UNIVERSITY OF LJUBLJANA

SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

# OPTIMIZATION OF CUSTOMER EXPERIENCE:

# THE CASE OF APPLE APPLICATIONS

Ljubljana, May 2026 TIMOTEJ ŽILEVSKI

**AUTHORSHIP STATEMENT**

The undersigned Timotej Žilevski, a student at the University of Ljubljana, School of Economics and Business (hereafter: UL SEB), author of this written final work of studies with the title Optimization of Customer Experience: The Case of Apple Applications, prepared in collaboration with mentor Blaž Zupan (UL SEB), PhD, Associate Professor.

D E C L A R E

1. this written final work of studies to be based on the results of my own research;

2. the printed form of this written final work of studies to be identical to its electronic form;

3. the text of this written final work of studies to be language-edited and technically in adherence with the UL SEB Technical Guidelines for Written Works, which means that I cited and / or quoted works and opinions of other authors in this written final work of studies in accordance with the UL SEB Technical Guidelines for Written Works;

4. to be aware of the fact that plagiarism (in written or graphical form) is a criminal offence and can be prosecuted in accordance with the Criminal Code of the Republic of Slovenia;

5. to be aware of the consequences a proven plagiarism charge based on the this written final work could have for my status at the UL SEB in accordance with the relevant UL SEB Rules;

6. to have obtained all the necessary permits to use the data and works of other authors which are (in written or graphical form) referred to in this written final work of studies and to have clearly marked them;

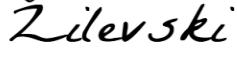
7. to have acted in accordance with ethical principles during the preparation of this written final work of studies and to have, where necessary, obtained permission of the Ethics Committee;

8. my consent to use the electronic form of this written final work of studies for the detection of content similarity with other written works, using similarity detection software that is connected with the UL SEB Study Information System;

9. to transfer to the University of Ljubljana free of charge, non-exclusively, geographically and time-wise unlimited the right of saving this written final work of studies in the electronic form, the right of its reproduction, as well as the right of making this written final work of studies available to the public on the World Wide Web via the Repository of the University of Ljubljana;

10. my consent to publication of my personal data that are included in this written final work of studies and in this declaration, when this written final work of studies is published;

11. that I have verified the authenticity of the information derived from the records using artificial intelligence tools.

Ljubljana, March 29th, 2026 Author's signature: 

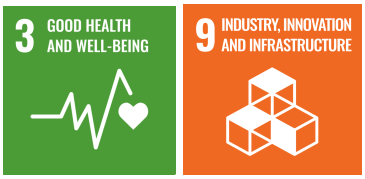
## ABSTRACT

This thesis explores the optimization of customer experience, focusing more specifically on user experience in the context of Apple applications, with special emphasis on Apple Music. Drawing from the theoretical foundation in user experience design and empirical data collected through the User Experience Questionnaire (UEQ) and supplementary survey questions, it examines key dimensions such as attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The findings suggest that while Apple Music is generally perceived as intuitive, reliable, and efficient, certain dimensions are rated lower and present opportunities for improvement. The most notable finding of the research is the negative association between novelty and overall satisfaction in the multiple regression model. Overall, this study provides practical insights into optimizing user experience by refining existing features and maintaining a balance between usability and innovation.



**KEY WORDS:** Customer Experience, Human-Computer Interaction, Mobile Applications, User Satisfaction, Interface Design


## SUSTAINABLE DEVELOPMENT GOALS





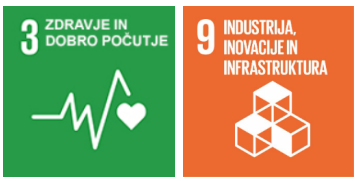
## POVZETEK

V magistrskem delu obravnavam optimizacijo kupčeve izkušnje, pri čemer se osredotočam predvsem na uporabniško izkušnjo v kontekstu Applovih aplikacij, s posebnim poudarkom na aplikaciji Apple Music. Na podlagi teoretičnih izhodišč s področja oblikovanja uporabniške izkušnje ter empiričnih podatkov, zbranih z uporabo User Experience Questionnaire (UEQ) in dodatnimi anketnimi vprašanji, analiziram ključne vidike uporabniške izkušnje, kot so privlačnost, preglednost, učinkovitost, zanesljivost, stimulativnost in novost. Rezultati kažejo, da uporabniki Apple Music večinoma doživljajo kot intuitivno, zanesljivo in učinkovito aplikacijo, medtem ko so nekatere dimenzije ocenjene nižje in predstavljajo možnosti za izboljšave. Najbolj izstopajoča ugotovitev raziskave je negativna povezava med novostjo in splošnim zadovoljstvom v modelu multiple regresije. Delo ponuja konkretne vpoglede, kako lahko z nadgradnjo obstoječih funkcionalnosti še dodatno izboljšamo uporabniško izkušnjo, hkrati pa ohranimo ravnovesje med enostavno uporabo in inovativnostjo.



**KLJUČNE BESEDE:** uporabniška izkušnja, interakcija med človekom in računalnikom, mobilne aplikacije, zadovoljstvo uporabnikov, oblikovanje vmesnikov


## CILJI TRAJNOSTNEGA RAZVOJA



# TABLE OF CONTENTS

**1 INTRODUCTION....1**
**2 THEORETICAL FRAMEWORK....2**
2.1 Experience Design....2
2.1.1 Human-Computer Interaction....2
2.1.2 User-Centred Design....3
2.1.3 User Experience....4
2.1.4 Customer Experience....6
2.1.5 Brand Experience....7
2.2 Apple's Design Philosophy....7
2.2.1 Apple's User-Centred Design....8
2.2.2 Relationship with Application Developers....10
2.2.3 Challenges and Criticism....13
2.3 Application Market Overview....15
2.3.1 The Evolution of Mobile Applications....15
2.3.2 Application Development....19
2.3.3 User Experience Trends and Practices in the Application Market....23
**3 RESEARCH METHODOLOGY....26**
3.1 Research Purpose and Hypotheses....26
3.2 Research Instrument: UEQ....28
3.3 Data Collection and Sample Description....30
3.4 Data Analysis Method....32
**4 RESULTS....34**
4.1 Descriptive Statistics of the Sample....34
4.2 User Experience Evaluation....36
4.3 Simple Linear Regression....41
4.4 Hypothesis Testing....43
**5 DISCUSSION....47**
5.1 Interpretation of Findings....47
5.2 Implications and Recommendations....49
5.3 Research Contribution, Limitations, and Future Suggestions....51
**6 CONCLUSION....52**
**KEY REFERENCES....54**
**REFERENCES....55**
**APPENDICES....64**

## TABLE OF FIGURES

Figure 1: Physical design of Apple products……...…8
Figure 2: Ecosystem of Apple devices……...…...9
Figure 3: Apple Store……...….9
Figure 4: Apple's promotional message.……....10
Figure 5: Mobile application distribution process……...…19
Figure 6: Positive feedback loop in the two-sided application market……20
Figure 7: Average distribution of mobile application revenue generation models……..22
Figure 8: Distribution of revenue generation models in App Store and Google Play...……..23
Figure 9: Distribution of respondents by gender……...…..31
Figure 10: Distribution of respondents by age…….……..…..32
Figure 11: Distribution of respondents by usage frequency……...…….35
Figure 12: Distribution of respondents by satisfaction level……...……36

## TABLE OF TABLES

Table 1: Dimensions and items of the UEQ…….……..……..29
Table 2: Benchmark values for each of the dimensions……...30
Table 3: Cronbach's Alpha of dimensions of the UEQ……37
Table 4: Average mean of dimensions of the UEQ……..37
Table 5: Mean for items of the perspicuity dimension of the UEQ…..……..……..38
Table 6: Mean for items of the dependability dimension of the UEQ…….38
Table 7: Mean for items of the efficiency dimension of the UEQ……,……...…39
Table 8: Mean for items of the attractiveness dimension of the UEQ…….40
Table 9: Mean for items of the stimulation dimension of the UEQ…….40
Table 10: Mean for items of the novelty dimension of the UEQ…….41
Table 11: Results of linear regressions…….……41
Table 12: Correlation matrix……43
Table 13: VIF values……43
Table 14: Regression model summary…….……44
Table 15: Regression coefficient and significance tests…….……...……..44

## TABLE OF APPENDICES

Appendix 1: Linear regression and correlation matrix…...……1
Appendix 2: Multiple regression……4
Appendix 3: Questionnaire……..……...…….5

## LIST OF ABBREVIATIONS

**5G** - Fifth Generation
**AI** - Artificial Intelligence
**CSAT** - Customer Satisfaction Score
**GIFs** - Graphics Interchange Format
**GPS** - Global Positioning System
**HCI** - Human-Computer Interaction
**HIG** - Human Interface Guidelines
**IAP** - In-App Payment
**ISO** - International Organization for Standardization
**NPS** - Net Promoter Score
**OS** - Operating System
**UCD** - User-Centred Design
**UEQ** - User Experience Questionnaire
**VIF** - Variance Inflation Factor
**VR** - Virtual Reality
**WiFi** - Wireless Fidelity

# 1 INTRODUCTION

Since the launch of app stores, mobile applications have become one of the main ways for users to engage with digital technology. As time passed and the technology became more developed, the applications started being integrated into many areas of everyday life, including healthcare, productivity, communication, e-commerce, finance, etc. and as a result, they constantly shape people's daily experiences and affect the way that people interact with the world around them. As the application industry continues to evolve, the concept of user experience is gaining relevance and can be considered as the main factor that differentiates successful applications from unsuccessful ones. A well-designed user experience not only makes it easier for users to achieve their goals but also has an effect on their emotional response. Apple is considered a leader in the area of shaping the user experience of digital products. The company has a strong reputation for paying special attention to the needs and emotions of their users, especially during the design process, and therefore their products are known to be user-friendly, prioritizing simplicity, consistency and elegance. Apple's Human Interface Guidelines (HIG) and the overall close cooperation with third-party application developers have been of significant importance in establishing an integrated ecosystem of devices prioritizing user experience as their core design principle.

The aim of this master's thesis is to explore how Apple optimizes its overall customer experience of their products, with a particular focus on the user experience of its applications, and to analyse the user-centred approaches that are being implemented in order to improve this experience. The research consists of five main sections. The first one provides a theoretical framework and consists of three subsections. The focus of the first subsection is on researching key concepts of experience design, such as human-computer interaction, user-centred design, user experience, customer experience and brand experience. These concepts are of significant value when trying to understand the broader picture of design decisions and how they affect the user's view of the product. The second subsection focuses on Apple specifically and how the company implements the principles of user-centred design in their way of doing business. I analysed in detail many aspects, where it is seen that users' needs are the priority, explored the relationship of the company with third-party application developers and also acknowledged the challenges and criticism that Apple faces. The third subsection of the theoretical framework includes the analysis of the application market overall. I explained in detail how the application industry developed, how it integrated into various aspects of life, and what the main user experience trends and practices in the application market overall are. Together, these three subsections provide an essential foundation for the empirical part of the study, as they enable a more comprehensive understanding and interpretation of the user experience of Apple applications, more specifically Apple Music, which is analysed as an example of Apple's design philosophy in practice.

The second main section is the research methodology, where the purpose of the empirical study, research hypotheses, data collection methods, and analysis procedures are described. In this part, the 6 hypotheses were formed and presented, together with the Apple Music application, which is the main subject of the empirical study. Although the title of the thesis refers to customer experience, the empirical study focuses more specifically on user experience of Apple Music, measured using the User Experience Questionnaire (UEQ). Therefore, the empirical findings primarily analyse users' experiences with the product itself, and any conclusions related to customer experience should be interpreted with caution. Each hypothesis corresponds to one of the 6 dimensions in the UEQ, which is a tool for measuring user experience that is also analysed in detail, together with other data analysis methods. The third section presents the results of the research, including descriptive statistics of the sample, evaluation of user experience dimensions of Apple Music and hypothesis testing. In the fourth section is a discussion, where the findings of the research are interpreted in relation to the theoretical framework and existing literature, implications for practice are considered, and the contribution, limitations and suggestions for future studies are presented. In the fifth and final section is the conclusion, where the whole research and its main findings are summarised.

