
69. Stave, C., Willstrand, T., Broberg, T., & Peters, B. (2014). *Older drivers' needs for safety and comfort systems in their cars: A focus group study in Sweden*. Linköping: Statens väg-och transportforskningsinstitut.
70. Hiscock, R., Macintyre, S., Kearns, A., & Ellaway, A. (2002). Means of transport and ontological security: Do cars provide psycho-social benefits to their users? *Transportation Research Part D: Transport and Environment, 7*(2), 119–135.
71. Knobel, M., Hassenzahl, M., Lamara, M., Sattler, T., Schumann, J., Eckoldt, K, et al. (2012). Clique trip: Feeling related in different cars. In *Proceedings of the Designing Interactive Systems Conference* (pp. 29–37).
72. Focus-telematics, D. (2006). *Statement of principles, criteria and verification procedures on driver interactions with advanced in vehicle information and communication systems including [Online]*. Washington, DC: Alliance of Automobile Manufactures.
73. Perez, M. A. (2012). Safety implications of infotainment system use in naturalistic driving. *Work, 41*(1), 4200–4204.
74. Bonnefon, J.-F., Shariff, A., & Rahwan, I. (2016). The social dilemma of autonomous vehicles. *Science, 352*(6293), 1573–1576.
75. Waytz, A., Heafner, J., & Epley, N. (2014). The mind in the machine: Anthropomorphism increases trust in an autonomous vehicle. *Journal of Experimental Social Psychology, 52*, 113–117.
76. Buente, W., & Robbin, A. (2008). Trends in internet information behavior, 2000-2004. *Journal of the American Society for Information Science and Technology, 59*(11), 1743–1760.

77. Alcántara-Pilar, J. M. (2015). *Analyzing the cultural diversity of consumers in the global marketplace*. Hershey, PA: IGI Global.
78. Howard, P. E. N., Rainie, L., & Jones, S. (2001). Days and nights on the internet: The impact of a diffusing technology. *American Behavioral Scientist, 45*(3), 383–404.
79. Lee, J. D. (2007). Technology and teen drivers. *Journal of Safety Research, 38*(2), 203–213.
80. Schoettle, B., & Sivak, M. (2014). *A survey of public opinion about autonomous and self-driving vehicles in the US, the UK, and Australia*.
81. Sha, S., Huang, T., & Gabardi, E. (2013). *Upward mobility: The future of China's premium car market*. New York: McKinsey & Company.
82. Grubb, E. L., & Grathwohl, H. L. (1967). Consumer self-concept, symbolism and market behavior: A theoretical approach. *The Journal of Marketing, 31*, 22–27.
83. Bin, S., & Dowlatabadi, H. (2005). Consumer lifestyle approach to US energy use and the related CO_2 emissions. *Energy Policy, 33*(2), 197–208.
84. Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67.
85. Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior, 26*(4), 331–362.
86. Yalch, R., & Brunel, F. (1996). Need hierarchies in consumer judgments of product designs: Is it time to reconsider Maslow's theory? *Advances in Consumer Research, 23*, 405–410.
87. Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *The Journal of Marketing, 52*, 2–22.
88. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly, 13*, 319–340.
89. Bauer, R. A. (1960). *'Consumer behavior as risk taking', dynamic marketing for a changing world* (Vol. 398). Chicago: American Marketing Association.
90. Zheng, X. S., Lin, J. J. W., Zapf, S., & Knapheide, C. (2007). Visualizing user experience through "perceptual maps": Concurrent assessment of perceived usability and subjective appearance in car infotainment systems. In *International Conference on Digital Human Modeling* (pp. 536–545).
91. Azoulay, A., & Kapferer, J.-N. (2003). Do brand personality scales really measure brand personality? *The Journal of Brand Management, 11*(2), 143–155.
92. Evans, F. B. (1959). Psychological and objective factors in the prediction of brand choice ford versus chevrolet. *The Journal of Business, 32*(4), 340–369.
93. Kuehn, A. A. (1963). Demonstration of a relationship between psychological factors and brand choice. *The Journal of Business, 36*(2), 237–241.
94. Westfall, R. (1962). Psychological factors in predicting product choice. *The Journal of Marketing, 26*, 34–40.
95. Ajzen, I., & Fishbein, M. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
96. Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action. *Journal of Retailing and Consumer Services, 29*, 123–134.
