

# Investigating Consumer Preferences and Purchase Decisions for Smartphones: A Choice-based Conjoint Analysis

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## List of Abbreviations

**CBC**    Choice-based conjoint

**GB**    Gigabytes

**MP**    Megapixels

**SD Card**    Secure Digital Card

# 1 Introduction

Over the last two decades, smartphones have gotten intertwined with consumers' lives and as some may argue they have become a necessity in today's society (Hew, Lee, Ooi & Wei, 2015). A smartphone is a portable electronic device that combines various integrated features such as a camera, processor, battery, memory or storage capacity (Yeh, Wang & Yieh, 2016). It is a multifunctional device that allows users to perform various tasks such as using the internet, listening to music, and taking pictures, in addition to its primary function as a telecommunication tool (Nakra & Pandey, 2014). One of smartphones' key features is their ability to connect to the internet, providing users with access to a wide range of online services, including using social media, navigation, and searching information (Okazaki & Mendes, 2013).

Although smartphones have been existing for some years now, they are a result of a product evolution process (Islam & Want, 2014). For example, before smartphones, there were basic mobile phones and although basic mobile phones were once used for communication purposes exclusively, smartphones nowadays serve multiple functions similar to those of personal computers (Almendros, Fortiz, Lopez & Segura, 2013). Smartphones have evolved over time to meet the changing demands of their users (Hakoama & Hakoyama, 2011). Many things that would take a lot of effort or time to do in the past are now possible to do within a short amount of time and with less effort thanks to the small device that people can carry with them. Smartphones also had a huge effect on daily life and behavioral patterns (Chiu, Hsieh, Hsu, Lai & Liang, 2018). As a result, individuals now perform a variety of activities on their smartphones, such as watching movies, streaming music, accessing the internet, checking emails, managing finances, following the news, and many more (Szymczak, 2013).

## 1.1 The Popularity of the Smartphones

It is also important to note that nowadays, smartphones are one of the devices or products that people use the most often in their daily lives (Islam & Want, 2014). For many people, it is the first thing they check after waking up and the last thing they check before going to bed. According to a report prepared by DataReportal, the global average smartphone screen time is four hours and 48 minutes a day (Kemp, 2022). Although it is impossible to know the exact amount of the average time duration of daily phone use, one can safely argue that smartphones are an important part of the daily life and the society in general today.

The importance and the level of influence smartphones have nowadays can also be understood by the number of smartphone owners and the smartphone ownership steadily increasing over the

course of the years (Ericsson, 2022). The utilization of smartphones for the purposes of portability and interconnectivity has risen tremendously in recent years, especially among younger consumers, who have a strong reliance on smartphones (Divine, Garver & Spralls, 2014). According to Ericsson (2022), the estimated number of smartphones in 2023 is expected to reach 6.90 billion. This number corresponds to 86.03 % of the world's current population of 8.02 billion as estimated by the UN World Population Prospects report (2022). Also, today there are 11.16 billion cellular mobile connections (with a growth rate of 5.72%) which is 3.14 billion more than the number of people in the world (Groupe Speciale Mobile Association, n.d.). The adoption rate of smartphones has been one of the fastest among other technological devices (Comer & Wikle, 2008). For example, in Europe, the smartphone industry is one of the most significant industries (Jurisic & Azevedo, 2011). Thus, the smartphone market plays a very important role in the global economy and is a field worth analyzing to understand how its' consumers behave.

## 1.2 Issues with Smartphones

While smartphones have brought many advantages to the consumers because they make their life easier and to the companies because there is a high demand for the smartphones, there are also some difficulties that come with these facts. From the consumers' perspective, there are many options that they must choose from. Although the flexibility and the freedom of having many options can be relaxing to the consumers, it also makes the decision-making process of which smartphone to get more complex. Understanding this decision-making process is important to the smartphone manufacturers because based on that, they can develop better-suited targeting strategies and product development plans. So, if the smartphone companies are aware of what their already existing or potential customers want, both consumers can be more satisfied because their needs may be met better and also companies can make more profit by developing the correct strategies.

From the smartphone brands' perspective, the size of the smartphone market being big and the consumers renewing their phones every few years is advantageous and constitutes a potential to make more profit (Alfieri, Berwald, Clemm & Cordella, 2021). However, the potential of the market attracts a high number of companies to compete in the market. Some of these are one of the biggest companies in the world such as Apple and Samsung and some are rather smaller yet still influential companies such as Xiaomi, Huawei. This high competition is disadvantageous for the smartphone companies and to survive in this challenging industry, they need to have robust strategies with a solid understanding of who their customers are and what they want.



Smartphone companies also need to differentiate themselves from their competitors. However, nowadays, if one looks at the smartphones, he or she will notice many similarities. Most of the smartphones are able to satisfy the same basic needs. Despite smartphone companies' efforts to differentiate their products by offering enhanced versions of smartphone features such as a higher quality camera or a better resolution screen, they struggle to manufacture phones that are distinctively different from each other (Chakraborty, Maity & Tiwari, 2021). One other reason why smartphones are prone to be perceived similar to each other is because of their operating systems sharing some similarity with each other and the common mobile applications such as social media apps existing in every smartphone (Tran & Yazdanparast, 2020). Because of the level of competition between smartphone manufacturers and within the smartphone industry, being aware of consumers' needs and preferences towards smartphones has become more significant than ever (Yeh et al. 2016).

However, although the popularity of smartphones is evident, there aren't enough studies to bring all the information and important insights that can be of use for the smartphone companies (Filieri & Lin, 2017). Kim, Seol and Suh (2017) noted that the lifespan of smartphones is getting shorter and smartphone users are also likely to renew their phones every couple of years while keeping their financial situation and needs in their mind. So, as the smartphone market continues to grow, despite the difficulty in deciding which exact smartphone features are crucial for the consumers, it is quite pivotal to identify them so that marketing campaigns and product development can be adjusted according to the needs of the consumers. Smartphone producers are under pressure to offer the right combination of features and price in their products, as billions of dollars are at stake if they fail to do so (Kim et al. 2017).

### 1.3 The Rationale of the Study

This study's goal is to identify the main smartphone attributes/factors that affect the consumers' smartphone purchase decisions and, analyze the trade-off that consumers make between the main smartphone attributes when deciding on which smartphone to buy. For this purpose, choice-based conjoint analysis method is used, which is a statistical market research technique that is used to understand how consumers make tradeoffs between certain existing or new hypothetical attributes of a product or service (Johnson, 1974). The specific smartphone attributes to be analyzed are brand, price, screen size, battery life, storage capacity and camera quality. In order to enrich the analysis, demographic questions and some smartphone-related questions are also used.

Although the popularity and importance of the smartphone market are evident, there aren't enough studies that provide a holistic overview with all the information and important insights that can be of use for the smartphone companies (Filiari & Lin, 2017). In the literature, there are some studies that focus on specific smartphone attributes or only on social factors affecting smartphone purchase decisions; however, there is also a gap. While smartphone companies may be conducting some private analyses, because they are not public and likely confidential one can not reach them. Also, in the literature, there is no research that checks the relationship between demographic data and some smartphone behavior such as frequency of buying a new phone or time spent daily on the smartphone with consumers' preferences. Additionally, there is no study in the literature that uses the same exact phone attributes as used in this study. The purpose of this thesis is while filling the research gap, also providing an overview of what consumers' preferences are regarding smartphones, how they come up with them and why they have the preferences they have.

In the next section, a literature review of studies regarding smartphone preferences is provided. Different studies and academic work will be examined in the context of consumers' smartphone preferences.

## 2 Literature Review

In the literature, it has always been an important topic to understand why consumers make certain purchasing decisions (Dudovskiy, 2015). If a company can know why its existing or potential consumers make the product purchase decisions they are making, they can produce products that are more valuable to the consumer. Alternatively, they can follow marketing strategies and make ads that prioritize what their potential customers value. Consumers want to satisfy their needs when they buy a product, and in order to satisfy the consumers' needs, companies need to identify their needs first (Biswas & Roy, 2015). For understanding the consumers' needs and what they value, conducting market research is very important so that the companies can match what consumers value better and they can also make more profit. According to Gross, Newman, and Sheth (1991) consumers combine 5 type of values when they are making decisions. First type of value is functional value. This type of value corresponds to the solution of the problem that the consumer is trying to solve. Usually, it can also be considered as the main reason why one is buying a specific product for example a jacket to ensure warmth. Second type of value is social value. Social value is a type of value that is meaningful only in social contexts. Jewelry or sports cars might be some examples that include social value as they can be associated with status. Third type of value is emotional value. This type of value occurs with the emotional arousal of the

consumers. A scent that reminds them of an happy memory can be given as an example. Fourth type of value is epistemic value. These can be any new experiences or knowledge gained from the purchased product or service. Last type of value is conditional value. An umbrella's value increasing during a rain is an example of conditional value.

Smartphones also provide various types of values and to have those values consumers consider many factors that affect their decision regarding which phone to buy. Since smartphones are such a big market the literature is also vast. The literature review will be done focusing on certain areas. Some studies in the literature, focus on multiple factors or multiple smartphone attributes that affect which smartphone the consumers will purchase at the same time. First, this group of studies will be examined. After that, studies that focus specifically on the relationship between smartphone brands and smartphone purchase decisions will be examined. Lastly, the literature on the effect of social factors such as recommendations, word-of-mouth, reference groups on smartphone decisions will be covered.

## 2.1 Studies That Focus on Multiple Attributes

In the literature, there are many studies that focus on multiple factors or phone attributes that affect smartphone purchase decisions. One of those studies that try to shed light on the factors affecting consumers' smartphone purchase decisions is done by Karjaluoto et al. (2005). Karjaluoto et al. (2005) conducted a study with a sample consisting of mostly graduate students in Finland. The results of their research indicate that the interface, functional smartphone properties, brand and price of the smartphones were found to be as statistically significant and important features that play a role in smartphone purchasing decisions. Karjaluoto et al. (2005) have also found that the main reason for a change in smartphones is technical problems. However, since this study wasn't a conjoint analysis one cannot learn how important the attributes were and how respondents made tradeoff between them.

There are also some studies that use conjoint analysis for measuring smartphone preferences. There are examples of both choice-based and ranking-based conjoint analysis. A choice-based conjoint analysis was done by Baganzi, Shin, & Wu (2017) with 365 university students in South Korea to research which smartphone features are to what extent important to the consumers and how the consumers trade-off between certain levels of the smartphone features used in the study. The selected features in the study were brand, price, RAM, camera, battery life and storage. The study found out that from these features, brand was the most important feature among the others. The order of importance of the remaining attributes from the most important to the least important

is price, camera, RAM, battery and storage. Also, in the literature, there is another conjoint study about smartphone preferences focusing only on the millennials (Murcia & Tobias, 2022). The attributes included in the study were storage capacity, battery time, SD card option, screen size and camera quality. The most important attribute out of these was found to be the screen size followed by storage space, camera quality, SD card option and battery life in an order from the most important to the least important one. Aydin, Duzgun, Telli and Yamamoto (2021) conducted a ranking-based conjoint analysis in the Turkish market during the Covid-19 pandemic using different smartphone attributes to measure consumers' smartphone preferences. The attributes that were studied were the quality of the camera, brand, second-hand value and storage capacity. As a consequence of the study, it was revealed that the most important smartphone attributes were brand, price and camera quality. It was also found that China-based and Turkey-based smartphone brands were disadvantageous in the minds of Turkish consumers. Another study about consumer preferences and perception about smartphones that was done by Kannan and Padma (2022) found that the most important smartphone feature was processing speed followed by battery duration, storage, camera and operating system. One other study conducted a ranking-based conjoint study on smartphone preferences among 200 students in India (Goyal & Jain, 2016). They found that the most important smartphone attribute was camera. The other two attributes that were important were after-sale services and RAM while the other attributes that were examined were screen size, operating system and price.

There are also other aspects that impact consumers' smartphone purchasing decisions. As also found important in this thesis study's survey by some respondents, in one study, the design of the smartphones was concluded to be another dimension that shapes preferences of the consumers to a great extent (Bhatti, 2007). Another study took the approach to analyze smartphone preferences based on their operating systems (Nakra & Pandey, 2014). In the study, Android and IOS were the most important smartphone operating systems. Among the Android users, Samsung was the most preferred brand. Other attributes that played the most crucial role in the consumers' purchase decision on which phone to buy was price, screen size as well as RAM. There were also different approaches in the literature. For example, one study that was done by Jung and Kim (2014) conducted a choice-based conjoint study about smartphone preferences to find out how the electromagnetic field of the phones affects smartphone purchase decisions. Only three attributes were used, namely brand, price and electromagnetic emission level. In the study, it was found that some clusters differed in their perceived risk levels about the phone emissions and it was revealed that 80% of the respondents could consider changing their phone brand for increased safety

regarding the phone emissions. Another study took the perspective of analyzing the smartphone repurchase decisions specifically (Badaruddin, Hew & Moorthy, 2017). The study found brand to be the most important factor influencing the smartphone repurchase decisions. Also, male respondents in the study were found to be placing higher importance on brand than females do and females valued the practical use of the smartphones more than males. In the literature, there is one other study that examined the motives behind smartphone purchasing decisions by using conjoint analysis and choosing “smartphone tools and applications” as attributes (Head & Ziolkowski, 2012). They examined two attributes with many levels. Their first attribute was mobile phone applications with levels such as text messaging, using email etc. The second attribute in their research was mobile phone tools such as calendar and calculator. They found out that mobile phone applications are more important than mobile phone tools. In their research they also made use of some clustering techniques and structural equation methods, to obtain meaningful segmentation results from the conjoint analysis part-worths. Another conjoint study that was done by Cho and Sayassatov (2016) took the perspective of analyzing smartphone preferences for the use of educational purposes. They found that screen size was the most important feature followed by memory capacity and price; however, the results might not be too reliable as their sample size was 30 people.