# 2 THEORETICAL FRAMEWORK

This chapter establishes the theoretical foundation for the study by introducing the key concepts and theories it builds on. It brings together existing research on experience design, Apple's design approach, and the application market to provide a clear context for the analysis that follows.

## 2.1 Experience Design

The section introduces the concept of experience design and its role in shaping interactions between users and digital products. It highlights the main theoretical perspectives that contribute to understanding how experiences are created, evaluated, and optimized.

### 2.1.1 Human-Computer Interaction

Computers first appeared on the market in 1940, but for the next 40 years, they were mostly used by engineers and scientists, due to their complexity and the knowledge that was required to operate such a machine. The concept of human-computer interaction (HCI) appeared in the year 1980 when computers became available to a wide population and were therefore usable by anyone (MacKenzie, 2024). According to Ruiz et al. (2021), HCI is a discipline that studies the interaction between people and computers. It is defined as "the understanding, design, evaluation, and implementation of interactive systems for use by humans" (Ruiz et al., 2021). The field of HCI and its understanding are becoming increasingly important with the evolution of technology, due to its function to contribute to the creation of intuitive,

accessible, and effective digital interfaces. The two main principles that guide HCI are usability and user-centred design. Usability refers to how efficiently, effectively, and satisfactorily users interact with the product, while the user-centred design focuses on designing interfaces that meet users' needs and preferences (MacKenzie, 2024).

According to Hustak et al. (2015), usability is an approach that helps to determine how difficult it is for the user to learn and access an application. In order for an application to be considered as highly usable, it has to make it easy for new users to perform basic tasks, minimise the time needed for the user to complete a specific task, make it simple for users to repeatedly perform these tasks, minimise the room for error by the user, and make the user feel comfortable while interacting with the interface. The field of HCI strives towards providing generalised principles for the development of interactive systems and determining a certain consistency among user interfaces. Consistency makes it possible for users to transfer skills from one system to another, which decreases the learning time, enhances productivity, and lowers the training costs. Making an intuitive, easy-to-use, and consistent user interface is one of the top priorities for every developer, but it is a complex task because it is hard to say what is good and what is not, due to all the differences among users. The users often also act differently than what the developers expect; therefore, testing before the launch of the application is crucial for the understanding of interactions between the user and the system (Hustak et al., 2015).

Because the technology sector is evolving fast, HCI standards with precise specifications soon become out of date, therefore most of the HCI standards focus on overall principles that need to be employed in order to create a usable interface. There are certain ISO 9241 standards related to usability of user interfaces, that highlight the critical factors and goals that need to be obtained during the development period. The standards highlight critical factors, such as principles applied when measuring the effort and time needed for the user to complete a specific task, measuring the user's overall satisfaction and product acceptance, designing dialogues between the interface and the user, representing information using screen layout, windows, graphical codes, etc. These standards create a certain framework for designing user interfaces and understanding the interaction between humans and computers, but just blindly following them can result in certain design issues getting overlooked, due to significant differences in requirements for user interfaces of different kinds (Hustak et al., 2015).

### 2.1.2 User-Centred Design

User-centred design (UCD) is closely linked to the field of HCI. While UCD emphasises understanding users' needs and goals in order to design products that meet them, HCI strives towards providing the theoretical foundation for creating interactive systems that increase the users' satisfaction and reduce the effort required to perform tasks (Ruiz et al., 2021). UCD is a concept mostly associated with electronic interfaces and optimization of customer experience. In the 80s, practices of system design had been left to the engineers, but their

focus was mainly on system optimization that made it possible for new types of interfaces to be implemented and increase the effectiveness of the system. Designers and computer scientists were questioning this method and started the movement of software design being focused on what users need and not what computers are capable of doing. This shift in mentality is considered a turning point for how digital systems are perceived (Chammas et al., 2015). The final users of computers became ordinary people and not experts, therefore the systems started evolving in a way that they are understandable, easy to use and convenient for solving everyday tasks. Closer attention started to be put on human behaviour, expectations, and limitations. UCD also started to focus on the involvement of the end user through the whole process of product development, highlighting the importance of users' needs and promoting the understanding of social contexts as the basis for a design process (Escobar et al., 2023).

As UCD principles gained in popularity, designers began involving users directly in the design process. Techniques such as interviews, surveys, and prototyping became standard tools to gather end users' insights in order to integrate user feedback in early stages of design, reduce errors, improve intuitiveness and more effectively and efficiently align product characteristics with user expectations. However, the involvement of users in all stages of the design process presents issues and limitations and can be, in some circumstances, seen as unfeasible and even undesirable. For example, users often do not know what they need, they do not know what is good for them, they sometimes can not properly articulate their needs even when they know them, they often change their minds, and they are also known to disagree with other users about what they need (Marti&Bannon, 2009). Even though there are certain challenges in involving the user in the design process, the adoption of UCD approach is known to result in increased user productivity and operational efficiency, reduction of support costs, making products more understandable resulting in easier training, better usability which leads to better user experience, reduction of discomfort and stress, competitive advantage of the brand and increased sustainability. UCD benefits both providers and users. If users are able to intuitively interact with the system and navigate through it without issues, they are less likely to make errors or require help, which reduces the work for customer support teams and shortens the time that the user needs to get used to the product. Therefore, employees are able to focus on high-value tasks, and customers are more likely to stay engaged and satisfied (Chammas et al., 2015).

### 2.1.3 User Experience

In the International Organization for Standardization (ISO), user experience is defined as "a person's perceptions and responses resulting from the use and/or anticipated use of a product, system, or service. It includes all the user's emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours, and accomplishments that occur before, during and after use." The term that is often used interchangeably with user experience is usability, but there are significant differences between the two, even though they represent related constructs. Usability refers to the ability of participants to complete tasks effectively

and efficiently, while user experience is a broader term that includes usability and also the concepts of beauty, hedonic, affective, or experiential aspects of a technology (Sauro et al., 2017). Jetter et al. (2007) similarly explain that the perception of quality of interactive products does not depend only on their functionality but also includes concepts from visual and industrial design, psychology, and marketing research. Attractive design has become one of the main product qualities for technology customers, and the focus is mainly on the mentality of designing experiences and not things.

Wright et al. (2008) categorise an experience in interaction design into three key themes: a holistic approach, a constructivist stance and a dialogical view. The holistic approach emphasises that while designing a user-centred interface, the whole person should be considered as the user and not just their cognitive abilities or efficiency in completing tasks. This view includes sensual, emotional, spatio-temporal and compositional aspects of interaction with the product, which means that the design should not only serve the functional purpose but also focus on how the product makes users feel and how it resonates with them. This encourages designers to focus on how the specific product engages the senses, how it connects with the user's environment and lifestyle and in what way it aligns with an individual's emotions, identity and personal beliefs. The second theme is the constructivist stance, which suggests that people interpret experiences based on their personal history and beliefs, and different people could experience the same things in different ways, meaning the experience is not delivered, but is subjectively constructed in the mind of the user. At first, people have expectations about the upcoming encounters, which can be experienced differently depending on what the individual expects, meaning the same encounter can be pleasantly surprising to some, while disappointing to others. It also depends on every individual how the encounter is interpreted and how it is connected to our past, emotions and beliefs. Then we reflect and make judgments about the experience in order to place value on it. The encounters can also be shared with others, and doing so can result in finding new meanings in them and connecting our personal experience to social and cultural understanding. A key part of constructing the experience is appropriateness, which means relating it to previous and also future experiences, therefore relating to our sense of self and our hopes for the future. The experience can result in changing our sense of self, or it can be seen as "just another one". The third concept is the dialogical view, which can be understood as a shared conversation between the person and everything around them. Both the person and everything around them represent multiple centres of value, and the experience is formed simultaneously, therefore not determined exclusively by one or another. It is also not just the person alone creating the experience, it is how all the elements interact with each other by each part bringing its own meaning, emotion and influence. The dialogical view suggests that the experience happens like a conversation, where all sides contribute their part, and not something that is entirely controlled by the person or the product (Wright et al., 2008).

### 2.1.4 Customer Experience

While user experience focuses on the specific ways individuals interact with the products, the customer experience includes every interaction that a person has with a brand. Lee et al. (2018) explain the difference between user experience and customer experience as the former mainly focuses on usefulness, usability, and the effect of the product or service itself, and the latter can be seen as a whole process of experience when interacting with a specific company on many touchpoints. Williams and Rothenberg (2022) similarly explain that an overall experience, which starts with finding out about the company and ends with the disposal of their product or service after usage, can be defined as customer experience. It consists of all the interactions between a customer and the company from start to finish, including customer service, in-store shopping, the company's website, its brand image, etc. User experience is closely related, but it only focuses on the customer's experience when interacting with a specific product or service.

According to the report by Keyser et al. (2015), customer experience is one of the main factors of long-term company success, but even though a lot of research has been done on the topic, there is still no universal definition. The definition suggested in the report is: "Customer experience is comprised of the cognitive, emotional, physical, sensorial, and social elements that mark the customer's direct or indirect interaction with a (set of) market actor(s)." There is still an ongoing debate as to what exactly the dimensions and foundations of the customer experience concept are. Keyser et al. believe that there are four main procedures to be performed to manage customer experience in a corporate environment. Firstly, the company must understand what the goals that the customer is expecting to achieve by using the product or service are. Secondly, the company must be aware that there are multiple parties involved in the customer experience and that it does not include only the relationship between the customer and the firm, but the whole ecosystem of the provided product or service. Thirdly, since the customer experience is a dynamic concept that is constantly changing with the introduction of new technology and developments, companies should not only focus on specific touchpoints of their relationship with the customer, but also keep track of the whole customer journey. Fourthly, many methods and indices should be used to accurately measure customer experience. The focus should not be put only on CSAT (customer satisfaction score) or NPS (net promoter score) (Keyser et al., 2015). The role of technology is becoming increasingly important in shaping the customer experience. Innovations, such as artificial intelligence, big data analytics, internet of things, virtual and augmented reality, etc., allow companies to understand, predict and respond to the needs of their customers with more precision and therefore continuously adapt the customer journey. By implementing these technologies across the ecosystem of interactions, companies are able to create seamless experiences that resonate with customers and strengthen loyalty and long-term success. It is believed that the future of customer experience lies in the strategic use of these technologies in order to create customer journeys that are able to adapt and

anticipate customer expectations, making it possible for companies to gain an advantage in this increasingly dynamic market (Srivastava et al., 2021).

### 2.1.5 Brand Experience

Brand experience can be seen as a result of the experience that the customer has when interacting with the brand and its products. It includes the consumers' perception of the brand at any contact moment and is conceptualised as subjective consumer responses that appear by interacting with brand-related stimuli that are present in the brand's design, identity, packaging, communications, environments, etc. It includes both internal and behavioural responses of the consumer. Unlike customer experience, which includes the full customer journey with all its touchpoints, brand experience stands for how these brand-related touchpoints shape consumer perceptions, feelings, and behaviours (Lee et al., 2018). The concept of brand experience captures what a brand delivers to its customers beyond its products and services. Instead of focusing on what a brand does or stands for, the brand experience emphasises how customers feel, think, sense, and behave when having contact with brand-related stimuli. The customer is not seen as a rational information-processor, but rather as a human being with needs for experiencing and engaging their senses with the environment around them. By understanding this, firms can transition from offering differentiated products to designing distinctive experiences and therefore deliver something meaningful and emotionally engaging to their customers (Schmitt, 2009). Beig and Nika (2019) explain that when products start becoming similar to one another and competitive pressures increase, the companies ought to put more focus on hedonic characteristics in their product offerings. The authors state that brand experience is not just about creating positive feelings for their customers, but represents a strategic way to increase the brand's value, the so-called brand equity. The concept of brand experience and brand equity is believed to be tightly linked to one another, meaning that the former can significantly affect the brand's awareness, perceived quality and loyalty, therefore affecting its equity. Creating memorable and emotionally engaging experiences is a way of building long-term value and overall success for the brand, which plays a vital role when creating competitive advantages among companies (Beig&Nika, 2019).