97. Gentry, L., & Calantone, R. (2002). A comparison of three models to explain shop-bot use on the web. *Psychology & Marketing, 19*(11), 945–956.
98. Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and Social Psychology Bulletin, 18*(1), 3–9.
99. Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2010). Explaining internet banking behavior: Theory of reasoned action, theory of planned behavior, or technology acceptance model? *Journal of Applied Social Psychology, 40*(5), 1172–1202.
100. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.
101. Rimer, B. K. (2008). Models of individual health behavior. *Health Behaviour, 41*, 325–336.

102. Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association for Information Systems, 8*(4), 3.
103. Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888.
104. Hong, S., Thong, J. Y. L., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision Support Systems, 42*(3), 1819–1834.
105. Osswald, S., Wurhofer, D., Trösterer, S., Beck, E., & Tscheligi, M. (2012). Predicting information technology usage in the car: Towards a car technology acceptance model. In *Proceedings of the 4th International Conference on Automotive User Interfaces and Interactive Vehicular Applications* (pp. 51–58).
106. Bennakhi, A., & Safar, M. (2016). Ambient technology in vehicles: The benefits and risks. *Procedia Computer Science, 83*, 1056–1063.
107. Aziz, S. A. (2016). Does fear of new Car technologies influence Brand loyalty relationship? *Journal of Marketing Management, 4*(1), 125–136.
108. Pakusch, C., Bossauer, P., Shakoor, M., & Stevens, G. (2016). Using, sharing, and owning smart cars. In *Proceedings of the 13th International Joint Conference on e-Business and Telecommunications (ICETE 2016)* (pp. 19–30).
109. Mangold, W. G., & Smith, K. T. (2012). Selling to millennials with online reviews. *Business Horizons, 55*(2), 141–153.
110. Kano, N. (1984). Attractive quality and must-be quality. *Journal of Japanese Society for Quality Control, 14*, 39–48.
111. Matzler, K., & Hinterhuber, H. H. (1998). How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment. *Technovation, 18*(1), 25–38.
112. Le, T. H., & Karlsson, M. (2017). *A review of the Kano model: A case study on online travel agencies*. Halmstad: Halmstad University.
113. Shukla, M. K., Ranganath, M. S., & Chauhan, B. S. (2017). Integrated Kano model and QFD in designing passenger Car. *International Journal, 5*(2), 241–242.
114. Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks: Sage Publications.
115. Blumberg, B. F., Cooper, D. R., & Schindler, P. S. (2014). *Business research methods*. London: McGraw-Hill Education.
116. Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations, 61*(8), 1139–1160.
117. Kraut, A. I. (1996). *Organizational surveys: Tools for assessment and change*. Hoboken: Pfeiffer.
118. Erickson, P. I., & Kaplan, C. P. (2000). Maximizing qualitative responses about smoking in structured interviews. *Qualitative Health Research, 10*(6), 829–840.
119. Griffin, A., & Hauser, J. R. (1993). The voice of the customer. *Marketing Science, 12*(1), 1–27.
120. Cooper, R. G., & Dreher, A. (2010). Voice-of-customer methods. *Marketing Management, 19*(4), 38–43.
121. Koch, N. (2011). The car entertainment system. In *New trends and developments in automotive system engineering*. London: InTech.
122. Reason, J. T., & Brand, J. J. (1975). *Motion sickness*. Cambridge: Academic Press.
123. Hock, P., Benedikter, S., Gugenheimer, J., & Rukzio, E. (2017). Car VR: Enabling in-car virtual reality entertainment. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 4034–4044).
124. Abu-Khater, H., Metzar, N., Alotaibi, M., Boulos, Z., Lally, W., & Daim, T. (2017). Technology management: Case of Facebook. In *Research and development management* (pp. 199–225). New York: Springer.

125. Ng, A., Brewster, S. A., Beruscha, F., & Krautter, W. (2017). An evaluation of input controls for in-car interactions. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 2845–2852).
126. Pickering, C. A., Burnham, K. J., & Richardson, M. J. (2007). A research study of hand gesture recognition technologies and applications for human vehicle interaction. In *2007 3rd Institution of Engineering and Technology Conference on Automotive Electronics* (pp. 1–15).