The effect of demographics on smartphone purchase preferences was also analyzed in the literature. Bolle, Hegner and Van Deursen (2015) have found that gender plays a significant role in smartphone purchase decisions, thus should be included in the studies about smartphones. There are some conjoint studies on smartphone preferences that had focused on the location of the respondents as a demographic. For example, Kim (2017) analyzed data from the Philippines, the United Kingdom and Saudi Arabia. Some studies about smartphone preferences used age as a demographic focus. In those studies, young consumers have been found to be more enthusiastic users of smartphones as compared to elder consumers (Cho & Sayassatov, 2016). Young consumers have also been found to be actively using smartphone phone functionalities, such as photo editing, satellite navigation, and texting more than other consumers, whereas elder consumers mainly use them for communication (Yeh et al. 2016). Furthermore, younger consumers tend to value extra features or features that can be considered as “luxury” more in smartphones (Wilska, 2003). They also value the most recent phone features more (Chowdhury & Rahman, 2013). Another study that had a focus on demographics was done by Goyal and Jagwinder (2009). They checked if age and gender have an effect on smartphone preferences. The results show that people between 18 and 30 years old valued the design and brand of the phone

more than any other age segment. Importance of price was found to be lower with the older segments. Gender was also found to be statistically significant in shaping consumers' smartphone purchasing decisions. Another study that focused on demographics namely on young customers' smartphone purchase decisions was done by Devi, Ponnusami, Pudaruth, Ramasawmy and Vencatachellum (2014). The results showed that, for the young consumers, price was the most important determinant of smartphone choices followed by brand. Some studies with a focus of using demographic data check the effect of gender and employment status on smartphone purchase decisions. For example, a study by Goel and Gupta (2019) focused on working vs. non-working women's preferences of smartphones and how social factors such as status, family/friends and reference groups affect their decisions. It was revealed that while social factors had no effect on working women, they were found to be affecting non-working women. Another factor that affects consumers' smartphone decisions is the durability of the phones combined with concerns about sustainability. A conjoint study by Wilhelm (2012) examined this situation. In the study, the attributes of durability, design, price, performance, customization and upgrade procedure were examined. The most important attributes were found to be price and design. The durability and the customizability of the smartphone were also statistically significant. However, environmental concerns were not found to be significant in playing a role in the respondents' smartphone purchase decisions. Lastly, in the literature, the difficulty of choosing a smartphone was also recognized. Some researchers identified this problem with their studies. Bączkiewicz, Kaczyńska, & Wątróbski (2021) have conducted a study where they compared some statistical methods that can be used for comparing phone models and help consumers choose the most suited option for them.

## 2.2 Studies That Focus on Brand

Brand plays a very important role in consumers' decisions in buying smartphones and there are many studies that examine the smartphone brands' influence on consumers' smartphone purchasing decisions (Huang, Li & Tsaur, 2022). Ahmed and Hussain (2020) published a study with a focus on the factors that affect brand loyalty for smartphones, where they found emotional, functional, social value and brand identification to be positively correlated to smartphone brand loyalty. Another study measured the effect of the components of brand equity, i.e. brand loyalty, brand awareness, perceived quality, on smartphone buying behavior using structural equation modeling (Ahmed, 2020). The study found that all components of brand equity positively affect smartphone purchasing intentions. One other study in the literature that measured the effect of brand on consumers' smartphone purchasing behavior was done by Khurshid and Khurshid (2018). In this study, positive statistically significant correlation was found between brand and

smartphone purchasing intentions. The reason for the purchasing decision was explained by the consumers' desire to ensure quality. Also, in Akkucuk and Esmaeili's study (2016) it was concluded that consumers value brand more than other aspects of smartphones when making their purchasing decision. Because of smartphone brands' high importance in affecting smartphone purchase decisions, according to Liang and Liu (2014), consumers would like to pay more money in order to get their favorite brand. Also, brand loyalty is very important for the smartphone manufacturers in order to keep their customers with them for their next smartphone purchase. For brand loyalty, consumers need to be trusting the brand. Mamun, Perumal, Salameh, Seduram, and Shaari (2022) suggest that there is a link between the loyalty of the consumers to a smartphone brand and the trust they have towards it. More specifically, Maharani Azis (2021) suggest that the factors that affect smartphone brand loyalty is brand experience, image of the brand, satisfaction of the consumer, quality of the brand and the switching cost of the brand. Another study published by Ravichandran (2023) suggests that brand awareness and brand association play an important role in positively affecting consumers' smartphone purchase decisions. Lastly, Adam, Fasa, Panjaitan and Vikaliana (2021) also found that brand credibility and positive product experience lead to a higher brand loyalty in smartphones. Overall, in the literature, brand is found to be very important in shaping the consumers' behavior on which smartphone to buy.

## 2.3 Studies That Focus on Social Factors

Another group of factors that have a significant influence on consumers' decisions is social factors, which are known as the influence resulting from other peoples' opinions, ideas and recommendations, that affect consumer behavior (Durmaz & Gunduz, 2021). The potential smartphone purchasers' acquaintances and close circle can have some effect on the potential customers' decisions and this effect is especially stronger if the potential customers are with their acquaintances in the moment of the purchase decision regardless of an online order or an in-store decision (Chen & Xie, 2005). Kartikawati et al. (2021) conducted a study to see if some social factors such as social media marketing, trendiness, word-of-mouth, etc. have a significant effect on the smartphone purchase intentions. It was found that social media marketing, interaction, entertainment, word-of-mouth, and trendiness have statistically insignificant effects, while smartphone customization had a significant influence on the respondents' smartphone buying decisions. Humans are social beings and they may affect each others' ideas. For example, smartphone purchase decisions can be affected by friends or families (McLeod & Nelson, 2005). More specifically, young customers that are in their 20s were found to be especially prone to be affected by their peers (Abas, Ali, Kheng, Rahim & Safin, 2016). John and Sengottuvelu (2018)

found that parents play a more important role in shaping their children's ideas on smartphones than their peers. Handayani and Susandy (2022) point out that influencer marketing can also affect the consumers' decision as to which phone to buy. Additionally, word-of-mouth can also affect consumers' decisions, which can be face-to-face or online nowadays. Aljuhmani, Alrwashdeh and Emeagwali (2019) found that electronic word-of-mouth is significant in affecting consumers' smartphone purchase decisions as it has an effect on their perceived brand image. One may consider online reviews as some form of word-of-mouth which can be influential in shaping one's mind about a certain product. Lee and Park (2008) found that information overflow and reviews that are inconsistent have a negative effect on the product that is being considered to be purchased. Furthermore, personal relationships can also be of importance. Mokhlis and Yaakop (2012) found that recommendations of smartphones that are done in a one-to-one setting can affect smartphone purchasing decisions. Also, when consumers are buying a product, they might be comparing themselves with some reference group (Sheth, 1991). This reference group can be their co-workers, friends, family, etc. For example, Garga, Maiyaki, and Sagagi (2019) found that reference group is very influential and play an important role in affecting consumers' smartphone purchase decisions. Lastly, Amran, Islam, Pramanik, Sarker and Rakib (2022) in their study have found that smartphone brand and price had a significant effect on smartphone purchase decisions while social influences in general were found to be insignificant as a determinant of the purchase process. Thus, in the literature, social factors are mostly important factors affecting consumers' smartphone purchase intentions.

## 2.4 The Literature Gap

As one can see, the literature on the factors and attributes that affect consumers' smartphone purchase decisions is quite broad. The previous sections about studies on consumers' smartphone buying preferences have established a structured basis for identifying gaps in the literature. Based on the literature, various factors have been recognized as significant in determining consumers' demand for smartphones and there are many studies that check the significance of many different aspects such as smartphones' technical features, brand perception and social factors. There is also a diversity in the statistical methods used ranging from conjoint analysis to structural equation methods or simple survey questionnaires. Some literature was focused on specific demographic parts of society such as working women vs. non-working women or only the millennials. Overall, the most important smartphone attributes can change depending on the market, the group that has been questioned and the factors that are being analyzed. Usually, brand and price was found important. There may also be more studies or experiments that have been conducted but not



published or shared with the public. For example, smartphone companies might be conducting their own market research.

However, in the literature, there are not many conjoint studies about smartphones when one compares them with the size of the smartphone market. There are some studies that directly ask the respondents how much they value certain smartphone attributes. Conjoint analysis is better than directly asking consumers about their preferences as it provides a more realistic setup. Also, although there are similarities in the smartphone attributes that are chosen in the studies mentioned in the literature review, there is no conjoint study that uses the exact attributes used in this thesis's conjoint experiment design, which are brand, price, screen size, battery life, storage capacity and camera quality. In this thesis study, there are also some smartphone-related questions to gather information such as the respondents' brand satisfaction or their probability of switching brands. These questions in combination with conjoint analysis were not asked in the literature before and a very detailed conjoint analysis was not done before both using many smartphone-related and demographic questions.

In summary, there is a gap in the literature. This study will utilize choice-based conjoint analysis to determine the smartphone preferences of consumers and will take advantage of some specific smartphone-related questions in combination with demographic data to achieve further insights. In the next section, the way the experiment was designed and carried out will be explained.

### 3 Methodology

In this section, the methodology of the study will be explained. More specifically, first, conjoint analysis is explained in detail while answering questions such as what is conjoint analysis, what it is used for, and why it is popular. Then choice-based conjoint analysis technique will be explained in detail clarifying how it is different from some other methods, what kind of advantages it provides to the researcher and why it was chosen. After that, the aspects of the experiment design will be explained such as the attributes and their levels that were chosen and how the choice tasks were created. Lastly, how the data was collected, the specific smartphone-related questions and the demographic questions used in the survey will be presented.

#### 3.1 Introduction of Conjoint Analysis

Conjoint analysis is a statistical market research technique that is used to understand how consumers make trade-offs between certain existing or new hypothetical attributes of a product or service and with it, one can achieve many things (Johnson, 1974). With the help of statistical

analysis and mathematical calculations used in conjoint analysis, one can have insights on how different attributes of a product would have an effect on the potential customers. One can make a prediction about how some new product attributes that have never been launched before would affect consumers' preferences about the product. More specifically, one can identify the importance of the attribute levels and the attributes of the product that is being studied in the experiment. Another way of extracting insight from conjoint analysis is, based on the utility estimations, constructing a product that will be preferred the most by the consumers. Lastly, one can also use the results from the conjoint analysis to segment the consumer based on their preferences.

Over the past years, the popularity of conjoint analysis kept growing not only among the researchers but also companies because of its significant ability to provide insights (Sawtooth Software, 2017). Nowadays, conjoint analysis is considered as one of the best and the most popular approaches for figuring out how to optimize a product, how to price it and make a prediction about how well it will perform in the market (Legner & Naous, 2021). One of the reasons why it is so popular these days is that it tries to imitate how consumers make trade-offs when buying a product or service. For example, a classic trade-off a conjoint analysis analyze could be a consumer trying to make a decision whether to pay less for a lower-quality version of a product or to pay more for a better-quality version of the product. With conjoint analysis, it is possible to measure tradeoffs both between attributes and when they are together. This ability to measure numerous features at the same time is also one of the things that differentiates it from other statistical research methods. Instead of directly asking the consumer the features they value in a product or how they would make tradeoffs between the attributes of a product, conjoint analysis offers a setup that is more likely to be confronted with in real life. If consumers were to be directly asked the questions that conjoint analysis is seeking answers for, one would not be able to extract the insights that can be acquired with conjoint analysis.

One of the main goals of conjoint analysis is to help the researcher extract significant insights that can be used strategically. It helps the researchers by giving them the chance to make higher-quality decisions regarding one's business. These decisions can vary from how to optimally price a product, how to decide on building a product, how to form a marketing message and which customer group to target based on consumers preferences (Appinio Research, 2022). Conjoint analysis also lets the user test many combinations of potential products and prices. All of these can be given as examples of how conjoint analysis can be used within the scope of marketing. Furthermore, given that price is chosen as a product attribute, conjoint analysis can be used for

pricing purposes too (Murcia & Tobias, 2022). Finding the optimal pricing strategy that would generate the most profit or revenue is a challenge that businesses have always faced (Rao, 1984). If one were to ask the respondents how much they would be willing to pay for a specific product attribute or its level, it probably won't be ideal because it is a question that is not easy to respond to and the answers might be not reliable. It is unrealistic to expect a reasonable answer to such questions especially if the respondents are not presented with any reference point of other competitors' products, prices and the overall market situation. However, using the results from the conjoint analysis one can achieve some insights such as calculating how willing the respondents are to pay for a certain attribute level, how sensitive they are to certain price levels or how the demand will be for certain combinations of product attributes (Baganzi et al. 2017). Another use case of conjoint analysis is for developing new or making the existing products better, meaning more in line with consumer needs and preferences (Legner & Naous, 2021). Some other statistical research techniques can also be used for the same purpose. For example, A/B tests; however, A/B tests are not able to compare and analyze the number of product or service variations that a conjoint analysis do. Conjoint analysis can also calculate how important a certain attribute of a product is to the consumers and it is able to estimate the consumers' acceptance behaviour considering different product attributes and price combinations. With this way, a company can generate many insights on how to implement a successful launch strategy. Another use case of conjoint analysis that companies can take advantage of is about how to make a product's packaging more appealing to the consumers (Silayoi & Speece, 2007). This stems from conjoint analysis' ability to mimic the real life purchasing setup that consumers face in a realistic way. Conjoint analysis can also be used for segmenting the consumers based on the conjoint results, in other words, their preferences (Cohen, Desarbo & Ramaswamy, 1995). Using different clustering algorithms and fine-tuning them, one can create subgroups of the consumers where the member of the subgroups are as similar as possible to each other and the subgroups are as different as possible from each other. The created segments can also be combined with other kinds of data. Using the segmentation that is derived from the conjoint analysis, for example, a smartphone company can make smartphone ads that prioritize the camera quality in order to target the consumers that value the camera quality in a smartphone the most. Alternatively, the segmentation can also be used for targeting specific consumers for specific ads online.

Lastly, conjoint analysis is not only used within the context of commercial businesses but also other entities. One example is the health industry, conducting conjoint analysis for selecting healthcare interventions (Kumar, Larsen & Tele, 2021). Another example is the sector of

transportation. The transportation sector has consistently been an important field that the choice-based conjoint analysis is applied to (Ay, Ergun & Kofteci, 2010). It is used to understand how tradeoffs are made with different transportation options and routes. Another use of conjoint analysis is regarding the environment. With the current and ever-increasing importance of climate change, researchers conduct conjoint analysis on certain projects not only considering the project-related features but also the good or bad consequences it will have on the environment (Kinoshita, 2020).

### 3.2 Why Choice-based Conjoint Analysis?

The feature that differentiates choice-based conjoint analysis from other conjoint analysis types such as ranking-based, adaptive, etc. is that it requires the respondents to choose a combination of attributes, meaning products, among different alternatives (Eggers, Sattler, Teichert, & Völckner, 2022). Adaptive conjoint analysis was also a method that could be used but it has the disadvantage of not giving enough focus to price and, despite it being a useful method, it lasts 2-3 times longer than a choice-based conjoint analysis, making it harder to use in the data collection process (Sawtooth Software, 2018). Choice-based conjoint analysis is the most popular conjoint analysis technique compared to other conjoint techniques (Orme, 2016). In real life, consumers need to make a decision about which product alternative to purchase and for that, compare products, their different attributes such as price, brand and technical abilities so that they can make up their minds by choosing one of the options they have. Choice-based conjoint analysis tries to imitate this decision-making process of the consumers and because of that, the concept is easy to understand by the respondents and it is intuitive (Eggers et al. 2022). In other words, the way the respondents are required to answer the choice tasks is very similar to how people decide on which product or service to buy in real life, thus making it easy to internalize for the respondents. In choice-based conjoint analysis the option for not choosing any of the presented hypothetical products is also present. If one doesn't prefer any of the presented hypothetical products, he or she can simply choose to indicate their preferences of not preferring any of the presented products. This makes the setup of giving a purchase decision more realistic because the respondents' preferences can be represented in a more accurate way (Haaijer, Vriens, Wansbek & Wedel 1998). One can use the data gathered from the none data and use it to group respondents or consumers that are alike in their preferences. One can also potentially find out if a certain combination of attributes or certain levels causes the respondents to choose the none option, thus enabling the researcher to have an insight observing a negative effect on the demand in certain cases. It can also be made use of in market simulations if a researcher would like to estimate share of the consumers that would not

choose any of the products in the market simulation (Orme, 2019). Another aspect one should consider is the conjoint model's ability to analyze the data using different levels of detail. Other conjoint methods that are different than choice-based conjoint analysis, use main-effects assumptions (Sawtooth Software, 2017). According to Sawtooth Software, usually choice-based conjoint analysis is strong with its ability to capture interaction effects. Especially given enough sample size, theoretically choice-based conjoint analysis is able to capture all interactions in the study. Moreover, choice-based conjoint analysis is known to be working well with its results regarding prices. Thus, considering all of the facts and advantages of choice-based conjoint method mentioned above, choice-based conjoint analysis is a very powerful statistical way of data analysis and is found to be suitable for this thesis's research.