## 2.2 Apple's Design Philosophy

Apple is an American multinational corporation founded in 1976 by Steve Wozniak, Steve Jobs, and Ronald Wayne, with headquarters located in Cupertino, California. Apple earns revenue by designing, manufacturing, and marketing smartphones, computers, wearables, and accessories, and by providing a variety of related services. The company's strong brand image, combined with its commitment to customer satisfaction, fosters high levels of trust and loyalty among its customers. Most of the company's success can be attributed to its ability to integrate hardware, software, and services in an ecosystem that provides customers with an outstanding user experience. Apple consistently focuses on creating products that are not only powerful but also easy to use and aesthetically pleasing, and every stage of the

product's life cycle, from design to post-sale customer support, is consistent with their brand image (Bogavac et al. 2023).

### 2.2.1 Apple's User-Centred Design

When looking at physical characteristics of Apple products, it can be observed that they combine aesthetic minimalistic design with high functionality, which is believed to be the main feature that makes their products stand out from competitors'. Apple's design is known for its sophisticated style and strict attention to detail (Siahaan, 2023). Apple designs their devices with the goal of triggering emotional reactions and attracting users, which is one of the main reasons for its sophisticated look. The products have thin profiles, and their design creates an illusion that they are even thinner than they are. As can be seen in Figure 1, the bright metal band around the iPhone masks the overall thickness of the device, the small flat edge of the MacBook creates a similar effect, and the iPad ends with a very thin edge, which gives the same impression. A lot of focus is also put on how the products feel. For example, the use of metal and glass conveys the impression of solidness and makes the device not seem like a frame wrapped around components. The products are geometric, symmetrical, and arranged in a way that gives the impression of purity and elegance (Edson, 2012).

*Figure 1: Physical design of Apple products*



*Source: Apple (2025).*

The emphasis on aesthetic quality and the sophistication of Apple's physical products is closely mirrored in the design of their user interfaces as well, where the same principles of simplicity, ease of use, and minimalism are applied in order to make the overall experience of the device cohesive. According to McAran and Shaw (2020), intuitiveness of the user interface is Apple's main focus and also one of the main reasons for their commercial success and worldwide reputation. Another significant characteristic of Apple's user interface is its consistency across devices, which helps create a cohesive ecosystem that is supported by seamless integration features that enhance operational efficiency and improve the customer experience (Li, 2024). Figure 2 illustrates how Apple devices interact with one another to form a unified and interconnected ecosystem. According to Edson (2012), software is designed to move and transform similarly to objects in the real world. For example, when a user exits the application, it gets minimised into the icon on the screen, so it is obvious where

it can be found if needed. This type of design helps users to visualise, interpret, and relate to technology.

*Figure 2: Ecosystem of Apple devices*




*Source: Dudovskiy (2023).*

Apple's UCD approach aligns well with their in-store experience as well. The focus of Apple's stores is not on the product, but on the shopping experience of their customers. As seen in Figure 3, the products are laid out on the counters and available for the visitors to engage with them before making a decision about the purchase. The Apple personnel are kind and knowledgeable, and are not there only to sell you the product, but to provide an experience. In the store, there is also a user experience area where customers are welcome to take classes about the usage of electronic devices (Lan, 2021). Apple does not hire in-store employees based primarily on their technical skills, but on their personality. They look for candidates who understand people, are willing to teach others and are able to effectively perform multiple tasks at once, which comes in handy when it comes to making large numbers of customers feel served and provided with a personalised experience. Salespeople of Apple always focus on the needs of consumers and the benefits that the product can bring into their lives, which is why they do not talk about the specifications of the product itself, but what the product can do for the customer. Steve Jobs believed that boring communication between employees and potential customers often results in a sales failure, and that one of the most valuable retail employee characteristics is the ability to stimulate conversations that bring out the best in people (Carmine Gallo, 2012).

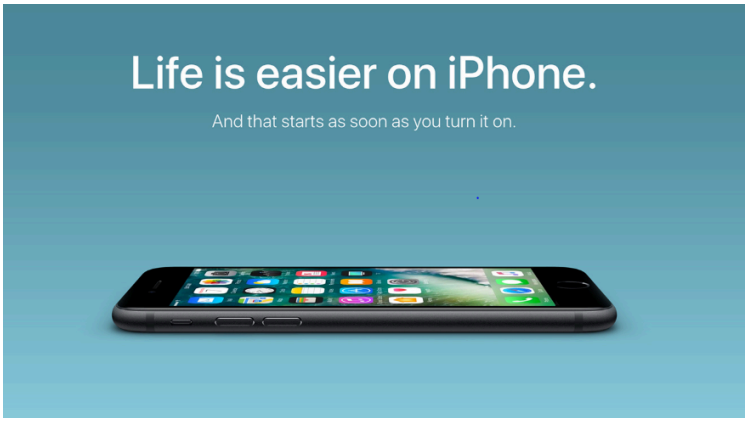
*Figure 3: Apple Store*



*Source: Apple (2025).*

Another strong element contributing to the overall experience of Apple is its marketing and promotion. According to Cai et al. (2024), Apple's marketing strategy revolves around empathy. There is a strong emphasis put on understanding the customers' needs and desires and creating marketing strategies with the goal of connecting with users and their emotions. By knowing its customers well, Apple is able to tailor their marketing campaigns in a way that attracts the specific market segment, which primarily includes individuals who tend to strive towards high quality and social status. The company is well aware that customers form opinions about the brand on every step of their customer journey, and these opinions affect the perceived quality of products, which is why Apple pays special attention to detail and makes sure that everything, from packaging to promotional messages, conveys the coherent brand image that they want their customers to perceive. Product features and the ideas behind them are communicated to the public using a simple and straightforward approach. Sentences on advertising material are short and easy to remember, fonts are big, and colour schemes are simple. The focus of promotional messages is not on specifications and features of a device, but on how it can improve people's lives (Cai et al., 2024), as illustrated in Figure 4. According to Qian (2024), Apple also engages in a unique advertising style by launching a limited number of certain products, and by doing so, creates a feeling of mystery and anticipation around them by not disclosing much information before the launch. This approach results in increased consumer interest and contributes to Apple's innovation aspect and the perceived exclusiveness of the brand. Cai et al. (2024) state that the suspense during product launches is one of Apple's most successful promotion tactics because it ignites curiosity and makes potential customers look for more information about the product.

*Figure 4: Apple's promotional message*




*Source: COTW (2017).*

2.2.2 Relationship with Application Developers

According to Kareborn et al. (2013), the market of application development started emerging in 2007 with the launch of the iPhone, and that is also when new possibilities started to open up for developers. A big majority of applications in Apple's App Store are developed by third parties, and the application development market is fragmented and saturated with a number of

developers. One of the main reasons for a high number of third-party developers is the fact that Apple offers easily accessible development tools, which keep the entry costs and entry barriers overall low (Daniel, 2016). In 2008, Apple launched its App Store and released the Software Development Kit, which made it possible for developers to create applications and provide their services to a wide variety of potential customers. Even though the developers are the ones creating applications, Apple sets the development parameters and controls which applications will be published and which will not. Doing so results in a highly centralised market with tight corporate control. The Software Development Kit strictly regulates the type of applications that can be made publicly available on Apple's App Store; for example, applications are not allowed to incorporate competing platforms into their functionality, and there are also many guidelines and rules regarding privacy, religion, sex, trademarks, etc. (Kareborn, 2013).

The business model where the platform is opened up to third-party developers is called crowdsourcing. The term explains the process when a company includes a mass of people to perform tasks that could alternatively be performed by employees or paid contractors of the company. In the case of Apple's App Store, it refers to outsourcing a part of its software development to a global base of self-employed workers who are often known as freelancers. By doing so, Apple eliminates the risk of costs associated with underperforming applications that do not bring the expected returns. Crowdsourcing usually takes place over an open online call meant for anyone who would like to participate, but in the case of Apple's App Store, participation is limited to registered members of their development platform. While there are no formal productivity obligations determined by a contract, Apple still enforces some engagement rules regarding monetisation, privacy and security, application updates, etc. Acquiring labour through crowdsourcing is not necessarily free for the company, but it is significantly less expensive than traditional employment forms. In the case of Apple, all costs related to the development and supply of mobile applications are borne by developers (Kareborn et al., 2013). According to Daniel (2016), in order to start building applications for Apple devices, it is obligatory to apply to the Apple Developer Program, which makes it possible to acquire all of the necessary instruments. Once a member is registered in the program, he receives many benefits, such as helpful guides for getting started with application development, manuals with tips for submitting applications to Apple's App Store, access to Apple Developer Forums, etc. Apple helps application developers turn their ideas into high-performing applications by providing all the necessary tools and guidelines needed for building, testing, marketing, and distributing (Apple Inc, 2025). A variety of tools are available, but the base of the development process is Xcode and Swift. Xcode is a tool that makes it possible for application developers to develop, test and distribute applications on all Apple platforms and operating systems. It serves as a development environment where you write and manage code for building, testing, and debugging applications, while Swift is a programming language that is used inside Xcode. Closely connected to Swift is SwiftUI. Swift is needed to define performance aspects of an application, and SwiftUI is a framework with which the visual elements of an application are built. There are also programs that

provide the learning materials for beginners, such as Swift Playgrounds, that allow developers to engage in lessons and walkthroughs to demonstrate core concepts of coding and building applications. TestFlight is a program that makes it easy to invite users to test the applications before they are distributed in the App Store in order to collect feedback and find potential bugs before the release. Apple also provides application design tutorials, application simulators, machine learning models, and more (Apple Inc., 2025).

In addition to offering all the tools that the developers need in order to create applications, Apple additionally strengthens its relationship with them by guiding them through best practices for user interface design and overall user experience by providing them with a resource called Human Interface Guidelines (HIG). The purpose of Apple's HIG is to eliminate the inconveniences arising from inconsistencies when switching from one Apple interface to another, which establishes a cohesive user experience across different platforms and positively affects the overall customer experience. To do so, Apple helps application developers by providing guidelines on creating consistent, efficient, and scalable interfaces. While the concepts of efficiency and consistency are self-explanatory, scalability stands for the ability of a system to be enlarged and able to handle growing amounts of data in order to accommodate the potential future growth. The goal of HIG is to help developers design operating systems that align with Apple's overall design philosophy and brand image and create interfaces that are familiar to Apple users (Visnapuu, 2023). Apple's HIG contains guidance and best practices that help developers design a compelling user experience for any Apple platform or operating system (OS), such as iPhone (iOS), iPad (iPadOS), iMac (macOS), Apple TV (tvOS), Apple Vision (visionOS), and Apple Watch (watchOS) (Apple Inc., 2025). According to Visnapuu (2023), the HIG consists of visual design, interaction design, and user experience considerations, while providing guidance on typography, iconography, layout, colour, navigation, etc.

According to McAran and Shaw (2020), the intuitiveness of Apple products is one of the main reasons for their success, so when it comes to HIG, the main objective is to incorporate these intuitive interactions also in applications provided by third parties. Intuitive interactions in this case can be defined as applying the prior knowledge, often unconsciously, in order to use the interface easily and quickly. McAran and Shaw (2020) conducted an analysis of HIG to see what makes the design of Apple applications, or applications in general, intuitive. Firstly, the design should be familiar, which refers to the usage of standard and well-known interface elements, icons, text appearance, terminology, and navigation components. It is also important to place buttons where people expect them; for example, buttons that people are most likely to press should be on the right side of the screen. The two important concepts that are mentioned in the research are also feedback and feedforward. Feedback refers to the application communicating with the user that a certain action has been registered (for example, a sound or visual change when the user presses a specific button), which helps the user navigate through the interface by confirming the interactions that have occurred. Feedforward refers to the application giving guidance to the user by giving cues before an

action is taken (for example, an application highlights the next clickable button in order to guide the user through the process), which allows the user to predict the consequences of their interactions. The use of metaphors increases the learning speed and makes complex tasks seem simple and straightforward (for example, an icon with an image of a trash bin is used to delete a file). When an application reflects real-world experiences, it is easier for users to understand how to navigate through it. Flexible and adaptable interfaces also increase the intuitiveness of an application by increasing the level of customisation, therefore allowing the system to align with the user's needs without demanding conscious effort (for example, rotating the device or using gestures to affect the content on screen). The path through the content of the application should be logical, predictable, and easy to follow, which means that the user should always know where they are in the application and how to get to the desired destination (for example, when the user is going through the settings, there should be an available list of all the previously clicked subchapters of the settings category) (McAran&Shaw, 2020).