127. Parada-Loira, F., González-Agulla, E., & Alba-Castro, J. L. (2014). Hand gestures to control infotainment equipment in cars. In *2014 IEEE Intelligent Vehicles Symposium Proceedings* (pp. 1–6).
128. Weng, F., Angkititrakul, P., Shriberg, E. E., Heck, L., Peters, S., & Hansen, J. H. L. (2016). Conversational in-vehicle dialog systems: The past, present, and future. *IEEE Signal Processing Magazine, 33*(6), 49–60.
129. Charissis, V., & Papanastasiou, S. (2010). Human-machine collaboration through vehicle head up display interface. *Cognition Technology & Work, 12*(1), 41–50.
130. Yoon, B. S., White, C., Wease, G., Honnappa, L., Tsai, S.-T., Wang, X., et al. (2014). Technology roadmap for automotive flexible display. In *Planning and roadmapping technological innovations* (pp. 159–175). New York, NY: Springer.
131. Broy, N., André, E., & Schmidt, A. (2012). Is stereoscopic 3d a better choice for information representation in the car? In *Proceedings of the 4th International Conference on Automotive User Interfaces and Interactive Vehicular Applications* (pp. 93–100).
132. Abdi, L., & Meddeb, A. (2017). Driver information system: A combination of augmented reality, deep learning and vehicular Ad-hoc networks. *Multimedia Tools and Applications, 77*, 1–31.
133. Meschtscherjakov, A., Wilfinger, D., Gridling, N., Neureiter, K., & Tscheligi, M. (2011) Capture the car!: Qualitative in-situ methods to grasp the automotive context. In *Proceedings of the 3rd International Conference on Automotive User Interfaces and Interactive Vehicular Applications* (pp. 105–112).
134. Allen, I. E., & Seaman, C. A. (2007). Likert scales and data analyses. *Quality Progress, 40*(7), 64.
135. Heitmann, M. (2006). Security risks and business opportunities in in-car entertainment. In *Embedded Security in Cars: Securing Current and Future Automotive IT Applications* (pp. 233–247).
136. Kim, J., Daim, T., & Anderson, T. (2010). A look into the future of wireless mobile communication technologies. *Technology Analysis & Strategic Management, 22*(8), 925–943.
137. Adamson, J. (2012). *Advantages of digital radio* [Online]. Retrieved September 29, 2017, from https://www.thenakedscientists.com/articles/interviews/advantages-digital-radio
138. Ramsay, R. (2011). *Advantages of digital radio*. [Online]. Retrieved June 29, 2017.
139. Goodwin, A. (2014). *What should you look for when choosing a car stereo?* [Online]. Retrieved September 30, 2017, from https://www.cnet.com/roadshow/news/what-should-you-look-for-when-choosing-a-car-stereo/
140. Endo, E. (2014). *In-car digital radio ready for take-off with groundbreaking car infotainment solution from NXP* [Online]. Retrieved September 29, 2017, from http://www.marketwired.com/press-release/in-car-digital-radio-ready-take-off-with-groundbreaking-car-infotainment-solution-from-nasdaq-nxpi-1867890.htm
141. Phan, K., & Daim, T. (2011). Exploring technology acceptance for mobile services. *Journal of Industrial Engineering and Management, 4*(2), 339–360.
142. Aldhaban, F., Daim, T. U., & Harmon, R. (2016). Exploring the adoption and use of the smartphone technology in emerging regions: Case of Saudi Arabia. In *2016 Portland International Conference on Management of Engineering and Technology (PICMET)* (pp. 2922–2930).
143. Bradley, E., Laraichi, O., Ryan, M., Tripathy, S., Van Der Schaaf, H., & Daim, T. U. (2017). Technology management: Case of the internet of technologies and smart city. In *Research and development management* (pp. 275–292). New York: Springer.

144. Zenobia, B., Weber, C., & Daim, T. (2009). Artificial markets: A review and assessment of a new venue for innovation research. *Technovation, 29*(5), 338–350.
145. Dias, F. F., Lavieri, P. S., Garikapati, V. M., Astroza, S., Pendyala, R. M., & Bhat, C. R. (2017). A behavioral choice model of the use of car-sharing and ride-sourcing services. *Transportation, 44*(6), 1307–1323.
146. Bellos, I., Ferguson, M., & Toktay, L. B. (2017). The car sharing economy: Interaction of business model choice and product line design. *Manufacturing & Service Operations Management, 19*(2), 185–201.