### 3.3 Specifications of the Conjoint Design

#### 3.3.1 Identifying Relevant Smartphone Attributes & Their Levels

One of the most critical decisions to be made when conducting a conjoint analysis is to choose the attributes of the product or service that is going to be examined in the experiment (Legner & Naous, 2021). An attribute is a term that is used to describe a feature of a product or a service in conjoint analysis.

In conjoint analysis, there are some prerequisites for choosing attributes and their levels so that a successful analysis can be maintained (Green & Srinivasan, 1990). The attributes chosen should be known to be impacting the decisions of consumers and they should not be totally irrelevant. If the attributes that are to be used in the conjoint analysis are not relevant, this may result in unreliable and unrealistic results (Menon & Sigurdsson, 2016). Also, the attributes and their levels are chosen to be mutually exclusive. In conjoint analysis, the attributes and their levels should be independent of each other, meaning that there shouldn't be any very similar attributes otherwise there will be some bias in the experiment and the results. In the selection of attributes, these principles were also paid attention. The literature review in the previous part was useful in identifying the attributes that are to be used in the conjoint analysis and defining the scope of the study.

The attributes chosen to be used in the conjoint experiment of the thesis study at hand are brand, price, screen size, battery life, storage capacity and camera quality. For the brand attribute levels Apple, Samsung, Xiaomi and Oppo was chosen. There are many studies that suggest different numbers of smartphone market shares but mostly these four share the top four places globally (Counterpoint Research, 2023). And since the goal of this research is to be as comprehensive as

possible in analyzing the main factors that play a role in smartphone purchase decisions, the previously mentioned four brands were chosen. The levels for the price attribute, taking into account market prices, are chosen to be 650 €, 900 €, and 1150 €. The rationale behind this is that by having three levels of the attribute, these attribute levels represent low, middle and high segments of phones. In other words, one can also call these levels of prices as low, medium and high in a realistic way. Another attribute that is included in the research is smartphones' screen size. This attribute also shares the same way of thinking with the price attribute in the sense that it has three levels. These levels are 5.5 inches, 6.1 inches, 6.7 inches and these levels would respectively represent a small, medium-sized and a big screen. Since in the real world, smartphone companies like Apple tend to release different sizes of a phone model, adding the different screen sizes helps the experiment become more realistic and accurate (Alang, 2018). Another important attribute that is included in the conjoint analysis experiment is the battery life of a phone with the levels of 9 hours, 11 hours, 13 hours of use. Although one may take advantage of using a powerbank from time to time, since it may be not available for use in every time of need or people might not always have the chance to plug their phone into a charger, the battery life of a phone is a significant attribute. Also, another attribute that is included in this study is camera quality of a smartphone. Its levels are 12 Megapixels (MP), 16 MP and 20 MP. Last but not least, the final attribute that is included to the conjoint analysis is the smartphone's storage capacity, whose levels are 64 GB, 128 GB, and 256 GB.

One can argue there are more attributes that can play a big role in consumers' decision to choose a smartphone to buy; however, using too many attributes and levels may result in respondents getting confused as they would be required to tradeoff between more parameters (Green & Srinivasan, 1990). Using too many attributes may also prompt the respondents to only use shortcuts for giving their decision or to base their decisions only on few "most important" attributes. This is not desirable as researchers are interested in measuring preference of all of the attributes used in the study.

Another problem with including too many attributes and attribute levels is that, increasing the attributes in a conjoint analysis, could potentially make the survey too long and might result in drop-outs or affect the number of people that complete the survey in a negative way, although choice-based conjoint analysis is known to be more engaging and interesting for the respondents than plain survey questions (Sawtooth Software, 2018). Alternatively, designing a conjoint study with only 3-4 attributes and few levels is also an option that is feasible (Jung & Kim, 2014). A researcher should consider his or her aims for the study when choosing attributes; however, an

important aspect to be careful about is keeping in mind that the number of attributes might be too less to properly describe the product and that the results to be produced are likely not very realistic (Ida, 2012). Thus all of these facts, were considered in choosing smartphone attributes and their levels. In this research, rather than using many attributes and levels, the focus is to use a few that are important and to increase precision by having as many respondents as possible answer the survey.

### 3.3.2 Generation of the Choice Tasks Design

Another important task when designing a conjoint study is deciding on the way the choice tasks are generated (Chrzan & Orme, 2000). In this study, the attribute brand has 4, the attribute price has 3, the attribute screen size has 3, the battery life has 3, the storage capacity has 3 and the camera quality has 3 levels. So, if one was to use all of the combinations of the attribute levels for creating different smartphone alternatives to be presented to the respondents, it would enable one to capture the interaction effects besides main effects but there would be 972 different smartphone alternatives that the respondents would need to evaluate and think if they would buy it or not. This is a high number of products to be evaluated by any respondent. However, it is still possible to design the conjoint survey in a way that less number of profiles are used and at the same time no attribute is used unevenly, resulting in the statistical calculations not to be distorted (Norwood & Lusk, 2005). To achieve an efficient design nowadays specially-designed softwares like Sawtooth are used, which is also made use of in this research for creating the survey (Baganzi et al. 2017).

The conjoint design chosen for this study is “Balanced Overlap Method”. The Sawtooth software shows the respondents every attribute level the fewest amount possible in order to prevent overlap and each level is shown the same amount of times in the choice tasks so that there is a balance. With this design, some degree of repetitions of certain levels within the choice tasks can be expected but no hypothetical product is shown twice. An advantage of the balanced overlap method is that, it is able to produce results as accurate as other designs such as random, complete enumeration in terms of main effects, and regarding the interaction effects, the balanced overlap method is able to produce more accurate results than the other designs mentioned before (Chrzan & Orme, 2000). The fact that except the attribute brand, all of the other attributes having 3 levels and the conjoint experiment displaying 4 concepts per choice task also helped the overlaps to happen. If some degree of level overlap is there, it improves the design because for example some brand-focused respondents wouldn’t only choose whatever brand they prefer the most repeatedly but they would be forced to make a decision between smartphones with the same brand but different technical features. Because of the reasons mentioned above, balanced overlap method

was chosen as the most suitable method for this study. The number of “random” choice designs generated with the balanced overlap method is 300, which is also the default and recommended number in Sawtooth software. With this way of creating the designs, many different hypothetical smartphones and different versions of the survey were shown to the respondents, with the aim of obtaining higher quality results as well as preventing any bias that might occur. An example of such potential bias is order effects which may occur when the order of questions might create some bias in respondents’ answers resulting in the outcome of the research to be affected (Révész & Rogers, 2020). Lastly, one could also prohibit certain combinations of attribute levels appearing together in the choice tasks. However, as suggested by Sawtooth software, since they may have some serious negative effects on the experiment design, they were not used.

According to Sawtooth software, for a choice-based conjoint analysis usually the number of choice tasks from 8 to 15 are enough (Chrzan & Orme, 2000). If the number of choice tasks to be included is too large, there might be some bias or noise in the data. In the design of this conjoint experiment, 14 choice tasks were presented per respondent and since there were 300 random choice designs generated as a pool to be used, the overall number of the tasks equals to be  $300 \times 14 = 4200$ . Among these tasks, the brands were shown on average 4200 times and the other smartphone attributes with each of their level 5600 times.

### 3.4 The Survey Design & Data Collection

#### 3.4.1 Data Collection

In this thesis, in order to collect data from as many respondents as possible for the choice-based conjoint analysis, the sampling technique called convenience sampling was used. Smartphones can be used by and thus be sold to many different groups of people. In fact, 86% of the world’s population is estimated to own a smartphone (Ericsson, 2022). Since most people own smartphones, they are already customers of a smartphone brand, which makes them a suitable target audience that can provide data for this study.

Data collection plays a crucial role in every research. The data needs to be enough to be able to gather reliable insights, achieve statistical significance and use certain methods (Godwin et al. 2020). Some researchers incentivize participation in their experiment or survey by offering money or something else that the respondents would value for participation or by putting some kind of prize that would be given out at the end of the experiment either randomly or depending on the respondents’ performance/input. However, in this study, there were no such incentives for the respondents to answer the survey and the respondents’ participation in the study was purely



voluntary. Given this setting, it is hard to convince people to take a voluntary survey, some of which might drop out of the survey or give low-quality answers. Thus, this difficulty is also one of the reasons for using the convenience sampling method for the data collection.

Since the goal of the data collection process was to make the survey reach as many people as possible, an online survey was carried out so that it is easier to reach people and reach them with lower effort compared to carrying out a physical survey with papers. With an online survey, it is also easier to reach a greater diversity of population. For this purpose, when collecting data, many different channels were used, all of which were online. One channel used was Whatsapp groups. These WhatsApp groups included groups for international Erasmus students in Berlin, many groups for permanent students in Berlin. The student groups in other cities of Germany were also used. Another group that was used was expats in Berlin. So, the diversity of the groups differed a lot. Some other data collection channels that were used were, Discord, LinkedIn, Facebook, and the Moodle system of the Humboldt University of Berlin. Some of the groups that the survey was sent to only consisted of Turkish people, a few groups included Spanish people only and some groups contained people from different countries. Because of the diversity of the groups and in the groups that the survey was sent to, the diversity in the respondents were also high.

### 3.4.2 Demographic Questions

In addition to the choice-based conjoint questions, other types of questions were also asked namely, demographic and smartphone-related questions. In the demographic questions, the age of the respondents was one of the questions asked. This information can be important because age plays a crucial role when segmenting consumers. One can argue that age can also be seen as one of the primary factors that affect consumer behavior. The reason for that is that the difference between a 20-year-old person and a 30-year-old person can be a lot since they probably have different amounts of life experiences and different ways of giving decisions or considering factors. Another question that was asked was the gender of the respondents. Gender is also an important demographic that companies use for segmenting their consumers and it may be found to be significant in giving financial decisions. Additionally, the respondents' current place of residence was asked. This might have an influence on the respondents' purchase decision because of a number of reasons. First, living in a specific country means being surrounded by a specific culture. This means that the respondents might be affected by things like shopping behavior of that specific country, the attitude towards smartphones, how people of different ages behave and interact, etc. In sum, everything about the country that the respondents are living in can affect their purchase behavior. Another question that was asked was the respondents' country of origin. The

respondents' country of current residence and their country of origin might differ. As mentioned, the country can have a big impact on the respondents' preferences and way of thinking. The extra question of the country of origin was asked in order to see, in case the respondents' country of origin is different than their current country of residence. For example, if the respondent lives in Germany but is from Spain, this means that they will have different cultures which may result in different preferences for purchasing a smartphone. Another question that was asked within the demographic question section is the level of education that the respondents have. People with lower levels of education might be very knowledgeable or vice versa. However, on average and in general, the answers from this question might be used as an indication of one's general knowledge level and it can be used for segmentation purposes too.

After the demographic questions end, the conjoint analysis starts. Before the respondents are shown the choice tasks, there is an "introduction to conjoint" page. On this page, respondents are first instructed that they should assume they are in need of purchasing a smartphone. Later, they are explained that they are going to see 4 hypothetical smartphones to purchase one from and in case they would choose not to purchase one, a none option for opting out. After that, there is a message that reminds respondents that it is important for them to state their choices as if they are really buying a smartphone. Then, respondents are told that there will be a sequence of several choice scenarios, each page being a new choice scenario with options of hypothetical smartphones to choose from, and that they should treat each choice scenario independently. Lastly, the smartphone attributes used in the study are clearly explained. Since the screen size is described in inches, a reference image of different smartphone screen sizes is provided and respondents are reminded that their decision should not be impacted by any attribute not mentioned in the choice tasks. After the introduction of the conjoint attributes, the choice tasks start.

### 3.4.3 Smartphone-Related Questions

Some questions were also asked that are specifically about smartphones and the respondents' ideas about them. These questions come after the choice-based conjoint questions on purpose. In designing experiments, the order of the questions can matter and have an effect on the results since the respondents might learn about the aim of the experiment explicitly or be impacted by the questions in another way (Carlsson, Mørkbak & Olsen, 2012). The first smartphone-related question was asking the respondents how they would distribute 100 points in terms of importance to the smartphone attributes used in the study. By including this question one can get some valuable insights. If the importance levels that the respondents fill themselves are the same or similar with what is obtained from the choice task preferences, one can argue that the respondents are accurate

in what they think and what they choose and the conjoint results would confirm that. So, it would serve as some kind of a validity check. After that, the respondents are asked what other smartphone attributes are important to them. The answer to this question can be important because the decision as to which smartphone to buy can be affected by many factors and if the answer to this question is known, one has more information that can be used to suggest the smartphone manufacturers marketing and strategical suggestions for new or existing phones. The existing options for this question are Design, Processor, Display resolution, Audio/sound system, Headphone jack/USB port, Charging speed, Other, None of the above.

After this question, the respondents are asked whether they own a smartphone and if their answer is yes, they are asked which brand it is. The brands that are included in the question as options are Apple, Samsung, Xiaomi, Huawei, Oppo and Vivo. Additionally, an “Other” option is provided so that the respondents can specify if they have any other brands. It is in general important to know which smartphone brand the respondents have and knowing the brand of the respondents’ smartphones also serves as complementary information for the other questions in the survey. With this information, one can see if the importance the respondents give to the brand levels as a result of the conjoint survey matches their real-life brand preference. Another question that is asked in the survey is how likely the respondents are to switch their brands in the future and to which brand if they have an option in their mind. This information can be used in the targeting strategy of the companies in their marketing mix strategy. Not all respondents may be prone to a brand switch but the ones that are as well as the brands these respondents are thinking of switching to can be found out with these questions. The list of brands is the same with the ones used in the question asking which brand of smartphone the respondents own. Moreover, the respondents are asked for how long they have had their phone and how often they buy a new one. With these information, one can detect the respondents who are roughly ready to renew their phone and suggest a marketing plan within a time frame, which can be beneficial for the smartphone companies and for the consumers. The options for the duration of the phone possession question are: less than 6 months, 6 months to 1 year, 1 year to 2 years, 2 years to 3 years, 3 years to 4 years and more than 4 years. The options for the frequency of phone renewal are: less than 1 year, 1-2 years, 2-3 years, 3-4 years, 4-5 years, more than 5 years.