### 2.2.3 Challenges and Criticism

Even though Apple is known as a company that pays special attention to design and its products are often praised as simple and user-centred, some argue that the company's emphasis on minimalism comes at the expense of functionality or user freedom. According to Norman (2015), Apple is giving design a bad name. Back in the day, Apple was famous for its easy-to-use, easy-to-understand user-centred design, where it was always easy to find out which actions are possible, understand how to select a specific action, receive feedback after selecting the action, and have the possibility to undo the action. Apple products could basically be used without manuals. Many things have changed since then. Although the Apple products are becoming more visually compelling than ever, this beauty has brought great cost with it. Apple is abandoning many well-established design principles, some of which were the reason for their reputation for offering products that are highly understandable and easy to use. Even though the HIG still emphasises some of these principles, many of them are no longer practised inside Apple. Norman (2015) states: "Apple has lost its way, driven by concern for style and appearance at the expense of understandability and usage". Because of Apple's striving towards visual simplicity and elegance, learnability, usability, and productivity had to be sacrificed. People have problems using these systems but tend to blame themselves for it. The first thing pointed out by Norman is the writing fonts that are too small and not contrasty enough to be readable. Often, the fonts that are manually enlarged by the users do not even fit on the screen. The next issue that is being pointed out is the discoverability principle. By looking at the screen, the user is not able to understand which actions are possible and how to perform them. It is not clear which text is clickable, and users also struggle to determine what gesture is needed to perform a specific action, which leads to the user trying out all the options just to see what the device offers. Another thing that was implemented by the change in the design is the removal of the undo button, which leads to the inability to recover from the undesired action.

Apple removed it to achieve visual elegance and simplicity, but the users complained, and Apple brought back the undo function. In order to activate the function, a user must shake the device, which is an action that is not universally implemented and increases the difficulty of usage. “The product is beautiful! And fun. As a result, when people have difficulties, they blame themselves” (Norman, 2015, p. 4).

Even though Apple is able to provide an exceptional customer experience and is also a highly trusted company among its users, it faces many challenges, especially with regard to its App Store. Since the only way to install an application on an Apple device is by downloading it from the App Store, Apple is being accused of engaging in unfair competitive practices by having complete power over the applications used on the devices of its users. Since developers need to distribute their applications through the App Store in order to reach the audience of Apple users, Apple has total control over the market and the ability to determine how the competition functions. Many critics argue that the company is charging unreasonable fees and imposing unfair conditions. Apple is also able to use its control of the App Store by engaging in exclusionary practices by excluding downstream competitors in the application market, which can result in consumers paying higher prices, having worse user experience or less choice when deciding on an application (Geradin et al., 2021).

One of Apple's questionable methods is also its In-App Payment (IAP) method, which sometimes comes at a high cost for both application users and its developers. There is a 30 per cent commission charged on transactions going through Apple's IAP, and there is no commission if the in-app payment method is owned by the developer or third party (Geradin et al., 2021). But the usage of the developer's own in-app payment methods is allowed only when the goods sold inside the application are of a physical nature. There are arguments against and in favour of Apple's IAP policy, and the solution to the problem is not clear, but it seems that Apple is better off compared to customers and developers of applications. The implementation of obligatory commission on sales of digital goods results in higher costs for the customer or lower profits for the developer. The developers of applications are prohibited from offering or informing customers about potentially cheaper and more efficient in-app payment methods, which is why it is of little surprise that some developers and users have a problem with Apple's commission policy.

There had been multiple lawsuits regarding the potentially unfair conditions imposed by Apple. In 2020, the European Commission decided to formally investigate whether Apple's rules regarding the distribution of applications through the App Store violate the competition law of the European Union. Apple is being accused of unfair practices, since it provides its own applications in its App Store and while doing so, enforces disadvantages on third-party applications that are competing in the same market (for example: music streaming applications Spotify vs. Apple Music and audiobook applications Rakuten vs. Apple Books). Apple's competitors in the application market are not the only ones that are unsatisfied with its practices in the App Store. In 2019, a group of iPhone buyers argued that the prices of applications in the App Store are inflated due to Apple's policy of charging a 30 per cent IAP

commission, which is imposed on some application developers. In 2020, the U.S. House Antitrust Report was released, in which Apple is being accused of wielding monopoly power over application distribution on iOS devices (Geradin et al., 2021). Another problem that Apple faced was the case with Epic Games. Epic Games was the developer of the game Fortnite, which was available on the App Store. Epic Games made the decision to offer a lower price for some in-app products by implementing their own payment system in the game, which bypassed Apple's IAP. Apple removed the game from the App Store and also threatened to terminate Epic Games' additional account, which was not connected to Fortnite. Epic Games decided to file a lawsuit, accusing Apple of unlawfully monopolising the market for application distribution and in-app payments on iOS devices (Geradin et al, 2021).

## 2.3 Application Market Overview

This section offers a broader view of the application market. It provides a concise overview of mobile applications and highlights current practices and trends that are relevant to user experience.

### 2.3.1 The Evolution of Mobile Applications

Applications are software programs that are designed to run on smart electronic devices, such as smartphones, tablets, computers, smart watches, etc., to enable the user to complete specific tasks. They can be acquired through distribution platforms called app stores, from which the users are able to download and install them on their device (Byun et al., 2020). Applications play a significant role in improving the functionality of smart devices by enabling them to customise their experience according to their personal needs. There are many application categories, such as communication, productivity, entertainment, education, health, finance, etc. The emergence of app stores significantly contributed to the widespread adoption of applications by making them more accessible to people. Apple was the first one to introduce an app store, but other mobile device makers quickly followed (Roma et al., 2016). The rapid expansion of app stores has also attracted new entrants, like Google, which introduced its Android mobile Operating System and launched its own app store. Today, the application market is greatly consolidated and is being dominated by two players: Apple’s App Store and Google Play (Roma et al., 2016). According to Peters (2023), in 2023, Apple App Store recorded revenues of 85.1 billion US dollars, while Google Play Store had revenues equal to 47.9 billion US dollars. Even though the number of application downloads is higher in the Google Play Store than the Apple App Store, it collects less revenue. Roma et al. (2016) state that the reason for more revenues generated in Apple’s App Store is that Apple users tend to be more willing to pay, since Apple mostly targets individuals who highly value quality, design, and innovation and overall have higher disposable income.

Before 2008, applications were an existing concept, but in the form of standalone programs, which were not easily accessible and also required relatively complicated installation processes and were therefore not as popular among common users of electronic devices. In

2008, the first app store was launched (Apple's App Store) with approximately 500 applications available for iPhone and iPod devices. This is considered a pivotal moment because an app store made it possible for developers to distribute applications directly to consumers, which significantly changed the way of software distribution and monetisation. Soon after Apple's launch of the App Store, the competitors, such as Google and Amazon, followed with the release of their own app stores (Wade et al., 2015). By 2010, the digital industry experienced significant progress as a result of the sophistication of the platform-based ecosystem, which connects buyers and sellers through digital platforms. Companies recognised the significance of the platform-based ecosystem and started developing business models to create value. The foundation of platforms, such as Airbnb, Uber, Facebook, Twitter, etc., started the revolution in the electronic industry. Many of the market leaders in the platform economy succeeded by providing the ability to connect one group of users with another by decreasing information and transaction costs. Applications are of significant value in the platform economy, due to their function of providing user interfaces for users to access these digital platforms (Acs et al., 2021). From 2010 to 2018, the adoption of mobile devices increased even further, and the reason for this is the new ability of mobile devices to create personalised experiences by offering a variety of different applications (Kesler et al., 2020). According to Pinchot et al. (2020), in 2019, there were 1.83 million applications available in Apple's App Store and more than 2 million applications available in the Google Play Store. Even though there were more applications available in the Google Play Store, Apple accounted for 64% of worldwide app store revenue, and Google for the remaining 36%. Stocchi et al. (2021) state that applications accounted for about 60% of all media consumption and 90% of the top 100 global brands offered at least one application.

The industry of application software development started being integrated into various aspects of life, such as healthcare, productivity, communication, e-commerce, finance, etc. In the healthcare industry, applications are making it possible for patients to have instant access to their health data, schedule online visits, keep track of their health condition by measuring blood pressure and heart rate, manage the dose of prescribed medication, and perform many other activities related to health. Some applications are also able to connect to other external devices, like inhalers and blood pressure monitors. In 2018, there was more than 9 billion US dollars invested by venture capital towards digital health companies, which is 2 billion US dollars more than in 2018. In 2020, there were more than 300.000 health applications available on the market (Gordon et al. 2020). Health application development is growing even further. According to the report by Kalgotra et al. (2022), after the pandemic, there has been a significant growth recorded in the development of health and fitness applications. Another category is productivity applications, which also became people's essential personal assistants by providing various functions, like note taking, calendars, timers, etc. They provide the opportunity to use time more efficiently, and the researchers suggest that the use of these applications could increase productivity by more than 34% (Azfar et al. 2016). According to Sallberg et al. (2022), productivity applications provide the utilitarian value by improving the efficiency and effectiveness of solving tasks, like creating spreadsheets,

making presentations, writing reports, etc. While productivity applications help users stay organised and efficient, messaging applications play a crucial role in facilitating quick and constant communication. Bailey et al. (2016) state that text messaging has become the dominant method of communication for young adults. In comparison with face-to-face communication, an advantage offered by messaging applications is that people have more control over the impressions that they are trying to convey. A message can be carefully edited and planned before being sent, and facial expressions, mimics, and physical appearance are concealed while communicating. Another concept integrated in these types of applications is the use of emojis, animated GIFs, video and audio messages, and photo decorations that all contribute to the range of communication options for a person to express themselves. Messaging applications also provide the opportunity for people to stay connected even when they are not physically close to one another, and there is a range of different communication applications, each being used for a different occasion (Griggio et al., 2019). Just as the communication needs are being met through a variety of messaging platforms, consumer needs are being addressed through e-commerce applications, which makes the shopping experience more accessible and diversified. “Online shopping is a dramatically developing business, since internet technology and applications started to provide customers with more accessible, more convenient, and cheaper methods to find more varied kinds of products than traditional shopping” (Nguyen et al., 2019). There have been significant changes in retailers’ business models since the widespread adoption of new technologies. With the introduction of mobile applications, physical stores became less attractive, which is why retailers strive towards building user-friendly e-commerce applications to increase loyalty and provide a positive customer experience (Khrais et al. 2021). Another industry that is experiencing significant changes due to the emergence of applications is finance. Finance applications are used to track bill dates and subscriptions, calculate credit scores, manage investments, etc. Some of the functions provided by this category of applications are budgeting and spending meters, financial goal trackers, automated reminders, and price comparisons. The use of personal finance applications improves confidence in financial decision-making and financial literacy (French et al., 2021). According to Huebner et al. (2018), the year 2008 is the start of the revolution in financial technology, which reshaped the way people bank, invest, and access financial services. The market barriers in the financial industry changed, which resulted in high amounts of market entrants that predominantly used mobile applications to acquire potential customers.

This wave of innovation is part of a broader trend, as emerging technologies keep transforming the industries, opening new possibilities and motivating developers to come up with increasingly advanced and innovative solutions. Constant advancements in the technology industry consistently create opportunities and challenges in the application market. Emerging technologies like artificial intelligence, internet of things, virtual reality, 5G network, etc., increase the number of possibilities and allow the developers to make innovative products that the world has not seen before. The evolving technology is also changing the way that users interact with products, which encourages application developers

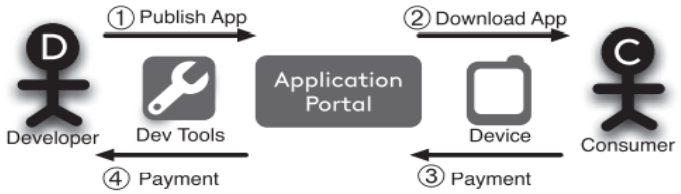
to adapt to these changes and design their applications accordingly (Chen et al., 2022). The Internet of Things is one of the technologies that is expected to significantly change the way we interact with things around us. The main idea behind it is the ability to wirelessly connect objects, ranging from everyday household items to complex industrial tools, and program them in a way where each object is able to sense, process, and communicate data. By doing so, the objects around us become more integrated and instead of requiring human input, they communicate with one another in order to perform the desired action, meaning that the system around us becomes automated and sustainable. The connectedness of devices is striving towards concepts such as smart homes and smart cities, which refer to the whole ecosystem of things working together with the goal of enhancing life quality (Villamil et al., 2020). Due to the development of artificial intelligence (AI), machines are able to mimic cognitive functions that people associate with the human mind. This technology has the ability to recognise patterns in large amounts of data, which is ideal for organising and analysing text, voice, and image-based content. Machine learning is a concept that is closely related to AI and refers to the ability of machines to learn how to excel at performing specific tasks by analysing raw data (Mesko et al., 2020). AI is predicted to transform most industries in the next decade, due to its ability to increase human capability at a low cost. Some examples of AI improving humans' everyday life are early detection of diseases and improving diagnosis in health care, increasing customer service by providing personalised assistants, automating vehicles for safer and more reliable transportation, etc. (Kelly et al., 2023). AI has a significant effect on the mobile application industry as well. It is expected to boost the application industry by enabling applications to predict outcomes, adapt to user preferences quickly and automate the decision-making process. Application developers are implementing AI technology and algorithms based on it to create intelligent and user-centric applications that boost the customer experience, and are also incorporating it into the application development process in order to decrease the operational costs of application development by automating specific processes that previously required human intervention (Sarker et al., 2020). Virtual reality (VR) can be described as a computer-generated three-dimensional environment, with which the users are able to interact. It is typically accessible through a headset that includes screens for a visual stimulus and sensors that track the user's movements in order to display them in the virtual world. At first, the focus of VR technology was on gaming, but soon after, many other benefits of VR emerged. One example of its contribution to the medicine industry is providing a safe and controlled environment that recreates real-life scenarios where medical procedures can be practised. In the future, it could also contribute to the education system by enabling students to engage in personalised and interactive learning experiences, which could improve understanding and retention. The VR technology is also expected to change the engineering industry by providing a platform that enhances the design process and provides safer and more cost-efficient methods of prototyping, visualising, training, and collaborating (Hamad et al., 2022). The introduction of VR technology creates new opportunities and challenges for the application industry by transforming the way in which users interact with devices. In the research conducted by Ashtari et al. (2020), the application developers outlined many challenges that they are facing

through the development process of VR applications, such as not knowing where to start, difficulties in making the experiences realistic, struggling to plan and simulate motion, many unknowns in development, testing, and debugging, etc. Since VR is a relatively new and quickly evolving technology, most of the barriers stem from the absence of sufficient learning materials and concrete design guidelines. (Ashtari et al., 2020). According to Dangi et al (2022), Fifth Generation (5G) technology is the most recent generation of mobile networks. In comparison to previous generations, it is an improvement from every perspective. It offers higher speed and capacity, while maintaining lower latency, which improves the overall operational efficiency and also helps with the implementation of other new advanced technologies. By providing a powerful and quickly reactive network like 5G, we are a step closer to realising ideas like smart homes, smart cities, smart farming, autonomous driving, etc. 5G technology can be understood as one of the main pillars supporting technological evolution by enabling devices to achieve greater potential. According to Al-Maroof et al. (2021), this technology is also expected to improve customer experience in the application industry by decreasing loading times, providing better graphics, reducing energy consumption, improving streaming and video-based applications, etc.

### 2.3.2 Application Development

The applications for mobile devices are usually developed by third parties, which can be either software houses or individuals. The app stores serve as online two-sided markets, which provide advantages and enhance the experience for all actors involved: platform owners, application developers, and consumers. Figure 5 includes a visual representation of how consumers and developers interact with one another through the app store (Roma et al., 2016).

*Figure 5: Mobile application distribution process*

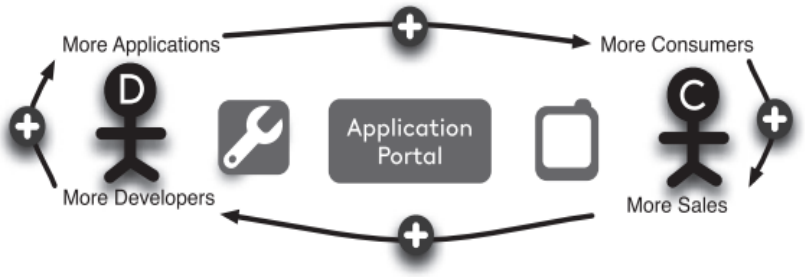



*Source: Holzer&Ondrus (2011).*

Platform owners, such as Apple, benefit from third-party creators developing applications, since a high number of applications results in increased functionality and overall value of Apple's devices. The advantage brought to developers of applications is the ease of distribution of their products or programs, since app stores allow them to reach many potential customers all around the world, which they might not be able to do if distributing on their own. Lastly, the customer experience of consumers is improved, due to the availability of a large number and a high variety of applications, all in one place (Roma et al., 2016).

Figure 6 demonstrates how these mutual benefits flow among application developers and consumers.

*Figure 6: Positive feedback loop in the two-sided application market*




*Source: Holzer&Ondrus (2011).*

Due to the dynamic nature of the application development industry, developers of applications are obliged to make many important decisions before and during the development process, which determine the success or failure of applications in the market (Roma et al., 2016). At the start, developers gain insight into customers' needs and a clear understanding of the problem statement. It is of crucial importance to gather information on who the target audience is, what purpose the application will serve, what kind of technology is needed, who the competitors are, and what the benefits will be for the developer as well (Thomas et al., 2021).

In the second stage, the focus is put on functionality and user interface of the application. A draft or a "skeleton" of the application is built to help the developers with the overall design. At this step of the process, it must be determined how the information will be presented, placed, and prioritised in a way that helps users understand and the ability to communicate requests effectively. Applications also need to store data, and the place of storage depends on the type of data, cost, and effectiveness of the storage environment. Usually, data can be stored on the device itself, but in case the data needs to be available across users and devices, a web server is the best option (Thomas et al., 2021).

At this point, a developer should already have a clear vision of what needs to be done and how. A development environment needs to be chosen based on the target market of the application. It needs to be clear whether the application is being developed for Android users, iOS users, or both, and accordingly, the right integrated development environment needs to be selected. The application needs to be tested continuously to find any bugs that might be present. It is advisable that the team that is testing the application is not the same as the one that developed it. While testing, it is important to go through many, if not all, real-world scenarios in order to find any mistakes or inconveniences (Thomas et al., 2021).

Before the publishing of the application, the team needs to decide how much and how to charge the user (single purchase of application, freemium, subscription-based, etc.). After the application is submitted to the desired app store, it is being tested again. Each app store has its own process of testing. After that is done successfully, the application is officially published and ready to be downloaded. The last phase is constant maintenance, where developers fix the issues that were overlooked in the testing phase and take care of possible inconveniences pointed out by users. New upgrades can also be added after the publishing, and developers need to constantly check whether their application runs smoothly over the period of the changing hardware and software environment (Thomas et al., 2021).

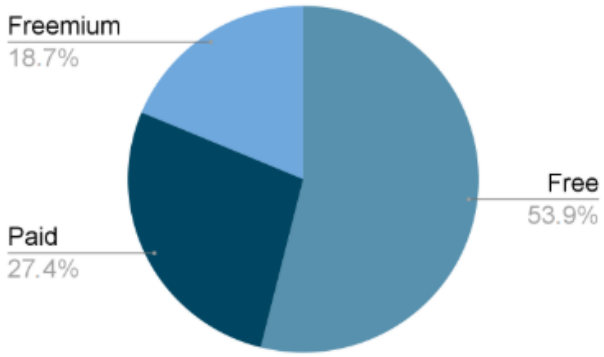
According to Tang (2016), a big majority of mobile applications are free to download, but due to the constant growth of the industry, many revenue-generating models have been established. In the early era, applications were not seen as profit-making businesses, but more of an extension tool to support advertising and marketing. Nowadays, application development can be studied as a stand-alone business. There are three common ways for developers to monetise their applications. They can either demand payment before the download (paid applications), offer users the option of paying to unlock extra features inside the application (in-app purchases), or introduce advertising in an application that is free to use (in-app advertisement). Out of these three methods of collecting revenue, four business models have been introduced: freemium, paid, paidmium, and in-app advertising. The term freemium stands for an application that is free to download but includes an option for in-app purchases. These payments can provide the user with extra benefits like additional functions, upgrades or even the removal of advertisements. These models are very common in the category of games. Paid applications require the user to pay for the application before downloading and do not offer in-app purchases. Paidmium refers to applications that require payment before downloading and offer in-app purchases. This model is common in application categories such as navigation and a dictionary. Applications with in-app advertising are usually free to download, and their developers earn revenue from advertisement impressions and conversions (Tang, 2016).

Roma et al. (2016) have conducted an analysis to find out how different revenue generation models affect sales and if the targeted app store has any effect on the revenues generated by each model. The revenue generation models have been categorised into payment-based models, which include both paid and freemium, and free models. The two app stores examined were Apple's App Store and Google Play Store. The research was conducted by randomly selecting applications from the two major app stores for a period of 20 weeks. The findings suggest that there is no dominant revenue-generating model and that the revenue generated by each model mostly depends on the application distribution platform on which the application is marketed. According to research, paid and freemium models seem to be more effective than the free model in Apple's App Store, in terms of application revenue generation. Paid and freemium models show similar revenue performance in Apple's App Store. In the Google Play Store, there were no significant differences between paid and free

models, and the freemium model was found to be the least successful among the three. The research has also shown that the effectiveness of in-app purchasing is highly correlated with the selection of the application's distribution platform, meaning that this practice shows positive influence on the application's revenue performance in Apple's App Store, but has a negative effect in Google Play Store. The reason for differences in the application's revenue generated between the two stores is in the average consumer's willingness to pay (Roma et al., 2016).

Figure 7 is a pie chart representing the average distribution of mobile application revenue generation models across the two dominating platforms: Apple's App Store and Google Play. It can be observed that in total 53.9% of applications are free to use, 27.4% of applications require a payment before downloading, and 18.7% of applications are free to download but require a payment for their premium functions (Roma et al., 2016).

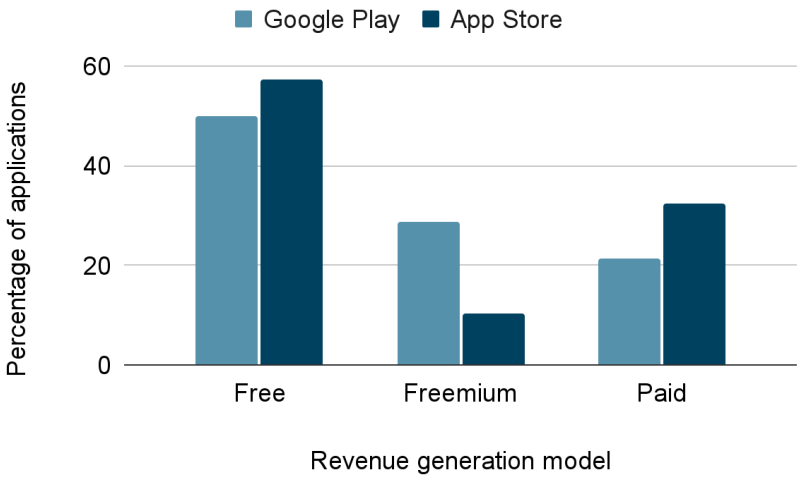
*Figure 7: Average distribution of mobile application revenue generation models*




*Source: adapted from Roma et al. (2016).*

By comparing the data among the two platforms, it can be seen in Figure 8 that the percentage of applications that are free to use is 57.3% in Apple's App Store and 49.9% in Google Play. 21.4% of applications in Google Play operate with a paid revenue generation model, while the percentage of paid applications in Apple's App Store is equal to 32.5%. The data suggests that Apple offers a higher percentage of free and paid applications, while the amount of freemium applications is significantly larger in Google Play with 28.7% compared to 10.2% in Apple's App Store (Roma et al, 2016).