Lastly, the respondents are asked the average time they spend daily on the phone and what their primary source of information is such as family/friends, internet comments, ratings etc. These information can be used to see if there is any correlation between the conjoint results and them. This way, some marketing strategy suggestions can be derived. The options in the source of

information question are: online reviews, family and friends, in-store demos, word-of-mouth recommendations, advertisements, own research and other. The answer options in the average daily time spent on phone are: online reviews, family and friends, in-store demos, word-of-mouth recommendations, advertisements, own research, other. In the next section, the data analysis, utility estimation, demographic and smartphone-related question data examination, segmentation based on preferences and market simulation will be done.

## 4 Data Analysis

In this section, the analysis of all of the data that is gathered during the survey will be done. This chapter consists of two main sections and some subsections. In the first section, the data will be introduced. In this part, data from the demographic and smartphone-related questions will be reported, where some observations based on the analysis will be shared. Then, in the second part of the data analysis, the CBC data will be analyzed. This section consists of some subchapters. Each subchapter will respectively report the utility estimates (part-worths), CBC importances, willingness-to-pay values, importance values based on demographic and smartphone-related questions, segmentation based on preferences and market simulation.

### 4.1 Reporting of Demographic and Smartphone-Related Questions

The survey was initially taken by 900 people and 375 from this 900 people fully completed it. Thus, the respondents who have not completed the survey until the last question were excluded from further analysis. Among the respondents, there was no respondent that chose a specific hypothetical product repetitively in the choice tasks. Because of this reason, no further exclusion was made from the 375 respondents that fully completed the survey.

The survey starts with the demographic questions and the first question was the gender question. From the respondents, 166 were male (44.27%) and 200 were female (53.33%). One can see a balanced distribution between the genders. 9 people indicated other sexual preferences or chose not to give an answer to this question.

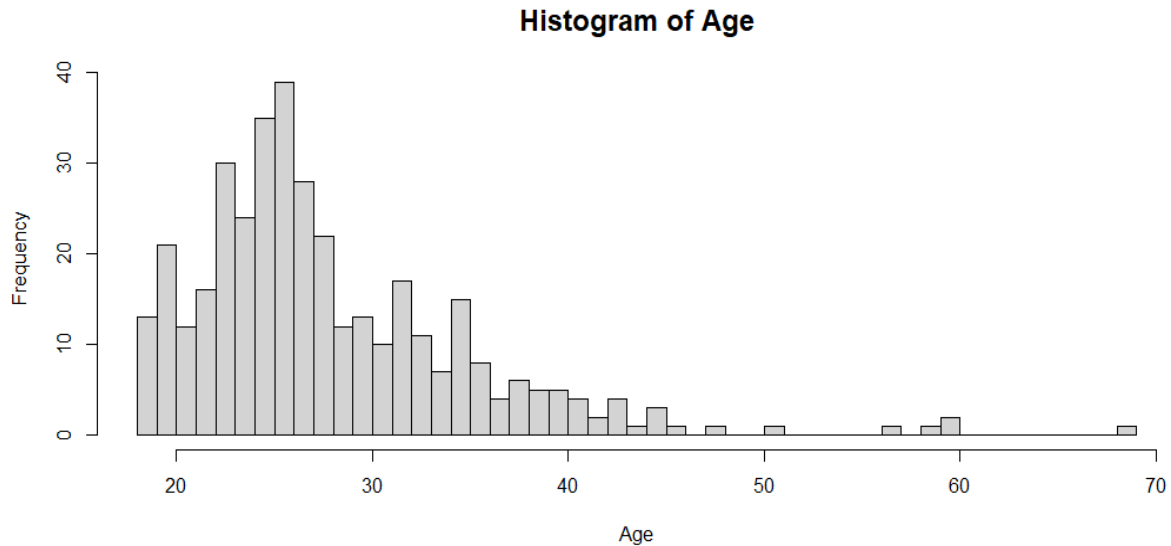


Figure 4.1: Histogram of respondents' ages  
(Author's Illustration)

Another demographic question was the respondents' age. One can see how they are distributed in the histogram above. Although the distribution of the age of the respondents is left-skewed, there are a few outliers towards higher ages. The minimum and the maximum age of the respondents were 18 and 69 respectively, while the mean is 28.32.

Australia (AUS)	1	Austria (AUT)	2	Barbados (BRB)	1	Belgium (BEL)	1
Canada (CAN)	1	China (CHN)	1	Finland (FIN)	1	France (FRA)	4
Germany (DEU)	278	India (IND)	2	Iraq (IRQ)	1	Ireland (IRL)	1
Malaysia (MYS)	2	Moldova (MDA)	1	Netherlands (NLD)	7	Poland (POL)	1
Romania (ROU)	1	Russia (RUS)	1	Slovenia (SVN)	1	South Africa (ZAF)	1
South Korea (KOR)	2	Spain (ESP)	2	Switzerland (CHE)	6	Turkey (TUR)	47
United Kingdom (GBR)	6	United States (USA)	3				

Figure 4.2: Distribution of respondents by country of residence  
(Author's Illustration)

Another demographic question that was asked was the respondents' country of residence. One can see which countries the respondents reside in in Figure 4.2. The distribution of respondents by their country of residence shows a high level of diversity with the presence of many different countries. There are two countries that draw the attention. One is Germany which 278 of the respondents (74.13%) live in. The other is Turkey which 47 of the respondents (12.53%) live in.

Albania (ALB)	2	Argentina (ARG)	1	Armenia (ARM)	1	Austria (AUT)	2
Belarus (BLR)	1	Belgium (BEL)	1	Belize (BLZ)	1	Brazil (BRA)	3
Bulgaria (BGR)	5	Canada (CAN)	1	Chile (CHL)	3	China (CHN)	2
Colombia (COL)	4	Croatia (HRV)	1	Ecuador (ECU)	1	Egypt (EGY)	2
France (FRA)	4	Georgia (GEO)	1	Germany (DEU)	84	Greece (GRC)	3
Honduras (HND)	1	India (IND)	9	Iran (IRN)	1	Iraq (IRQ)	1
Ireland (IRL)	1	Italy (ITA)	2	Japan (JPN)	1	Lebanon (LBN)	1
Luxembourg (LUX)	1	Macedonia (MKD)	2	Malaysia (MYS)	1	Mexico (MEX)	3
Moldova (MDA)	2	Nepal (NPL)	1	Netherlands (NLD)	4	Pakistan (PAK)	2
Philippines (PHL)	1	Poland (POL)	5	Romania (ROU)	2	Russia (RUS)	6
Serbia (SRB)	2	Slovakia (SVK)	1	Slovenia (SVN)	1	South Africa (ZAF)	1
South Korea (KOR)	2	Spain (ESP)	4	Switzerland (CHE)	4	Tunisia (TUN)	1
Turkey (TUR)	175	Uganda (UGA)	1	Ukraine (UKR)	1	United Kingdom (GBR)	5
United States (USA)	4	Uruguay (URY)	1	Venezuela (VEN)	1	Vietnam (VNM)	1

Figure 4.3: Distribution of respondents by nationality

(Author's Illustration)

In addition to the country of residence question, the respondents' nationalities were also asked in the questionnaire. One can see the exact distribution in Figure 4.3. In total, there were 56 different nationalities among the respondents. Two of these nationalities are more prominent than the others. One of these nationalities is Turkey. 175 respondents were Turkish, which corresponds to 46.67% of all of the respondents. The second most prominent nationality among the respondents was Germany. 84 respondents were Germans, which corresponds to 22.40% of all the respondents.

Employment status is another important question to ask in the surveys. A reason for that is that the employment status data can be used to segment the respondents. Another reason why employment status is an important demographic question to ask in the surveys is that it can also be used to get an idea or a general overview of the respondents' income levels, which can be used for various purposes. In the barplot below in Figure 4.4, one can observe the respondents' employment status distribution. The most frequent employment statuses were being a student and a full-time employee. 180 of the respondents were students (48%) and 132 were full-time employees (35.20%). Additionally, 32 respondents were working part-time, 21 were seeking opportunities, 3 were retired and 2 chose not to answer this question.

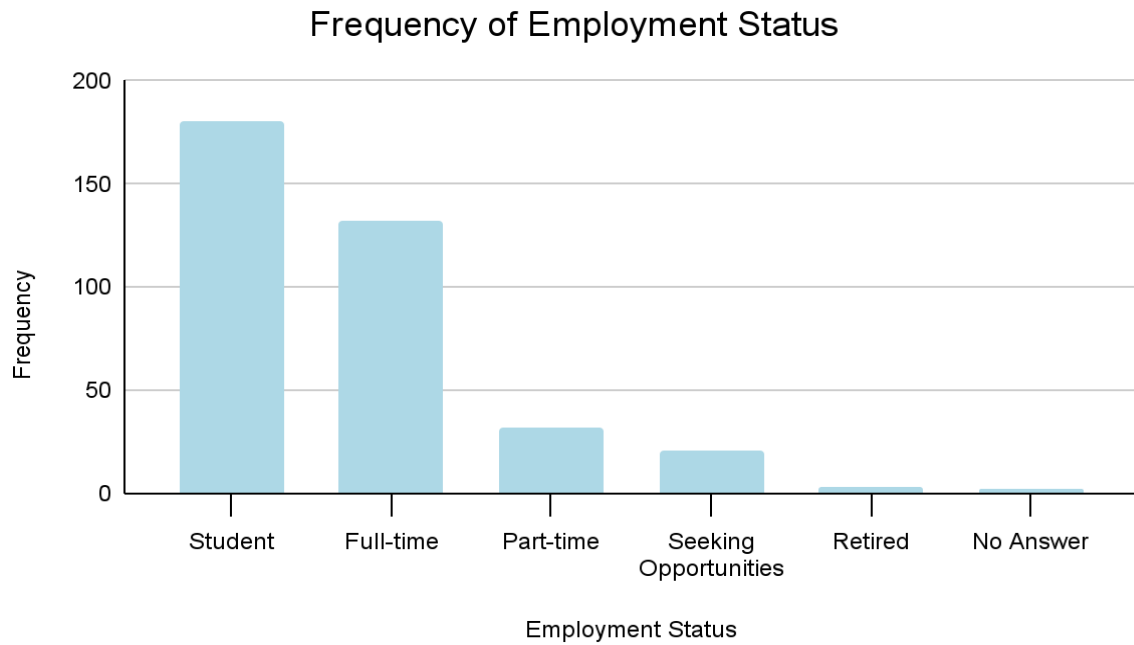


Figure 4.4: Barplot of respondents' employment status  
(Author's Illustration)

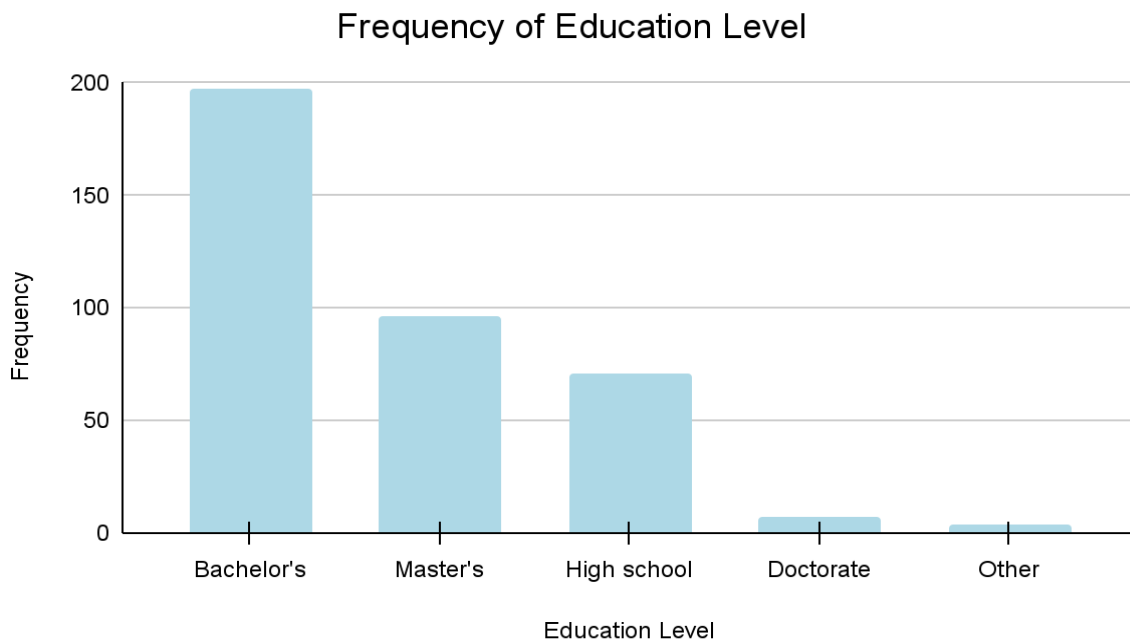


Figure 4.5: Barplot of respondents' education level  
(Author's Illustration)

Another demographic question was asked to see the education level of the respondents. The barplot in Figure 4.5 shows how respondents' level of education was distributed. Around half of the respondents have a Bachelor's degree and around one-third have a Master's degree. To be more specific, the number of respondents who have obtained a Bachelor's degree was 197, which

corresponds to 52.53% of the data. The second highest education level was Master's degree with 96 people, which corresponds to 25.60% of the respondents. This is followed by 71 people with a High School degree (18.93%). Additionally, 7 people had a Doctorate degree and 4 people chose the option other.