*Figure 8: Distribution of revenue generation models in App Store and Google Play*




*Source: adapted from Roma et al. (2016).*

An important concept that developers of the applications also need to consider is the so-called app-store optimization. According to Karagkiozidou et al. (2019), the rankings in application markets drastically affect the applications' sustainability, which is why publishers compete for the greatest prevalence in the app store. In order to improve the application's visibility and maintain the ranking position, publishers perform the process of app store optimization, which can be achieved through keyword optimization and the improvement of conversion rates. Research by Karagkiozidou et al. (2019) suggests that there are 8 main factors affecting the application's position in an app store, which can be split into two categories: factors dependent on the user and factors dependent on the publisher. Volume of installs, ratings, and user reviews fall in the first category, because the publisher can not have any effect on them. Screenshots & videos, description, application localisation, application name & title, and application icon are all part of the second category since they are directly affected by the publisher. The research suggests that the first category (installs, ratings, and reviews) plays a more important role in an application's positioning in the app store.

### 2.3.3 User Experience Trends and Practices in the Application Market

According to Shamaileh et al. (2023), there are six important factors affecting the individual's user experience of an application: personalisation, integrity, performance, utility, external influences and facilitating conditions. Personalisation refers to the extent to which an application can be customised by each user according to their preferences (Shamaileh et al., 2023). It can also be defined as "a process that changes the functionality, interface, information access, content, or distinctiveness of a system to increase its relevance to an individual or a category of individuals" (Esanov et al., 2022). Personalisation offers users the option to tailor their experience based on their needs, goals, knowledge, interests, etc. The goal is to enable users to select and navigate through an application's virtual journey according to their preferences. According to Esanov et al. (2022), four aspects of an

application that can be personalised are the information, the presentation of information, the delivery method, and the action.

Integrity is understood as the amount of trust that users have in the application or its developer. It is important for users to believe they are not a part of any fraudulent activities and that the information displayed by the application is reliable and trustworthy (Shamaileh et al., 2023). Security issues impose a significant threat to the adoption and diffusion of applications. Studies have shown that concerns about security and privacy risks are found to be the most significant among many reasons why individuals choose not to install a certain application (Balapour et al., 2020). Users worry about the vulnerability of applications and are afraid to have their activity tracked or sensitive data stolen by falling victim to malicious code that applications could possess. Therefore, it is of great importance for application developers to understand security perceptions and minimise users' concerns by implementing effective mechanisms in the development process. By doing so, the application will attract new users as well as retain current ones (Balapour et al., 2020).

Performance of an application is the ability to improve users' work and effectiveness and contributes to the overall efficiency of an action that the user is trying to perform inside the application (Shamaileh et al., 2023). Performance of an application can be understood as its ability to let the user perform specific tasks without perceived delay or irritation. In performant applications, the users are never met with a blank screen during the launch and are able to achieve what they planned to, without their attention wandering. Bad performance of an application results in user dissatisfaction, because it increases the cost of time and decreases the reliability of the process (Molyneaux, 2014). In the research conducted by Hort et al. (2022), the four performance characteristics defined were responsiveness, launch time, memory consumption, and energy consumption. Responsiveness is the ability of an application, which refers to the latency in response to users' requests. The closer the response time is to zero, the more satisfied users are. The time that it takes for an application to load data and operations, to make them available to the user, is referred to as launch time. Memory describes the amount of data that the applications occupy on the device and is of critical importance in resource-constrained systems like mobile phones, where the device's data is relatively low. Due to growing functional capabilities of applications, and on the other hand, limitations in battery size, reducing energy consumption is gaining relevance. Energy is consumed by applications due to the use of several components, such as audio, display, GPS, WiFi, etc. The research suggests that high energy consumption negatively impacts users' overall satisfaction (Hort et al., 2022).

Contrary to performance, which focuses on technical aspects, utility focuses on the functional aspects and refers to the perceived usefulness, functionality, and services of an app. It relates to the features that provide value to the users, which is of significant importance when it comes to the users' perception of an application. Functional factors were recognised as a dominant influence on users' choice about the adoption of applications (Shamaileh et al., 2023). Utility refers to factors, such as users' perceptions about the design and technical

capabilities of applications based on the application's ability to achieve specific goals, and be efficient and easy to use, while doing so. It also refers to the individual's beliefs about the usefulness of an application, therefore, how important the application is for performing a specific task (Camilleri et al., 2023). In the research conducted by Scott et al. (2020), several factors contributing to the utility of applications were identified. The research was focused specifically on the utility of health applications, but the method used can be applied to other categories as well. For determining the utility of applications, three categories were identified: content, usability, and efficacy. Content refers to qualitative, mostly text-based material inside the application. Usability takes into account an application's learnability, flexibility, satisfaction, attractiveness, consistency, and error rate, while efficacy is understood as the ability of an application to cause meaningful change in users' behaviour and outcomes (Scott et al., 2020).

External influences refer to concepts such as overall popularity, recommendations from friends, reviews, marketing, etc. (Shamaileh et al., 2023). The study of Hammouri et al. (2021) explained the effect of social influence on mobile applications. Social influence, in the context of mobile applications, refers to the extent to which a potential user believes that peers think he/she should use a specific mobile application. Social influence was classified into two categories, external and internal sources. External sources refer to mass media reports and other users' experiences, while internal sources refer to word of mouth from friends, family members, and colleagues. The authors also highlighted that poor user awareness is one of the main reasons that cause mobile users to uninstall an application, and that the influence from the social environment significantly affects the awareness and positively affects the continuous use of applications (Hammouri et al., 2021). A significant part of external influences are ratings and reviews that are usually published on the app store. The research was conducted by Sallberg et al. (2022) on how ratings and reviews of applications affect the number of downloads. Ratings inform the potential consumer about other people's perception of a product's value,which is why high-quality products tend to receive higher ratings that impact the potential customers' decision-making. Another important factor, besides the actual rating score, is the number of ratings, which provides information about awareness of the product among consumers. A high number of ratings is associated with more discussions about the product, therefore, higher awareness. Both the rating score and the number of ratings are positively correlated with the number of downloads. Reviews refer to the opinions of users in text format, and are used to help consumers find a product that matches their needs and preferences. Ratings and reviews are usually acknowledged in combination, which means that they strengthen each other's reliability, which is why a good rating will have more perceived reliability if it is followed by a positive text review (Sallberg et al., 2022).

Facilitating conditions are factors that make it convenient for individuals to use and adopt an application and refer to concepts of accessibility, training and technological support for the application, integration with existing systems, etc. (Shamaileh et al., 2023). According to

Tam et al. (2018), facilitating conditions, in the context of applications, refer to the extent to which a potential user believes that organisational and technical infrastructure, that is used to support the use of the application, exists. Research by Hamzah et al. (2023) suggests that facilitating conditions have a significant impact on the individual's decision about the continuous use of a mobile application. Facilitating conditions in this research are defined as external factors that make it easier for individuals to use an application. Easily accessible services increase the likelihood of the application's usage. The requirements of facilitating conditions vary across different categories of applications. For example, gaming applications require conditions that provide a seamless and enjoyable experience, focusing on stable networks, low latency, device compatibility, user support, etc. (Ramirez et al., 2019). In banking applications, facilitating conditions focus on security, reliability, accessibility to financial information, professional customer support, etc. (Seesuk, 2020). In health applications, it is very important to have mobile devices that are compatible with instruments for measuring blood pressure, heart rate and other health data (Apolinario, 2018).

# 3 RESEARCH METHODOLOGY

This chapter describes the research design and methodological approach used to address the research objectives. It explains how data were collected, measured, and analysed to ensure validity and reliability.

## 3.1 Research Purpose and Hypotheses

While the title of this master's thesis refers to customer experience, and the theoretical part addresses various aspects of experience design, the empirical research focuses specifically on user experience, which is a narrower and more concrete aspect of the broader concept. The purpose of the empirical part of the research is to analyse the user experience of the Apple Music application. I chose to analyse Apple Music because it is an application that has been developed by Apple itself, and therefore closely follows Apple's design principles. The research was conducted using the user experience questionnaire (UEQ), which suggests that user experience consists of six dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty (Schrepp, 2020). Additionally, the study also included a measure of users' overall satisfaction with the application in order to test how each dimension of the UEQ associates with it. In my research, I have decided to test six hypotheses, each of them connected to one of the user experience dimensions highlighted in the UEQ.

H1: Attractiveness and the user's overall satisfaction with Apple Music are positively associated.

Attractiveness of the application refers to the overall impression of the product. It reflects the overall positive or negative response by the user and does not have any specific reference to

the application's functionality or how well it performs tasks (Schrepp et al., 2014). By measuring the attractiveness of Apple Music, I will try to determine whether the users find the application attractive, enjoyable and pleasing. According to UEQ, the attractiveness of applications is positively associated with the user experience and, therefore, with the overall satisfaction with the application (Schrepp et al., 2014).

H2: Perspicuity and the user's overall satisfaction with Apple Music are positively associated.

Perspicuity is a dimension of UEQ that measures how easy it is to get familiar with the application, how easy it is to learn to use it, and if the application's functions are clear and understandable (Schrepp et al., 2014). The clarity of functions and ease of navigation are known to significantly affect the user experience by enabling the user to efficiently complete their tasks, which is why it is a necessary condition for many mobile applications (Li et al., 2020). According to UEQ, the perspicuity of the application is positively associated with the user experience and, therefore, with the overall satisfaction with the application (Schrepp et al., 2014).

H3: Efficiency and the user's overall satisfaction with Apple Music are positively associated.

The efficiency dimension refers to the user's ability to complete their tasks inside the application without unnecessary effort, with speed and accuracy (Schrepp et al., 2014). The efficiency of a system plays an important role in shaping the quality that is perceived by the user, and users who are able to quickly achieve their goals generally report higher levels of satisfaction (Weichbroth, 2020). According to UEQ, efficiency of the application is positively associated with the user experience and, therefore, with the overall satisfaction with the application (Schrepp et al., 2014).

H4: Dependability and the user's overall satisfaction with Apple Music are positively associated.

The dependability factor helps determine whether the user feels in control of the interaction, can predict the application's behaviour, and feels safe when interacting with the application (Schrepp et al., 2014). According to Shmatko et al. (2023), ensuring the dependability of applications has become a crucial aspect of the development process and positively contributes to the widespread adoption of applications and their success. According to UEQ, dependability of the application is positively associated with the user experience and, therefore, with the overall satisfaction with the application (Schrepp et al., 2014).

H5: Stimulation and the user's overall satisfaction with Apple Music are positively associated.

Stimulation is the excitement and motivation that is felt by the user during the usage of the application. A stimulating application feels interesting and enjoyable (Schrepp et al., 2014). Highly stimulating applications result in the users wanting to continuously engage with them and make them emotionally invested in the experience. The stimulation can be achieved by combining compelling aesthetics with meaningful interactivity (Lewis, 2014). According to UEQ, stimulation of the application is positively associated with the user experience and, therefore, with the overall satisfaction with the application (Schrepp et al., 2014).

H6: Novelty and the user's overall satisfaction with Apple Music are positively associated.

The novelty factor tells us if the user perceives the application as innovative, creative and unique (Schrepp et al., 2014). In order for applications to capture the interest of the initial user and also maintain engagement, they should continuously introduce innovative features to prevent the experience from becoming monotonous. Innovative features can take many forms, such as new visual elements, updated interaction patterns, content personalisation features, etc. (Kataria et al., 2020). According to UEQ, novelty of the application is positively associated with the user experience and, therefore, with the overall satisfaction with the application (Schrepp et al., 2014).

### 3.2 Research Instrument: UEQ

According to Schrepp et al. (2014), the UEQ was developed to provide a fast and immediate measurement of user experience across different types of interactive systems. The first version of the UEQ was created in 2005, and it initially consisted of 229 potential items, which were reduced to 80 by an expert evaluation. The 80-item version was used in several studies that focused on the quality of interactive products, but the factor analysis showed that the UEQ can be simplified even further and still provide reliable and valid results. As presented in Table 1, the current version of UEQ consists of 26 items organised into 6 different scales, which together capture both pragmatic and hedonic aspects of user experience. Each item is presented as a scale with two opposite attributes (for example: annoying/enjoyable) and participants rate their experience on a 7-point Likert-type scale ranging from -3 to +3, where -3 represents a strong agreement with the negative attribute, and +3 indicates a strong agreement with the positive attribute (Schrepp et al., 2014).