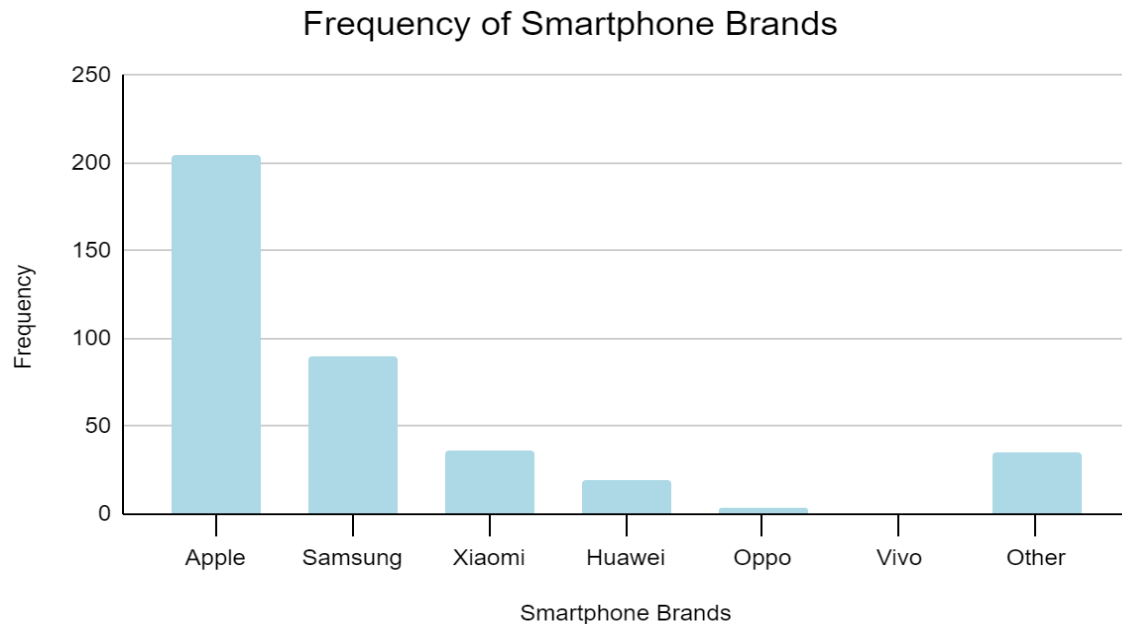


Figure 4.6: Barplot of the brands of respondents' smartphones  
(Author's Illustration)

The distribution of the which brands the respondents' smartphones belong to can be found in Figure 4.6. 205 of the respondents are owners of an Apple brand phone. This accounts for more than half of the respondents (54.67%) and it is also reflected in the CBC results. The second most prominent brand was Samsung with 89 people, corresponding to 23.73% of the respondents. The ownership among the other brands was relatively low compared to Apple and Samsung. The number of respondents who had other brands was as follows: Xiaomi 34 (9.06%), Huawei 19 (5.07%), Oppo 4 (0.01%), Vivo 0 and Other 38 (10.13%). Oppo and Vivo are smartphone companies that have an important amount of share globally and compete with Huawei in terms of market shares; however, this was not represented in the data set (Counterpoint Research, 2023). Also, the number of the people who chose the other option was relatively high too and it included many different brands. The distribution of the answers stated in the other option was as follows: 12 Google, 10 Oneplus, 4 Motorola, 2 Sony, 1 Blackberry, 1 Cubot, 1 Honor, 1 LG, 1 Nokia, 1 Shift and 1 ZTE.



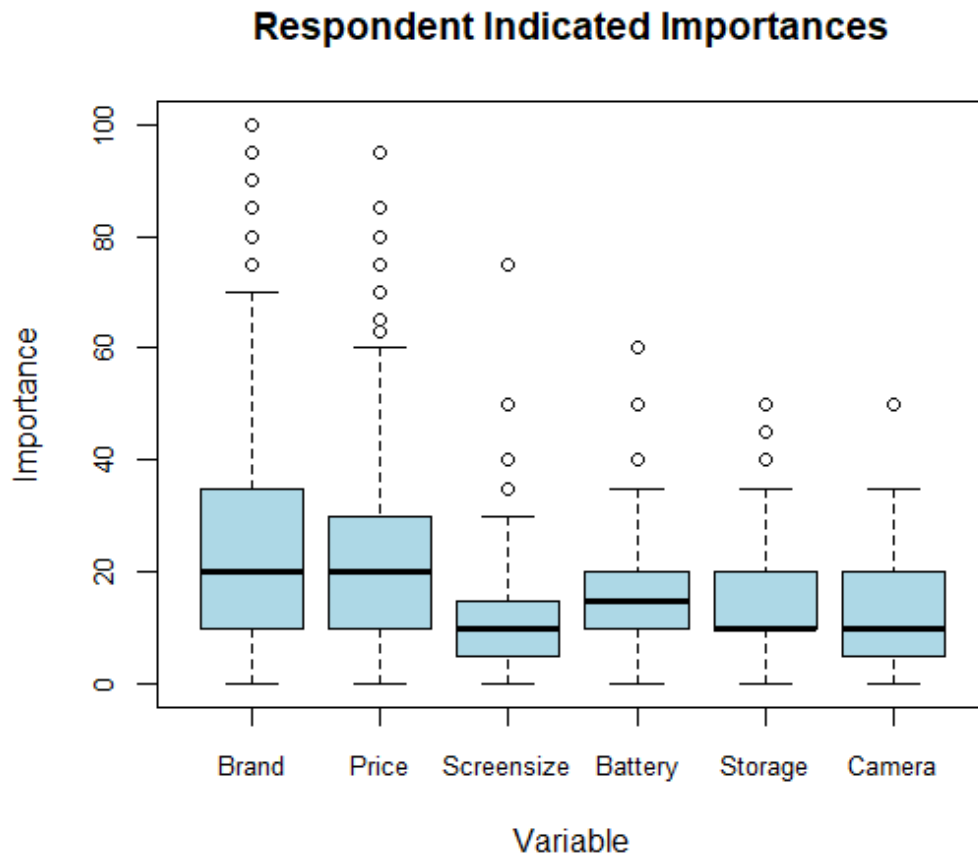


Figure 4.7: Boxplot of respondent-indicated importances  
(Author's Illustration)

In the survey, the respondents were asked to allocate 100 points between the CBC smartphone attributes of brand, price, screen size, battery, storage and camera according to how important they think each attribute is. The results can be seen in Figure 4.7: . According to the respondent-indicated importances, brand is the most important attribute followed by price while the other four attributes share similar and lower importances. The averages for the respondent-indicated attribute importances are as follows: brand 24.80, price 22.74, screen size 10.27, battery 15.17, storage 13.98, camera 13.04. As will be explained later in the chapter, these results are also reflected in the CBC importances.

Design	Charging Speed	Display Resolution	Processor	Sound System	Input Ports	Other	None
59.20%	43.73%	38.93%	38.67%	29.87%	25.87%	17.87%	5.33%

Table 4.1: Importance of the other smartphone attributes  
(Author's Illustration)

Another smartphone-related question was asking the respondents which other phone attributes are important to them which is crucial to get further insights on the attributes that are important to the respondents. According to the results of the question, as one can also see in Table 4.1, the following

number of the respondents find the following phone attributes important: design 222 (59.20%), charging speed 164 (43.73%), display resolution 146 (38.93%), processor 145 (38.67%), sound system 112 (29.87%), headphone jack/USB port 97 (25.87%), other 67 (17.87%) and 20 (5.33%) none of the above. Since respondents may find more than one attribute important, in this question multiple selections were allowed. Among the respondents who chose the other option, the operating system of the phone was one of the most repeated additional phone attributes. Another frequent “other” answer was the ecosystem, connectivity and integration. People seem to find these important as well. A few of the respondents also indicated that fairness, ethical issues, working conditions, politics, environmental impact, and repairability are important to them. The correlation between the columns was also checked. There is significant 0.18 correlation at the 0.05 level indicating that people who find design important also find display resolution important. These people might be categorized as people who value aesthetics particularly. People who find processor important also correlated with display resolution with 0.25. Additionally, display has a significant correlation of 0.11 with charging speed and 0.12 with sound quality of the phone. Sound system also has a significant correlation of 0.22 with the phone having USB port and 0.21 with the phone having a faster charging speed. The USB port attribute also has a significant correlation of 0.12 with the charging speed of the smartphones.

< 1 year	1-2 years	2-3 years	3-4 years	4-5 years	> 5 years
5 (1.33%)	17 (4.53%)	93 (24.80%)	109 (29.07%)	103 (27.47%)	48 (12.80%)

Table 4.2: Frequency of Smartphone Purchases  
(Author’s Illustration)

Respondents were also asked how often they purchase a new phone. By looking at Table 4.2, one can see how often the respondents renew their phones. Only a few respondents renew their phone in less than two years and the number of respondents who renew their phone in more than five years is relatively low as well. Most people renew their phone in around every two to five years. Also, the average age of the respondents who purchase a phone with a frequency of less than a year is 33.20 while the average age of the respondents who purchase a phone in every three-four years is 26.97. This difference might be resulting from income.

Another question that was asked to the respondents was the time duration that they had their phones for. The answers that the respondents gave were as the following: 14.40% less than six months, 14.93% six months to one year, 22.93% one-two years, 22.40% two-three years, 14.67% three-four years and 10.66% more than four years. Both of the previous two questions were

analyzed together in order to identify the potential new phone buyers. It was found that 75 of the respondents are likely going to buy a new phone soon.

It is important for the smartphone companies to find out how people make decisions about which phone to buy and a very important part of that is the consumers' primary source of information. In the survey, consumers' primary source of information for researching and gathering information about smartphones was also asked. The data from this question was as follows: online reviews 263 (70.13%), own research 229 (61.07%), family and friends 143 (38.13%), in-store demos 63 (16.80%), word-of-mouth recommendations 72 (19.20%), advertisements 29 (7.73%). So, online reviews are the most important source of information. Companies can develop strategies to manage the online reviews in a good way, for example by answering some negative comments or replying positively to the positive comments. This question was a question where multiple responses were possible, and because of that correlations were also checked. Some significant correlation at the 0.5 alpha level was found between the options, which are as follows: a 0.11 corr. between online reviews and word-of-mouth recommendations, 0.20 corr. between family and friends and word-of-mouth recommendations, 0.10 corr. between in-store demos and word-of-mouth recommendations, 0.19 corr. between in store-demos and advertisements, 0.16 corr. between word-of-mouth recommendations and in-store demos.

	< 1 hour	1-2 hours	2-3 hours	3-4 hours	4-5 hours	> 5 hours
Male	7 (4.22%)	22 (13.25%)	40 (24.10%)	38 (22.89%)	29 (17.47%)	30 (18.07%)
Female	2 (1.00%)	16 (8.00%)	38 (19.00%)	53 (26.50%)	40 (20.00%)	51 (25.50%)

Table 4.3: Average daily phone usage by gender

(Author's Illustration)

Another question that was asked to the respondents was how much time they spend on their phone daily. The results are as follows: less than one hour ten people, one-two hours 38 people, two-three hours 80 people, three-four hours 90 people, four-five hours 73 people and more than five hours 81 people. This data was also checked according to two prominent genders in the data in Table 4.3. In the table, percentages were calculated within the genders. It was observed that females tend to use their phones for a slightly longer period of time than males. An additional observation was that, the average age of the respondents who spend less than one hour daily on the phone was 33.30 whereas this was around 28 for the other options that are higher than 1 hour. So, respondents with higher ages spend less time on the phone. Lastly, the Turkish respondents were observed to be spending more time on the phone than the German respondents.

Another question that was asked to the respondents was how likely they were to switch to a different phone brand instead of their current one for their next phone purchase. This was a sum allocation type of question where the respondents allocated 100 points between the “stick with the current brand” option or the “may switch to another brand” option. In general, the mean likelihood of the “stick with the current brand” option was 73.55 and the “switch” option 26.45. This shows that most of the respondents seem to be satisfied with their current choice of brand. In the data set 118 respondents stated that they will stick to their current brand 100% and 106 of these respondents were Apple users, which shows the strong brand loyalty towards Apple. When this data was analyzed with respect to genders, it was found that the average satisfaction level of males was 69.00% whereas this number was 76.94% with females. Also, there was an increase in brand satisfaction with the increasing level of education. When the respondents are grouped according to their education level, the average percentage of the respondents who indicated their willingness to stick with their current brand was as the following: Highschool 69.94%, Bachelor’s 73.64%, Master’s 75.93%, Doctorate 77.14%. This indicates that the willingness to stick with the current phone brand increases with education level.

Apple	Samsung	Xiaomi	Huawei	Oppo	Google	Oneplus
88.38%	62.19%	48.38%	34.21%	62.5%	68.64%	36.67%

Table 4.4: Average brand satisfaction among different brand users

(Author’s Illustration)

The question asking the respondents their probability of sticking with their current brand for their next phone purchase was also analyzed with regards to the phone brands that the respondents already own. In Table 4.4, the average brand satisfaction level of each smartphone brand user was calculated. According to it, the phone users that are most loyal to their brand are Apple users, that also constitute the majority of the data with 205 respondents out of 375. Samsung, Oppo and Google phone users seem to be less satisfied with their brand of choice, which consist of 89, 4 and 12 users respectively. Xiaomi, Huawei and Oneplus are phone brands whose users are inclined to switch to a different phone brand with more than 50% likelihood on average. These brands have 34, 19 and 10 users in the data set.

Another question that was asked to the respondents was which brand they may change to if they are thinking of switching to another brand. In general, the results to this question are as follows: 92 people might switch to Apple, 116 to Samsung, 57 to Xiaomi, 40 to Huawei, 30 to Oppo, 13 to Vivo, 14 to Google and 3 to Oneplus. 216 of the respondents indicated that they were satisfied with their current brand choice. Since these numbers don’t add up to 375, one can assume although

some people are satisfied with their current phone, they may still change to another brand. It is important to note that in this question multiple answers were allowed since people might be considering switching to more than one brand.

(Switch from rows to columns)	Apple	Samsung	Xiaomi	Huawei	Oppo	Vivo	Google
Apple users (n= 205)	-	64 (31.22%)	25 (12.20%)	19 (9.27%)	8 (3.90%)	3 (1.46%)	2 (0.98%)
Samsung users (n= 89)	40 (44.94%)	-	23 (25.84%)	11 (12.36%)	13 (14.61%)	6 (6.74%)	7 (7.87%)
Xiaomi users (n= 34)	19 (55.88%)	18 (52.94%)	-	7 (20.59%)	5 (14.71%)	3 (8.82%)	3 (8.82%)
Huawei users (n= 19)	9 (47.37%)	10 (52.63%)	3 (15.79%)	-	1 (5.26%)	1 (5.26%)	1 (5.26%)
Google users (n= 12)	3 (25.00%)	6 (50.00%)	1 (8.33%)	0 (0.00%)	1 (8.33%)	0 (0.00%)	-

Table 4.5: The number of people who might switch from one brand to another

(Author's Illustration)

In Table 4.5, the distribution of how many people using a specific phone brand might switch to another brand is examined. The switches are represented to be happening from the brands in the rows to the ones in the columns. For example, the number 64 means that there were 64 people from the 205 Apple users among the respondents, that might switch to Samsung and 64 corresponds to 31.22% of the 205 Apple users. One can observe that the percentages in the row for Apple users are lower than the other rows suggesting that not many Apple users are thinking of switching to a different brand. In fact, the row-wise sum of the percentages is as follows: Apple 58.03%, Samsung 112.36%, Xiaomi 161.76%, Huawei 131.05%, Google 91.66%. According to these numbers, Xiaomi users are highly prone to switching to another brand, that is mostly either Apple or Samsung. Another insight that one can derive from Table 4.5 is that the brand that Apple users might switch to most is Samsung and the brand that the Samsung users might switch to most is Apple and to some degree Xiaomi. This might confirm that these brands are mostly in high competition with each other. For Xiaomi and Huawei the biggest competitors seem to be Apple and Samsung as many of their users indicated that they may switch to Apple or Samsung. Lastly, Google users seem to have a preference for Samsung specifically.

## 4.2 The Analysis of the Conjoint Data

In this section, the analysis of the conjoint data will be provided in combination with demographic and smartphone-related data. Firstly, the utility estimation was done with random coefficient logit model at the individual level. This model was used because interaction effects tend to fade away when the researcher uses random coefficients logit model or in other words, mixed logit method at the individual level (Sawtooth Software, 2017). Also, getting utilities with random coefficient logit model at the individual level is especially helpful because with individual-level utilities, one can account for the heterogeneity in preferences, one has more freedom in analyzing the data, segmenting the respondents and they also provide more flexibility when building market scenarios or estimating different product combinations' shares (Howell, 2009).

For the utility estimation the `gmnl` library was used in R. In order to run the algorithm, the CBC data was put to a form that `gmnl` library can work with. In order to estimate the utilities, the attribute levels must be numerically coded (Orme, 2019). In this thesis study, they were dummy coded and one level in each attribute was left out since an attribute with  $n$  levels can be described by  $n-1$  dummies. Amongst the brands, Oppo was left out, and in the other attributes, the smallest level was left out. Also, in the algorithm, price was scaled in 100. The reason for that is because all of the other variables except price are considered categorical for the algorithm and they are dummy coded. By scaling the price, the imbalance between the price variable and the dummy variables that are coded as zero or one as well as some potential problems regarding conversion is prevented. Additionally, excluding price, all of the variables were assumed to be normally distributed and the price was assumed to be log-normally distributed since this assumption makes the compatibility of the price coefficients with the economic theory better (Kohli & Mahajan, 1991). The number of random draws in the model was 100 and it took 213 iterations to get the final estimates. The log-likelihood ratio shows how well the model performs in explaining the variation or choices by the respondents (Andrews & Currim, 2003). In the model used for getting the final individual-level utilities, the log-likelihood ratio was 0.42. Also, all of the variables were found to be highly significant and some of the standard deviation as well, which shows the presence of heterogeneity in consumers' preferences. The analysis will start off with the part-worth values of each attribute, which shows how much an attribute level is preferred over another (Green & Srinivasan, 1990).

### 4.2.1 Analysis of the Utilities

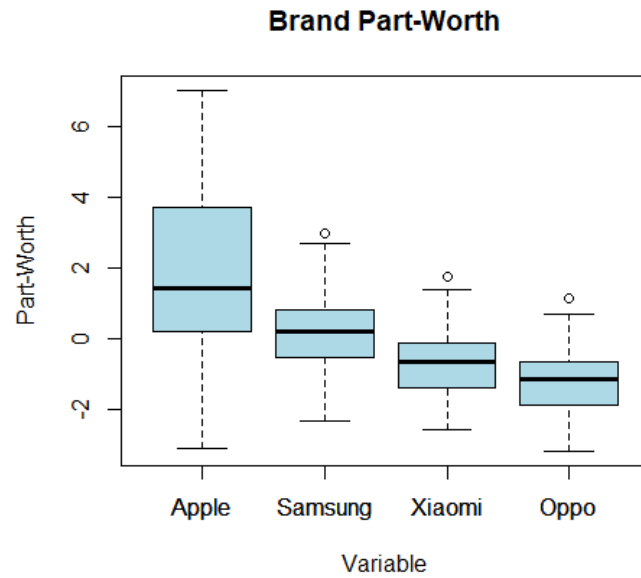


Figure 4.8: Boxplot of the average brand part-worth values  
(Author's Illustration)

In Figure 4.8, one can observe the average part-worth values of the brands used in this study across the individuals. One observation that can be made is that the respondents value Apple the most by a significant difference. Samsung is the 2nd, Xiaomi the 3rd and Oppo is the least valued brand. Another observation that can be made is that there is a bigger amount of deviation in the part-worth value for Apple compared to other brands, which may be a sign that the preferences for Apple vary more than other brands.

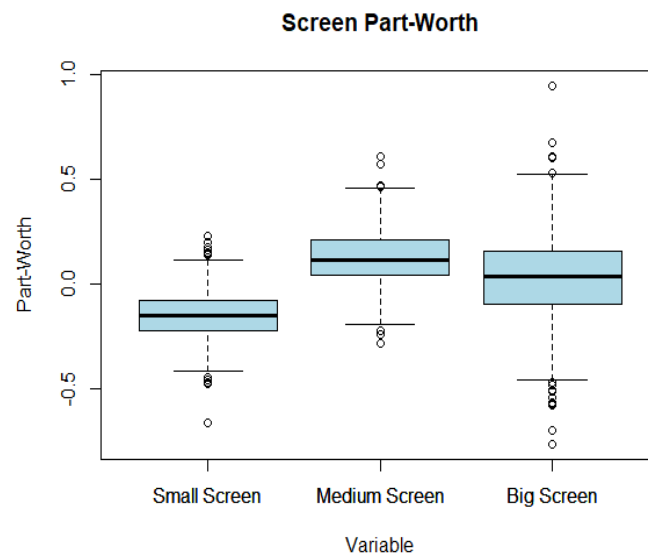


Figure 4.9: Boxplot of the average screen size part-worth values  
(Author's Illustration)

Another phone attribute that was used in this study to see consumers' preferences regarding it was screen size. In Figure 4.9, one can see how consumers value various sizes of the smartphone screens. The small, medium and big screen sizes correspond to 5.5 inches, 6.1 inches, 6.7 inches. Overall, from the most preferred option to the least option, the various screen sizes are ordered in the following way: medium, large and small. So, in real life, there are likely different segments that prefer different sizes of smartphones but according to the data gathered in this study, one can conclude that there is not a linear relationship between the screen size and the preference of the consumers or, in other words, a bigger phone screen is not always more preferred.

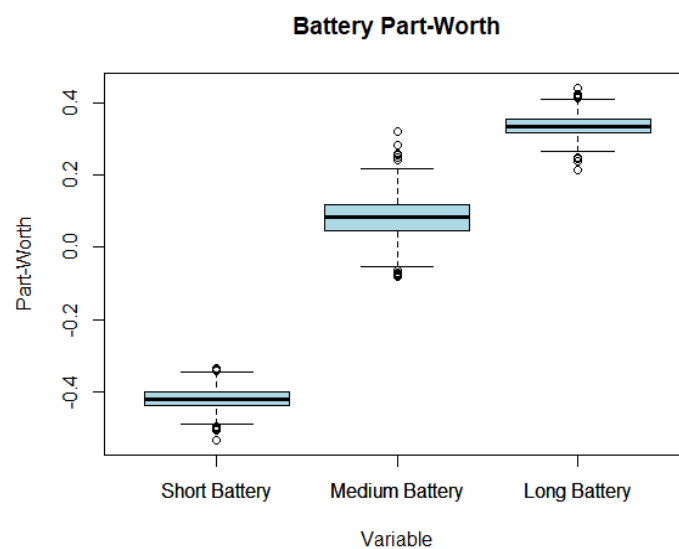


Figure 4.10: Boxplot of the average battery life part-worth values  
(Author's Illustration)

Another phone attribute that was used to see consumers' preferences regarding it was battery life. The boxplot in Figure 4.10 shows how much the respondents value or get utility from each level of different phone batteries. Short, medium and long battery refers to 9, 11 and 13 hours of use respectively. Overall, from the most preferred option to the least preferred option, the various batteries are ordered in the following way: long-lasting battery, medium-level battery and short-lasting battery. One can also observe that while the utility derived from medium and long battery life is close to each other, the utility derived from short battery is much lower than the other two.



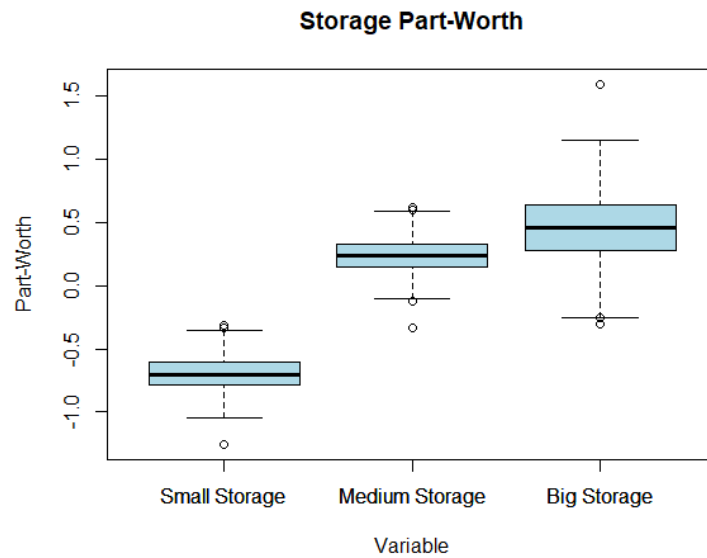


Figure 4.11: Boxplot of the average storage capacity part-worth values  
(Author's Illustration)

Another phone attribute that was used to see consumers' preferences regarding it was storage capacity. The boxplot in Figure 4.11 shows how much the respondents value or get utility from each level of different storage capacities. Small, medium and big storage capacities refer to 64 GB, 128 GB, 256 GB respectively. The boxplot indicates that there is a preference towards “the more storage a phone has, the better it is” approach. One can see that while people strictly prefer medium storage over small storage in phones, there is a smaller difference in preferences between medium storage and big storage.

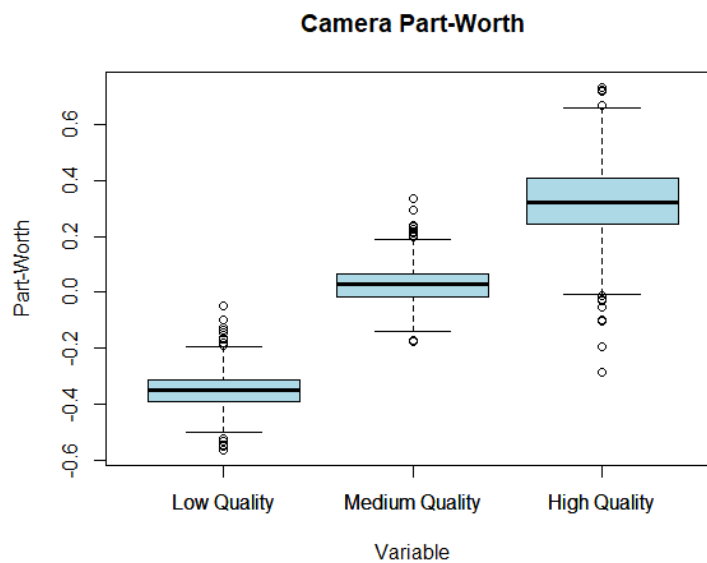


Figure 4.12: Boxplot of the average camera quality part-worth values  
(Author's Illustration)

The boxplot in Figure 4.12 shows the utility levels that respondents get from low, medium and a high-quality phone camera, corresponding to 12 MP, 16 MP, 20 MP respectively. This variable is the most linearly distributed variable as the distances between the means of the part-worth values are close to being equal. For the respondents, the higher the camera quality is, the more utility they get from owning that phone. While this is an expected result, the smartphones with higher quality cameras are usually more expensive (Berne, 2023). So, consumers have to make some degree of trade-off between the camera quality and price when buying a new phone.

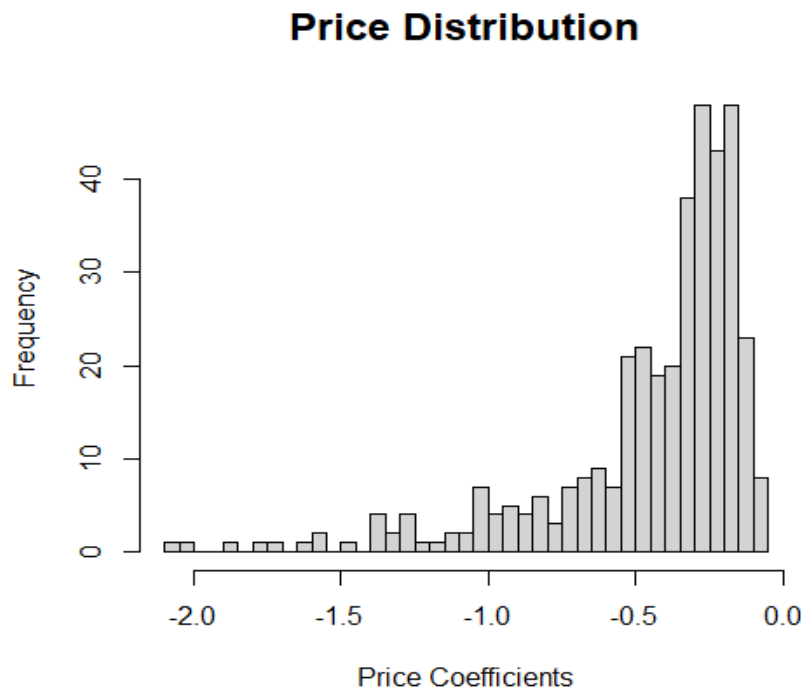


Figure 4.13: Histogram of individual price coefficients  
(Author's Illustration)

By looking at the histogram in Figure 4.13, one can observe the respondents' preferences with regards to prices. The distribution of price coefficients is skewed as they were assumed to be log-normally distributed. This assumption helps to get more realistic preferences related to price (Kohli & Mahajan, 1991). The mean of the price coefficients is found to be -0.44. Lastly, although many respondents share similar preferences related to price, one can also see that some respondents are much more price sensitive than others.

Brand	Price	Screen size	Battery	Storage	Camera
39.38%	23.75%	5.16%	9.00%	14.61%	8.09%

Table 4.6: Average importances of the attributes  
(Author's Illustration)

Based on part-worth values, the ranges were calculated. The range is the difference between the lowest and the highest part-worth value within an attribute (Orme, 2019). And based on the percentage of ranges, the importance of each attribute was found, which will be referred to as “importances” in this study. Using the average of the individual-level utilities, Table 4.6 was obtained. According to it, one can argue that people decide on which phone to buy mostly by looking at the brand and price as the sum of these importances adds up to 63.13% of all the importances. With 39.38%, brand is the most important aspect that the respondents consider when they are making their minds about which smartphone to buy. The high importance of the brand was also expressed in the survey by some comments implicitly saying that they prefer Apple over other brands regardless of the conditions and a few even stating that they don’t even consider other brands except Apple. These comments also indicated that whenever they are buying a phone, they just compare the existing Apple options and choose one of them. There were also some comments stating a strong preference for Samsung but to a less frequent extent than Apple. On average, price is the second most important attribute according to the respondents with 23.75%. The other attributes’ importances seem to be relatively low compared to brand and price.

	Brand	Price	Screen Size	Battery	Storage	Camera
Model	39.38%	23.75%	5.16%	9.00%	14.61%	8.09%
Respondent	24.80%	22.74%	10.27%	15.17%	13.98%	13.14%

Table 4.7: Comparison of the model-estimated and respondent-indicated average importances  
(Author’s Illustration)

Table 4.7 compares the importance levels that are predicted by the random coefficient logit model and the importance levels gathered from the responses that the respondents gave to the question of how important the attributes were to them. In general, the distribution of the importances estimated by the model seems to match with the respondent-indicated importances. One can see that similar to the model results, respondents also indicated their preference showing that the brand is the most important attribute followed by price. Another observation is that, screen size, battery and the camera attribute were found less important in the estimation model compared to the respondent-indicated importances. In summary, one can see that when respondents are directly asked how important they find the phone attributes, they assigned a more balanced importance distribution throughout the attributes, which makes it harder to learn the main attributes that drive their purchasing decision. This demonstrates one of the advantages of CBC, namely that it helps the researcher find out “more realistic” preferences of the consumers (Eggers et al. 2022).