*Table 1: Dimensions and items of the UEQ*

| Dimensions | Items |
|---|---|
| Attractiveness | annoying/enjoyable, good/bad, unlikable/pleasing, unpleasant/pleasant, attractive/unattractive, friendly/unfriendly |
| Perspicuity | not understandable/understandable, easy to learn/difficult to learn, complicated/easy, clear/confusing |
| Efficiency | fast/slow, inefficient/efficient, impractical/practical, organised/cluttered |
| Dependability | unpredictable/predictable, obstructive/supportive, secure/not secure, meets expectations/does not meet expectations |
| Stimulation | valuable/inferior, boring/exciting, not interesting/interesting, motivating/demotivating |
| Novelty | creative/dull, inventive/conventional, usual/leading edge, conservative/innovative |

*Source: adapted from Schrepp et al. (2014).*

The sufficiency of the measured user experience can be determined by comparing the data of the performed UEQ to the benchmark data set, which consists of a large sample of other commonly used products (Schrepp et al., 2014). This dataset enables researchers to interpret their results in relation to established standards. The dimension of the evaluated product is considered excellent if it is among the best 10% of results, good if it is between 10% and 25%, above average if it is between 25% and 50%, below average if it is between 50% and 75% and bad if it is below the 75% of best results. A comparison of results with the dataset provides practical meaning to the raw scores of different dimensions of the UEQ and also enables researchers to easily benchmark their scores against the scores of other commonly used products in the market. In Table 2, there is a presentation of benchmark values for each of the dimensions.

*Table 2: Benchmark values for each of the dimensions*

| | **Att.** | **Eff.** | **Per.** | **Dep.** | **Sti.** | **Nov.** |
|---|---|---|---|---|---|---|
| Excellent | ≥ 1.75 | ≥ 1.78 | ≥ 1.9 | ≥ 1.65 | ≥ 1.55 | ≥ 1.4 |
| Good | ≥ 1.52<br>< 1.75 | ≥ 1.47<br>< 1.78 | ≥ 1.56<br>< 1.9 | ≥ 1.48<br>< 1.65 | ≥ 1.31<br>< 1.55 | ≥ 1.05<br>< 1.4 |
| Above average | ≥ 1.17<br>< 1.52 | ≥ 0.98<br>< 1.47 | ≥ 1.08<br>< 1.56 | ≥ 1.14<br>< 1.48 | ≥ 0.99<br>< 1.31 | ≥ 0.71<br>< 1.05 |
| Below average | ≥ 0.7<br>< 1.17 | ≥ 0.54<br>< 0.98 | ≥ 0.64<br>< 1.08 | ≥ 0.78<br>< 1.14 | ≥ 0.5<br>< 0.99 | ≥ 0.3<br>< 0.71 |
| Bad | < 0.7 | < 0.54 | < 0.64 | < 0.78 | < 0.5 | < 0.3 |

*Source: adapted from Schrepp et al. (2014).*

The UEQ has many strengths. It is a standardised and multidimensional tool that can be used to measure both pragmatic (perspicuity, efficiency, dependability) and hedonic (stimulation, novelty, attractiveness) qualities of a product, which makes it an appropriate framework for thorough evaluation of user experience. Its conciseness and benchmarking capabilities allow researchers to gather results that are efficient and can also be interpreted in relation to other products (Schrepp et al., 2014).

### 3.3 Data Collection and Sample Description

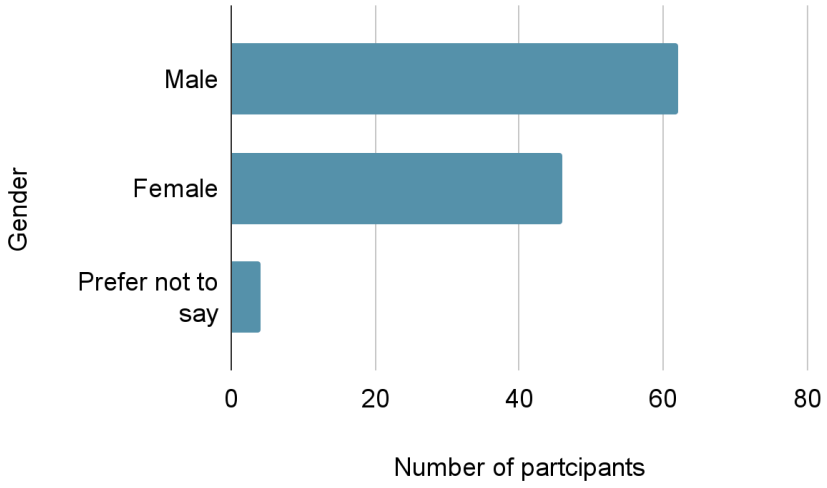
The research was conducted using a quantitative approach. I decided to use this type of research because it allows for objective measurement of user experience factors and provides numerical data, which is appropriate for the statistical analysis of the relationship between user experience and overall satisfaction. Quantitative research is particularly appropriate when the goal is to identify and study relationships between variables, such as the association between individual UEQ dimensions and the user's overall satisfaction. With the usage of structured data and standardised measurement tools, this approach reduces subjectivity and makes it possible to compare results with high reliability. Furthermore, the quantitative design of research supports the collection of data from a large number of respondents, which makes it possible to identify specific patterns and trends within the sample (Brown, 2015).

The questionnaire was distributed using an online distribution technique, which is efficient and cost-effective when gathering large amounts of data. This approach is well-suited for examining the general association between user experience factors and the user's overall satisfaction (Andrews, 2007). The questionnaire was distributed through two digital platforms, Instagram and Reddit, which are platforms where I already had access to users who are likely familiar with Apple Music. I posted the questionnaire link on my Instagram story, which allowed immediate access to followers who use Apple Music, and the questionnaire was also shared in Apple Music-related Reddit groups in order to reach users

who actively follow and participate in discussions about the application. The sampling strategy for the study was convenience sampling, which was chosen because of its practicality and suitability for studies where participants are easily accessible through digital channels. According to Golzar et al. (2022), convenience sampling is often used in social science research because it allows researchers to gather a sufficient number of responses without the need for complex sampling procedures. Even though this procedure does not result in full randomisation of respondents, it is an effective method for studies where the main objective is to identify patterns and relationships between the variables (Golzar et al., 2022). While this sampling technique provides many benefits, it can result in a sample that is not representative of the entire Apple Music user base across the whole population.

As presented in Figure 9, the sample consisted of 62 male respondents, 46 female respondents, and 4 respondents who preferred not to state their gender. Males represented the largest group inside the sample, accounting for more than 55% of all respondents who are considered in the interpretation of the results. Female respondents made up a significant portion of the sample as well, representing slightly more than 41% of the sample, while a small minority of about 3% decided not to disclose their gender. Even though the distribution of genders in the sample is not perfectly balanced, both male and female perspectives are sufficiently represented.

*Figure 9: Distribution of respondents by gender*

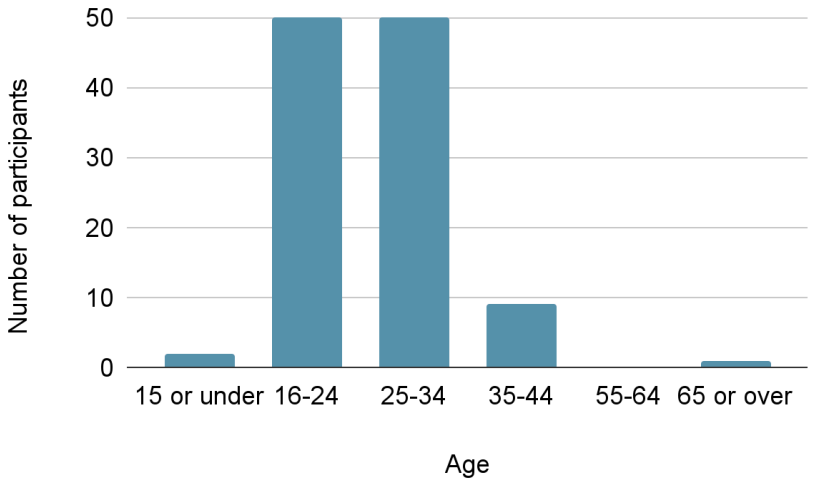



*Source: own work.*

The age structure of the respondents is presented in Figure 10. The data indicates that the majority of respondents are relatively young; specifically, 50 respondents belong in the 16-24 age group, and another 50 of them fall within the 25-34 age group. Together, these 2 groups account for 100 out of 112 respondents, which is slightly less than 90% of the whole sample. Additionally, 2 respondents stated being 15 years old or younger. Older age groups are represented in significantly lower numbers. 9 respondents reported to be between 35 and 44

years old, 1 respondent was 65 years old or older, and none of the respondents stated to be between 55 and 64 years old. Therefore, the representation of older age groups is limited, which suggests that the questionnaire mostly reached younger individuals, which may also be the consequence of the online distribution method and the internet platforms that were used for the distribution of the questionnaire. Since the results of the study largely show only the attitudes, opinions and behaviours of younger generations, the findings should be interpreted accordingly.

*Figure 10: Distribution of respondents by age*




*Source: own work.*

When looking at the data for geographic distribution, it can be observed that the largest proportion of respondents is from Slovenia (49 respondents), followed by the United States (32 respondents). Additionally, 32 respondents were from various other countries around the world, including the United Kingdom, Mexico, Malaysia, Finland, Poland, etc. For each of these countries outside Slovenia and the United States, the individual share of respondents was lower than 5% of the total sample. This geographic distribution indicates that the questionnaire achieved international reach to some degree, but the nationality of respondents is primarily focused in Slovenia and the United States. As a result, the findings of the research may not apply to the whole population, which is why the results should be interpreted accordingly.

### 3.4 Data Analysis Method

The questionnaire began with an introduction that provided brief instructions for completing the first section, which included the UEQ. The UEQ has a predetermined structure consisting of 26 items that are grouped into six distinct dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. These dimensions capture both practical and more pleasure-oriented aspects of user experience, which makes it possible to comprehensively evaluate the Apple Music application. The second section of the

questionnaire consisted of 4 closed-ended questions and 1 open-ended question. The first closed-ended question gathered information about the frequency of Apple Music usage in order to find out how often the participants interact with the application. The second closed-ended question asked participants to indicate their level of overall satisfaction with the application. This variable served as the dependent variable in the following analysis and was necessary for analysing the association between the 6 UEQ dimensions and the user's overall satisfaction with the application. The two remaining closed-ended questions collected data about the sex and age of participants, while the open-ended question gathered information about their nationality. These questions allowed for a basic description of the sample and maintained transparency regarding the characteristics of the respondents.

Before conducting the statistical analysis, the dataset was examined for inconsistent and irrelevant responses, which were removed to ensure the reliability and relevance of the results. There were 136 respondents to the online questionnaire. 13 of them were excluded from the interpretation of the results because they stated that they never use Apple Music, and another 11 respondents were excluded due to inconsistent response patterns identified through the UEQ Analysis Tool, which indicates non-serious and unreliable answers across multiple dimensions. Specifically, these respondents showed inconsistencies in three or more UEQ dimensions, reflected by highly varying ratings for items within the same dimension. 112 responses were included in the analysis.