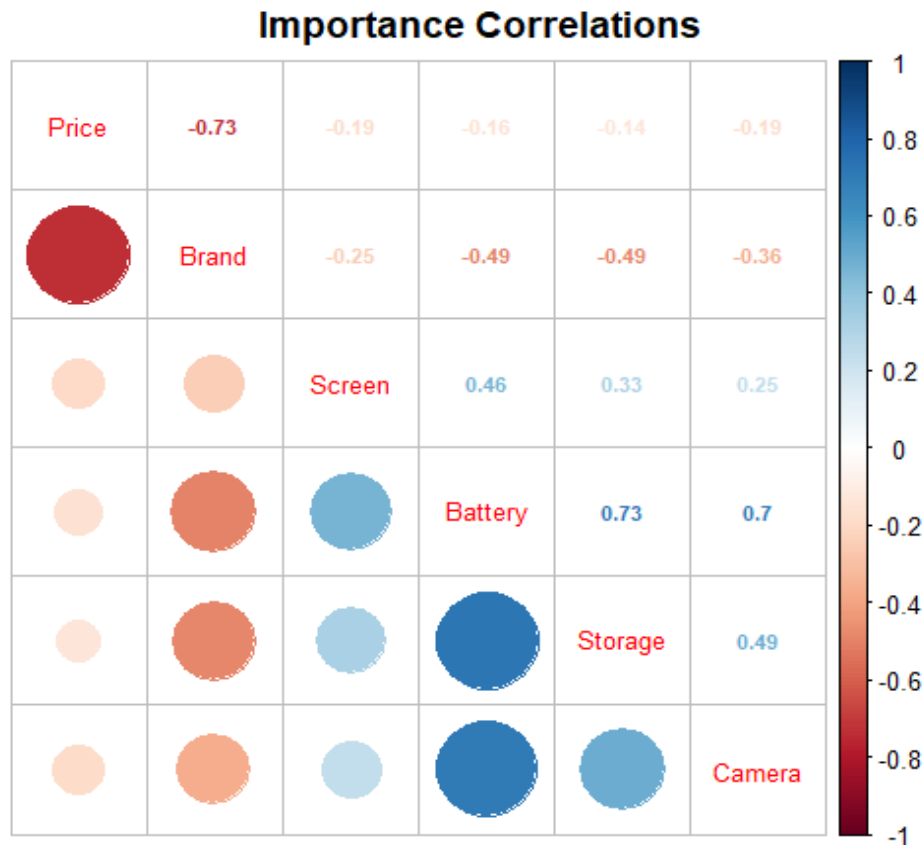


Figure 4.14: Correlation table of average attribute importances  
(Author's Illustration)

In the correlation plot in Figure 4.14, the individual importances of the respondents are checked to see how they are correlated with each other. An insight that can be derived from Figure 4.14 is that the importances that are attached to brand and price are strongly negatively correlated with -0.73. This shows that if people value brand a lot, for them price is not very important. In other words, in order to get a good or high-end smartphone brand such as Apple, some people are ready to pay higher prices. Another interpretation of the negative correlation between brand and price could be that for some consumers the functionality of the smartphone such as connectivity to the internet, presence of basic apps is satisfactory and they don't look out for extra features. Thus, these consumers may be naturally more inclined to look out for cheaper smartphones without the highest quality features. Another insight that can be derived from Figure 4.14 is that brand correlates negatively with screen size, battery, storage and camera. One can argue that brand is a separate category of a smartphone attribute on its own because according to the correlation plot above, when the respondents value brand, they tend to value the technical features of the phone less and vice versa. Another insight that was observed in Figure 4.14 was that the price is negatively correlated with other attributes pointing out to the respondents' willingness to pay higher prices for better smartphone features or lower prices for average smartphone features.

Lastly, although the importances of screen size, storage capacity, battery life and camera quality were relatively low, they seem to correlate between each other.

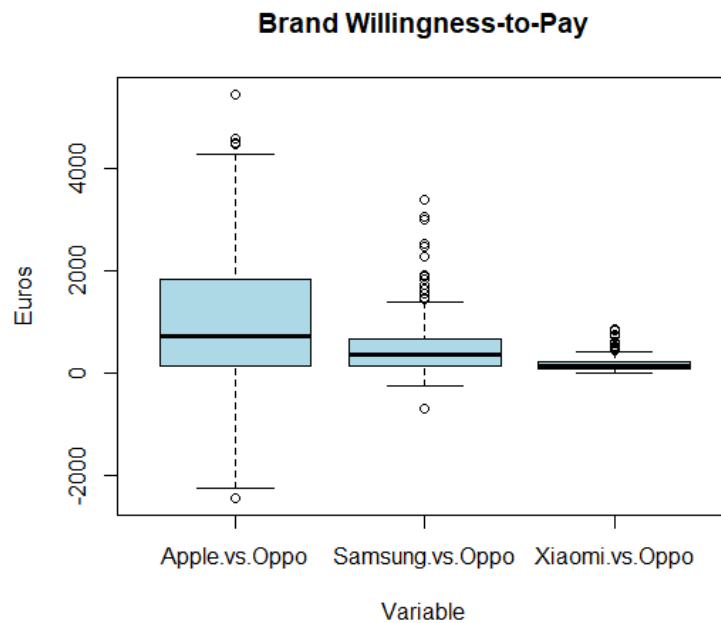


Figure 4.15: Boxplot of brand willingness to pay  
(Author's Illustration)

In conjoint analysis, provided that price is included as a variable, one can also calculate individuals' willingness to pay for the chosen attributes in the experiment and their levels (Eggers et al. 2022). The boxplot in Figure 4.15 shows how much the respondents would be willing to pay to switch their phone brand from Oppo to other phone brands. One can observe some extreme values in the boxplot and there are some potential reasons for it. In general, in the random coefficient logit model, brand was found to be the main driver of the purchase decisions followed by the price. For example, Apple's utility coefficient in the random coefficient model was found to be very high compared to other brands. Its standard deviation was also high. Additionally, some respondents only chose a certain brand in the choice tasks, which affected the outcomes and resulted in outliers. Because of these reasons, the results in the boxplot should be considered taking into account the previously mentioned facts. However, one can still derive some insights from the boxplot. On average, for an upgrade from Oppo to Apple, people are ready to pay an additional 1087 euros. For a change in brand from Oppo to Samsung, the respondents are willing to pay on average an additional 494 euros. And for a change from Oppo to Samsung, people are willing to pay an extra 186 euros on average.



Figure 4.16: Boxplot of screen size willingness to pay  
(Author's Illustration)

The boxplot in Figure 4.16 shows the amount of euros people would be willing to pay for an increase in small screen size to medium or big screen size. Small, medium and big screen sizes are 5.5 inches, 6.1 inches, 6.7 inches respectively. One can see that some respondents have extreme willingness to pay values both for and against an increase in screen size. Aside from those, on average, the respondents would pay 95 euros more for an increase in screen size of 5.5 inches to 6.1 inches and the respondents would be willing to pay extra 62 euros for an increase from 5.5 inches of screen size to 6.7 inches. This shows that on average, medium-sized screens are preferred over bigger screen sizes.

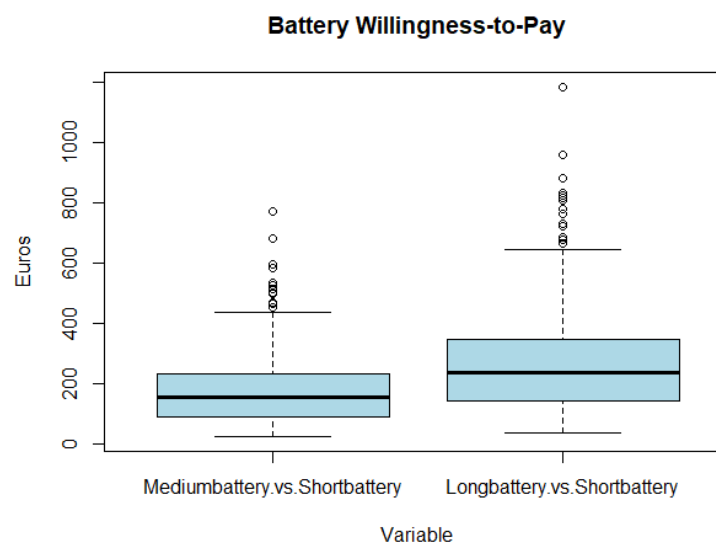


Figure 4.17: Boxplot of battery life willingness to pay  
(Author's Illustration)

The boxplot in Figure 4.17 about the battery life of smartphones shows how much would the respondents be willing to pay for an upgrade in battery from short-lasting to either medium-lasting or long-lasting battery with everything else about the phone being identical. As usual, there are some outliers that have extreme preferences. Short, medium and long battery life corresponds to 9, 11 and 13 hours of use. The boxplot shows that the more battery life with a smartphone there is, the more preferred it is. The respondents would be willing to pay an additional 175 euros for an increase from 9 hours to 11 hours of use and an additional 266 euros for an increase from 9 hours to 13 hours of use.

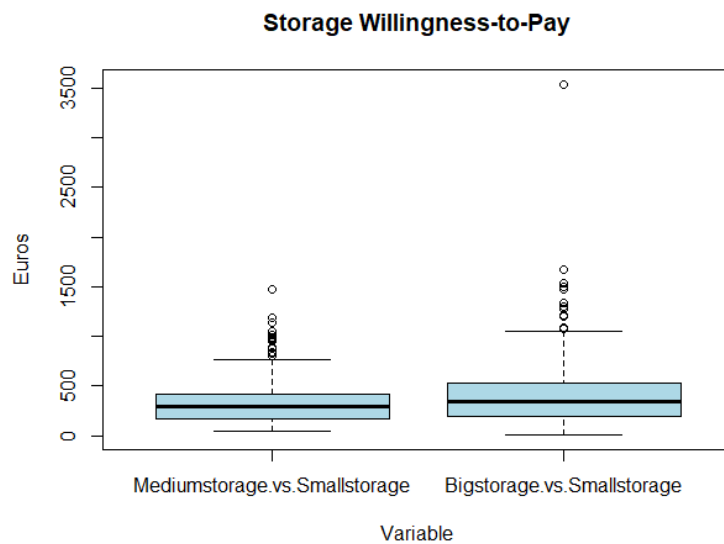


Figure 4.18: Boxplot of storage capacity willingness to pay  
(Author's Illustration)

The boxplot in Figure 4.18 about storage capacities shows how much extra the respondents would be willing to pay for an increase from small to medium and small to big storage assuming that all else is equal regarding the smartphone. Small, medium and big storage refers to 64 GB, 128 GB, 256 GB memory capacity respectively. As observed in the previous figures, there are some extreme values. In general, the more storage there is the more the respondents would be willing to pay for the phone. On average, respondents would be willing to pay 331 euros more for an increase from 64 GB to 128 GB and 407 euros more for an increase from 128 GB to 256 GB in a phone.

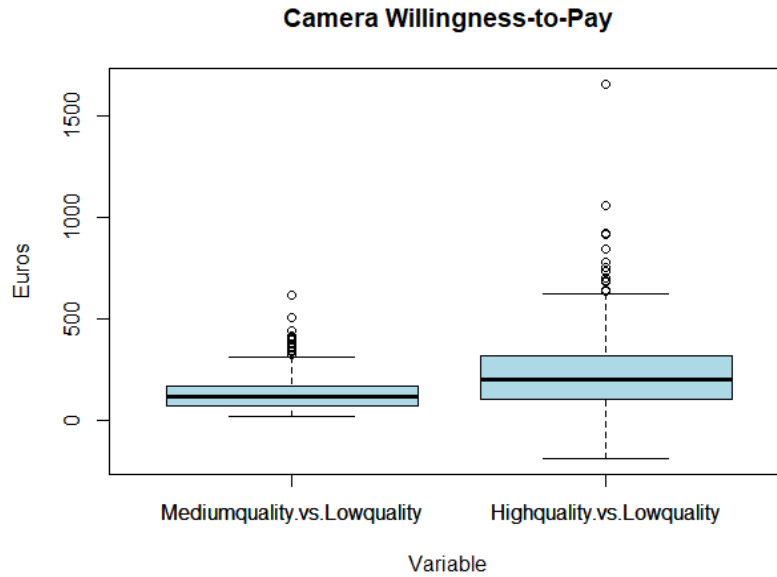


Figure 4.19: Boxplot of camera quality willingness to pay  
(Author's Illustration)

The boxplot in Figure 4.19 shows how much the respondents would be willing to pay for an increase in camera quality with all else being the same regarding smartphones. The levels for low, medium and high camera quality are 12 MP, 16 MP and 20 MP. On average, for a change in a smartphone's camera quality from 12 MP to 16 MP, respondents would pay 132 euros more and on average for a change in a smartphone's camera quality from 16 MP to 20 MP, they would pay 237 euros more. Although there are some outliers, in general, a higher quality of camera is preferred and people are willing to pay more for a higher camera quality.

#### 4.2.2 Analysis of Importances Based On Demographic and Smartphone-Related Questions

In this section, the analysis of attributes' importances using demographic and smartphone-related questions is done. The demographic data that was collected from the respondents in this study was age, gender, country of residence, education, employment status and country of origin. The correlation between these demographic information and the importance information has been checked assuming that alpha is 0.05. Between respondents' ages, genders and their importances no statistically significant correlation was found.



	Brand	Price	Screen	Battery	Storage	Camera
Turkish in Turkey	48.42%	14.81%	4.97%	8.85%	14.64%	8.31%
Turkish in Germany	41.79%	20.49%	5.30%	9.25%	14.77%	8.39%
German in Germany	33.40%	30.52%	5.49%	8.86%	13.74%	8.00%

Table 4.8: Average importance values based on respondents' country of residence and origin  
(Author's Illustration)

Table 4.8 shows the average importance that the respondents give to the phone attributes used in the study based on their country of residence and origin. Since both in country of residence and country of origin columns, Germany and Turkey were the only prominent countries that had many respondents, these two countries were used in grouping the respondents according to their countries. In the data set, there were 127 Turkish respondents living in Germany, 47 Turkish respondents living in Turkey and, 83 German respondents living in Germany. There were no German respondents living in Turkey. By looking at Table 4.8, one can conclude that overall, the importances of the screen, battery, storage and camera are similar in values. The table suggests that the Turkish consumers living in Turkey, value brand more than the other two groups and they value price the least among the other two groups. The Turkish respondents living in Germany expressed preferences that can be considered in the middle of the other two groups as can be observed in the table above. Lastly, compared to the other groups, the German respondents living in Germany find the brand the least important and price the most important attribute within those two attributes. So, a strategy that can be derived from the table above is that the smartphone manufacturers can place more focus on their marketing budget increasing brand awareness, or they could increase their budget for making ads about the brand, targeting the Turkish customers as Turkish customers give high importance to the brand. Also, for the German customers, the smartphone brands might offer some possibly cheaper deals as they give high importance to price. This can be done for example either by cutting down on the selling price or by offering bundles with other companies like sim card providers so that the value for the price offered increases. Since for the German customers, the price and brand importance is almost equal, keeping the resources allocated to keeping the prices competitive and brand equity high equal might also be a strategy that the smartphone companies can consider. This way, they might become a favorable player in the market by capturing the consumers that value both price and brand.

With regards to respondents' education level, there was no relationship between the respondents' brand importance and education level but there was one between price importance. As education

increased, a negative relationship of -0.10 was observed with price. This may stem from the fact that respondents with higher education level having higher incomes.

	Brand Importance	Price Importance
Apple Owners (n=205)	48.32%	17.97%
Samsung Owners (n=89)	31.24%	26.79%
Xiaomi Owners (n=34)	26.86%	33.62%
Huawei Owners (n=19)	26.79%	33.37%

Table 4. 9: Average brand and price importance values in relation to brand ownership  
(Author's Illustration)

Another insight was derived by checking how individuals with different phones value brand and price. According to Table 4. 9, Apple users value brand on average significantly more than other smartphone brand owners and price far less than the other smartphone brand owners. Samsung owners seem to be more price cautious than the Apple owners and they place less importance on the brand compared to Apple owners. Finally, Xiaomi and Huawei owners, find price more important than the brand unlike the owners of the other smartphone brands. Although still substantial, Xiaomi and Huawei owners also place lower importance on brand compared to others.

Lastly, another smartphone-related question whose relation with the importances was checked is the time respondents spend using their phone. In the analysis, it was found out that time spent on phone versus price importance correlates statistically significantly with -0.14, which means people who spend more time on the phone tend to care about its price less and vice versa. One might argue that since some people know that they spend a lot of time using the phone, they would like to buy a premium phone, and this makes them give less importance to the price of it. Additionally, brand importance correlates significantly with time spent using the phone at the 0.05 level with a 0.13. This means that people who spend more time on their phones, tend to find the brand of their phone important.

#### 4.2.3 Segmentation Based on Preferences

Another way of making use of conjoint data is clustering the respondents according to their preferences so that meaningful segments are created that can be further analyzed and targeted (Cohen et al. 1995). For the clustering, a hierarchical clustering algorithm was applied to segment the data based on the respondents' importances using the ward method. The importance data that is obtained from the individual utility estimations was used because importances summarize the respondents' preferences in a compact way. Another reason why segmentation based on

importances was made is so that each attribute is equally represented by one column, which prevents some potential bias or imbalance in the segmentation.

	Brand	Price	Screen	Battery	Storage	Camera
Segment 1	54.49%	16.74%	3.87%	7.25%	11.18%	6.46%
Segment 2	22.71%	45.07%	4.51%	8.19%	12.72%	6.81%
Segment 3	33.97%	19.80%	6.30%	10.72%	19.94%	9.28%
Segment 4	24.87%	18.17%	8.79%	13.53%	20.87%	13.78%

Table 4.10: The mean importances of the attributes across segments  
(Author's Illustration)

One can see the preference-based segmentation results in Table 4.10. In total, four segments were created based on how important respondents find the attributes of smartphones that are used in the CBC study. According to the results, Segment one consists of 166 people and it differentiates itself by its high importance of brand as it has the highest brand importance by far out of the four segments (54.49%). Segment one also has the lowest importances amongst the other segments in all of the other product attributes. So, one can argue that this segment is characterized by giving the most value to the brand. One may call this segment the Brand segment. Segment two has 82 people. Segment two has the highest price importance out of the four segments and the lowest brand importance but the key characteristic that distinguishes it from the other segments is its strong price sensitivity (45.07%). Because of this reason, one can call this segment the Price Segment. Segment three includes 77 people in it and it has medium-level importances in all of the attributes, meaning that it doesn't have any importance for an attribute that is the highest among the importances other segments have for the attributes. It also doesn't have any importance that is the lowest in any of the product attributes in comparison to other segments. So, one may call this segment the Balanced segment and argue that for this segment every attribute is important. Segment four consists of 50 people. This segment has the highest importances for screen, battery, storage and camera, which distinguishes it from the other segments. Because of this reason, one may name this segment as the Other-attributes segment.

Targeting is an important aspect of marketing theory and consumers have different needs and preferences (Lascu & Zinkhan, 1999). Especially nowadays with the advancements in technology and product diversity in general, companies must put extra effort to correctly identify their potential customers (Maderia, Silveira & Toledo, 2015). Using the importance-based segmentation, one can target consumers based on their preferences. Smartphone companies can produce targeted ads and deals that are specific to the segment or even the individual. Below, one

can find an analysis of each segment separately and custom-tailored strategy suggestions provided for each segment.

Segment one values brand the most and price the least. One way that the smartphone companies can make use of this insight is that they can make ads that prioritize the values the consumers want to be connected or associated with. For example, they can target this segment by making ads that put importance to the perceived coolness of the brand. Ads have certain messages that they want to convey or that try to convince the viewers to think in a certain way (Danaher, 2021). For Segment one, the ads can convey messages such as “if you buy this phone, you will be more popular among your friends” or “if you buy this phone, you will be cool”. Segment one consists of mostly people who own Apple phones and they indicated they are satisfied with their brand of choice. So, Apple’s strategy seems to be working with this segment of consumers.

Segment two is very price sensitive and puts a high value on price. This segment needs to be targeted with attractive prices and potentially by flexible payment methods. Companies try to optimize their prices according to their cost structure, competition in the market and their profit margin and these may not enable them to change their prices a lot (Kienzler & Kowalkowski, 2017). However, a strategy to target Segment two might be coming up with bundles. Some bundles can be smartphone and smartphone case/wireless headphones or a sim card contract with partners. By partnering with third-party companies, smartphone manufacturers might be able to create additional value for their customers. This is not only because the bundles might not be available elsewhere but also because bundles provide an opportunity for the smartphone manufacturers to partner with other companies which may enable them to offer price-attractive deals.

Segment three has a more balanced distribution of importances across the attributes. The consumers in this segment need to be targeted in a way that prioritizes every attribute to some extent. This segment might be a potential good segment for the phone brands that are not premium such as Apple. For example, a medium-level priced smartphone model that doesn’t have the highest quality and latest features in the market but rather average-level features might be a good product targeting this segment. If the smartphone brands decide on trying to reach their potential consumers via ads, they can do so with the ones that put importance on brand, price and the other phone attributes equally.

Segment four is the segment that had the highest importances for screen, battery, storage and camera. This segment also had a low price importance. So, smartphone brands can make ads that prioritize the screen size, battery duration, storage capacity and camera quality. Once these phone

attributes are emphasized in the ads, the potential customers might be more interested in buying the phone. Lastly, since the importance of brand in this segment is low one can offer the already existing customers with some premium priorities or a brand program so that their incentive to stick with their current brand is increased after they buy their phone. This may also be used as an advantage for attracting the new customers as well.

#### 4.2.4 Market Simulation

Another way of data analysis in conjoint analysis is to simulate a market to check how the respondents' preferences would shape it as market simulations can be useful to see how different products created by combining the attributes and levels used in the study affect market shares (Orme, 2019). The market shares were calculated based on the logit rule. Logit rule provides more flexibility and gives each of the products in the market simulation a probability for being chosen by the customer, which provides a realistic framework (Orme, 2019). After using the logit rule, the mean was taken across the individuals to obtain the market shares. One should note that the CBC market simulations are an interpretation of the respondents' utilities and don't reflect real market shares as market shares can be influenced by many different factors such as product availability, imperfect buyer knowledge and the presence of other competitors (Orme, 2019).

A couple of different market simulations were run to test different scenarios. In the first market simulation, there are 4 products and one none option making the simulation more realistic (Eggers et al. 2022). Four products have Apple, Samsung, Xiaomi and Oppo brands. They also have the lowest price which is 650 euros and the lowest attribute levels for the other attributes. The reason for that is to be able to replicate a market simulation to get an idea on the low-end market.

	Apple	Samsung	Xiaomi	Oppo	None
Market Shares	51.05%	19.59%	7.95%	6.00%	15.42%

Table 4.11: Market shares for a low-end market simulation

(Author's Illustration)

Table 4.11 shows that in a market simulation where the attributes of price, screen, battery, storage and camera are all at their lowest levels and only the brands differ, Apple seems to dominate the market with 51.05% of the shares. The second closest option is the Samsung phone which has 19.59% of the shares in the market. The other two smartphones with Xiaomi and Oppo brands have lower shares, that are 7.95% and 6.00% respectively. In this market simulation setting, the none option is assigned a 15.42% share, meaning that 15.42% of the respondents wouldn't choose

any of the products within this market setting. Overall, according to this market simulation, one may argue that the brands except Apple, might need to put more focus on their branding.

	Apple	Samsung	Xiaomi	Oppo	None
Market Shares	46.55%	16.73%	6.84%	5.16%	24.73%

Table 4.12: Market shares for a mid-end market simulation

(Author's Illustration)

If the market consisted of 4 products and a none option, where all products have the middle option in their attributes of price, screen, battery, storage, camera and only differ by brand, the market shares would be as in Table 4.12. In the mid-end market simulation, one can see that the shares of the brands decrease compared to their shares in the low-end market simulation while the general distribution of shares is preserved. Apple is still the market leader by a big difference with 46.55% followed by Samsung with 16.73% and the other two products' shares are still low with Xiaomi at the 6.84% and Oppo at the 5.16% level. In the mid-end market simulation, 24.73% of the respondents wouldn't buy any of the hypothetical products. Compared to the low-end market simulation, this is close to a 50% increase in the number of consumers who wouldn't choose any of the given products in the market simulation. So, one can argue that the increase in the none option is caused by the increase in price from 650 euros to 950 euros in the smartphones.

	Apple	Samsung	Xiaomi	Oppo	None
Market Shares	40.51%	13.48%	5.45%	4.13%	36.43%

Table 4.13: Market shares for a high-end market simulation

(Author's Illustration)

In Table 4.13, the market simulation for a high-end scenario was examined. In this situation, the insights are the same with the low and mid-end market simulations. The market shares of the products are lower but the distribution is preserved with Apple being the leader by 40.51%, followed by Samsung with 13.48% and the other options having low shares. One can observe that the none option increases due to the increase in price.



Figure 4.20: Combined Barplot of Low, Mid, and High-end Market Simulations  
(Author's Illustration)

The barplot in Figure 4.20 shows how the market would react if all the previously analyzed market simulations were combined. One can see a similar result to the other market simulations. In a setting where all of the previous market simulations were to be combined, the best-selling phone would be Apple with low qualities and low price. Then a Samsung phone with low qualities and low price would come the second, closely followed by Apple with medium features, having a price of 950 euros. In this market simulation, the other products' shares are in general low and there is no change in their ranking in the market. And lastly, 13.85% of the respondents wouldn't buy any of the product alternatives in this market simulation, possibly due to high prices.

## 5 Conclusion

In this section first, a comprehensive summary of this thesis study is provided, where a holistic look is offered to the key results, findings and insights. After this section, the potential limitations. The limitations include some criticism about how the quality of the study could have been increased as well as some remarks that rationalize some of the results found. Lastly, the thesis is summed up with some potential future directions of the research provided.

### 5.1 Overview of the Study

In this thesis study, using choice-based conjoint analysis and some demographic and smartphone-related questions, consumers' smartphone preferences were examined. In the literature there were

many different approaches both checking different smartphone features and some other different factors that may be affecting smartphone purchase decisions, using various statistical methods. In the majority of the studies where brand and price were included, they were statistically significant in shaping consumers' smartphone preferences as also was found in this study; however, depending on the scope of the research and the smartphone features included in the study the most important attributes were found to be subject to change.

For this conjoint questionnaire, the chosen smartphone attributes and levels were brand (Apple, Samsung, Xiaomi, Oppo), price (650 €, 950 €, 1150 €), screen size (5.5 inches, 6.1 inches, 6.7 inches), battery life (9 hours, 11 hours, 13 hours of use), storage capacity (64 GB, 128 GB, 256 GB) and camera quality (12 MP, 16 MP, 20MP). There were 375 respondents from different countries with the majority being from Germany and Turkey and with ages being mostly between 18 and 30. The results showed that brand was the most important smartphone feature, followed by price. The other attributes' importance order with a decreasing fashion were storage, battery, camera and screen size. However, these attributes' importance was low and close to each other compared to brand and price importance.

Based on the results, the managerial level of smartphone companies can follow the strategies suggested in this study. Alternatively, there were also some additional insights which would likely be useful if they are used in combination with other company-specific information. Still, one needs to keep in mind some potential limitations of this study.

## 5.2 Limitations

There are different kinds of limitations. First of all, one of the reasons why this study was done was to learn about the main smartphone attributes that affect which smartphone consumers choose to purchase. In reality, there are more smartphone attributes than the ones used in this study and they may have an effect on the purchase decision as well. Also, in general, the prices were found to be high as implied by some of the comments in the survey. This might have affected the results. In the experiment design, the choice tasks were generated randomly to achieve a high efficiency in experiment design but this might have led to some unrealistic choice alternatives.

Another potential limitation stems from the use of convenience sampling for the data collection. More people with more diversity could have been reached. Since smartphones are used by many people, the ideal data set would include a higher number of respondents. And because the number of respondents used in this study wasn't very high, it is hard to generalize the results to the whole consumer. Also, the prices used in the study were in euros but there were respondents from other



countries where euro is not used as a currency. The price sensitivity results might have been affected from that. Even in the countries where the currency is euro, since countries have different market prices and purchasing power levels, the price sensitivity of the respondents might have been different, affecting the results.

For the future research, these limitations should be avoided if possible. There are also a couple of areas of research that can be focused more in the future. One of these areas is the sustainability of the smartphones and how they affect consumers' purchase decisions. This concern was also represented in this study by some respondents and has potential to gain more importance in the future. The effect of the extent of smartphones being manufactured sustainably or long-lasting/durable on consumers' smartphone purchase decisions can be a topic that is worth conducting more research on. Another area of future research focus can be the inclusion of more smartphone attributes in the studies or more specifically in the choice-based conjoint analysis. For example, smartphones with foldable screens have never been studied before within a conjoint framework.

Overall, the smartphone market is one of the biggest and most competitive markets in the world. Smartphone companies need to identify their existing or potential customers' needs and preferences. With this thesis, the previously mentioned research gap was filled and some valuable insights were derived regarding consumers' smartphone preferences. These insights serve as a useful guide for all of the actors and stakeholders in the smartphone industry that potentially will help them make more informed, higher-quality decisions.

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Mert Erdinc

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