The gathered data was first analysed by using the UEQ Analysis Tool. This tool automatically transforms the responses from the UEQ's 7-point Likert scale by applying values to them, ranging from -3 (most negative) to 3 (most positive) and also calculates statistical data, such as mean scores and standard deviations, for each item and dimension of the UEQ. By using the UEQ Analysis Tool, I was able to evaluate the user experience of Apple Music in a standardised and systematic way and compare these results with the existing UEQ benchmark data. In addition, the tool also provides an overview of the reliability of individual dimensions by analysing internal consistency and calculating reliability coefficients, such as Cronbach's alpha. After the analysis with the UEQ Analysis Tool, the results were exported to Microsoft Excel and combined with the remaining data from the questionnaire. Prior to conducting the multiple regression analysis, 6 simple linear regressions were performed as an initial exploratory step. In each regression, one UEQ dimension served as the independent variable and overall satisfaction as the dependent variable. The purpose of these linear regressions was to provide a basic understanding of the individual relationships between each UEQ dimension and the user's overall satisfaction, and also to observe the strength and direction of these associations. Satisfaction was measured on a Likert scale and was treated as an interval variable. For each regression, the basic assumptions were checked: the data were examined for potential outliers, standardised residuals were inspected for extreme deviations, linearity was assessed through scatterplots, and the distribution of residuals was visually analysed. No major violations of the assumptions were observed, supporting the use of linear regression. Before conducting the

multiple regression, I have also tested for multicollinearity by performing a correlation matrix of the UEQ dimensions and calculating the Variance Inflation Factor (VIF) for each variable. The relationship between UEQ dimensions and overall satisfaction with Apple Music was then primarily analysed using multiple regression. In this model, UEQ dimensions served as independent variables, while the user's overall satisfaction represented the dependent variable. Because the dependability dimension showed a critically low Cronbach's alpha, which suggests low reliability of results, I have decided to exclude this dimension from the multiple regression. Consequently, the model included 5 dimensions of the UEQ as independent variables. Multiple regression analysis was used to examine the association between these 5 UEQ dimensions and overall satisfaction while controlling for the other dimensions, thereby enabling the testing of research hypotheses.

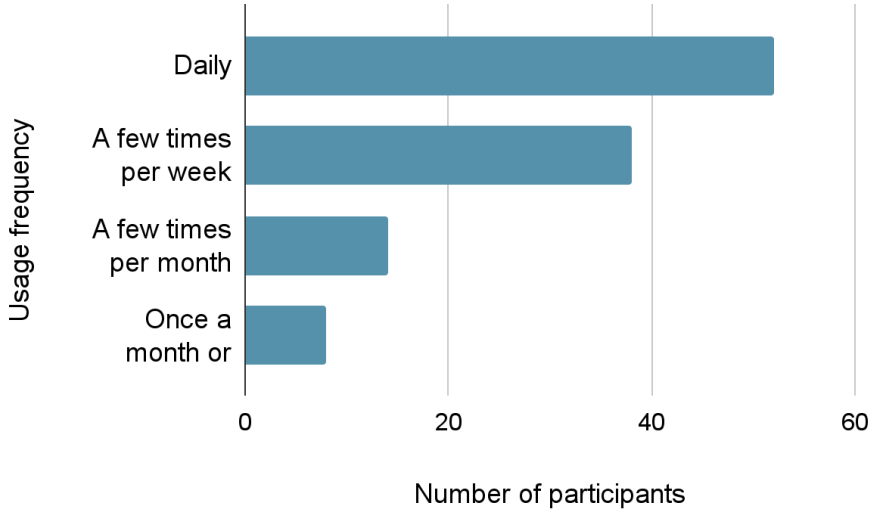
# 4 RESULTS

This chapter presents the findings of the empirical analysis. It reports the outcomes of statistical tests and summarizes the key patterns observed in the data.

## 4.1 Descriptive Statistics of the Sample

Descriptive statistics summarise the basic features of the data, provide an overview of the respondents' characteristics and make it easier to understand the structure and behaviour of the sample. The first descriptive variable examined in this research is the frequency of Apple Music usage. The results indicate a relatively high level of engagement, with the majority of respondents reporting frequent use of the application; more specifically, 52 out of 112 respondents answered that they use Apple Music on a daily basis. This group accounts for almost half of all valid responses, suggesting that Apple Music is deeply integrated into the everyday lives of many users. Additionally, a significant number of respondents reported using Apple Music a few times per week, and that category includes 38 individuals, which further demonstrates that regular usage is widespread among users. Together, daily and weekly users account for the vast majority of respondents, which implies that the results of the study primarily show the perceptions of active and engaged Apple Music users. Less frequent usage patterns were reported from a significantly smaller segment of respondents. 14 respondents stated that they use the application a few times per month, and only 8 respondents reported using Apple Music once a month or less. These users with lower frequency of usage represent a relatively small part of the sample, which suggests that occasional usage is not common among the respondents who were included in the analysis. In addition to frequent and occasional users, some of the respondents stated that they never use Apple Music, but since those responses were eliminated from the analysis of results, this option is not included in Figure 11, which visually presents the usage frequency of respondents.

*Figure 11: Distribution of respondents by usage frequency*

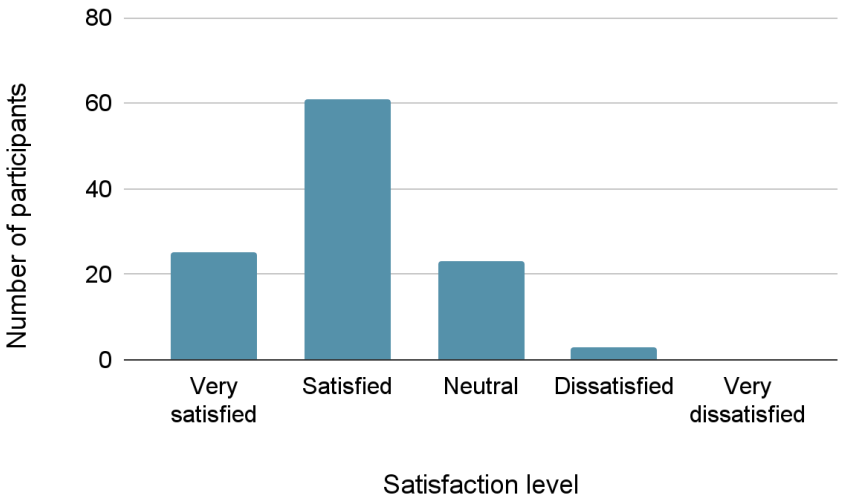



*Source: own work.*

Overall, the results for the usage frequency indicate that the sample is appropriate for researching user satisfaction and perceptions of Apple Music, since most of the respondents have substantial experience with the application and are able to provide valuable and informed opinions about the application's features and performance.

In addition to usage frequency, participants were also asked to rate their overall level of satisfaction with Apple Music. The results indicate a positive level of overall satisfaction, with 61 respondents reporting being satisfied and 25 respondents being very satisfied with the application. These two groups represent almost 77% of the sample. Neutral responses were reported by 23 respondents, who stated that they do not feel satisfied nor dissatisfied with Apple Music. Only 3 respondents indicated that they are not satisfied, and none of them reported being very dissatisfied with the application. Overall, the low number of negative responses and a high proportion of satisfied and very satisfied users suggest that the user experience is generally positive among Apple Music users. The results are presented in Figure 12.

*Figure 12: Distribution of respondents by satisfaction level*




*Source: own work.*

### 4.2 User Experience Evaluation

According to Schrepp (2020), Cronbach's alpha is often used to objectively measure the reliability of the results obtained within each of the 6 dimensions of the UEQ. It expresses the interrelatedness of items within the dimension and provides a value between 0 and 1. High values mean high connectedness among items, while low values mean the opposite. When defining the acceptable values of the Cronbach's alpha when using the UEQ, most of the reports interpret the measurement by the following rule of thumb: Cronbach's alpha > 0.9 (excellent), Cronbach's alpha > 0.8 (good), Cronbach's alpha > 0.7 (acceptable), Cronbach's alpha > 0.6 (questionable), Cronbach's alpha > 0.5 (poor), and Cronbach's alpha < 0.5 (unacceptable).

Values of Cronbach's alpha in the conducted research about the user experience of Apple Music are presented in Table 3 and are equal to 0.86 for attractiveness, 0.76 for novelty, 0.78 for perspicuity, 0.71 for efficiency, 0.7 for stimulation, and 0.52 for dependability. This means that the reliability of the data inside the attractiveness dimension is good, the reliability of data within novelty, perspicuity and efficiency is acceptable, the stimulation dimension has questionable reliability, and the reliability of data within the dependability dimension is poor. Since the reliability of the stimulation dimension is on the upper side of the interval and would be interpreted as acceptable if the Cronbach's alpha was just 0.01 points higher, the results can be interpreted with enough confidence. The dimension of dependability has a value of Cronbach's alpha close to being completely unacceptable for interpretation, and therefore, these results have to be interpreted with caution, as they may not accurately reflect the true picture.

*Table 3: Cronbach's Alpha of dimensions of the UEQ*

| **UEQ Scale** | **Cronbach's Alpha Coefficient** |
|---|---|
| Attractiveness | 0.86 |
| Novelty | 0.76 |
| Perspicuity | 0.78 |
| Efficiency | 0.71 |
| Stimulation | 0.70 |
| Dependability | 0.52 |

*Source: own work.*

The results for each scale range from -3 to 3. From the obtained results, it is seen that out of all six dimensions, perspicuity has the highest average score of 1.951, dependability has an average score of 1.799, efficiency 1.797, attractiveness 1.740, stimulation 1.121 and novelty 0.857, as seen in Table 4. When comparing results with the benchmark values, we can see that attractiveness has a good score, perspicuity and efficiency have excellent scores, while stimulation and novelty are above average. Although the dependability dimension also scored excellently, it can not be confidently concluded that this result accurately reflects reality.

*Table 4: Average mean of dimensions of the UEQ*

| **UEQ Scale** | **Mean** |
|---|---|
| Perspicuity | 1.951 |
| Dependability | 1.799 |
| Efficiency | 1.797 |
| Attractiveness | 1.740 |
| Stimulation | 1.121 |
| Novelty | 0.857 |

*Source: own work.*

Perspicuity was the highest-rated UEQ dimension of Apple Music. A high score in perspicuity suggests that users find the application easy to use and do not face significant difficulties in navigating through it. Table 5 presents individual components of the perspicuity dimension and their ratings. Users rated Apple Music as very easy to learn and highly understandable, giving these items scores of 2.089 and 2.071, respectively. Results suggest

that new users are able to quickly learn how to use the application, and the interface is logically structured. The score of 1.964 for complicated/easy suggests that Apple Music also seems to be perceived as easy rather than complicated, suggesting that its design functions in a straightforward way. Even though the score of 1.679 for clearness of the application is relatively good, it indicates that some users might occasionally experience slight confusion.

*Table 5: Mean for items of the perspicuity dimension of the UEQ*

| **Item** | **Mean** |
|---|---|
| difficult to learn/easy to learn | 2.089 |
| not understandable/understandable | 2.071 |
| complicated/easy | 1.964 |
| confusing/clear | 1.679 |
| Total | 1.951 |

*Source: own work.*

The second-highest scoring dimension is dependability, which indicates that users perceive Apple Music as reliable, consistent and functioning as expected. As can be seen in Table 6, users rated Apple Music as meeting their expectations (1.982) and being secure (1.964), suggesting that the application performs reliably and provides users with confidence regarding data safety. The score of 1.741 for predictability indicates that users perceive the application as largely predictable, but occasional inconsistencies may occur. The lowest rating within this dimension, 1.509 for obstructive/supportive, implies that while Apple Music generally assists users in their activities, moments can occur when the interface feels unhelpful or less responsive. However, due to the low reliability of this dimension, these results should be interpreted with caution as they may not reflect the real picture.

*Table 6: Mean for items of the dependability dimension of the UEQ*

| **Item** | **Mean** |
|---|---|
| does not meet expectations/meets expectations | 1.982 |
| not secure/secure | 1.964 |
| unpredictable/predictable | 1.741 |
| obstructive/supportive | 1.509 |
| Total | 1.799 |

*Source: own work.*

A relatively high score for efficiency of Apple Music suggests that users generally perceive it as a quick and well-organised application that is practical in its operations and enables users to complete tasks with speed, accuracy and without unnecessary delays or complications. Table 7 shows that users rated Apple Music as fast (1.973), showing that the application performs well in terms of speed and responsiveness. The score of 1.821 for cluttered/organised suggests that users find the application's interface organised and its content and features arranged logically, making it easy to navigate. The scores of 1.696 for efficiency and practicality indicate that Apple Music is considered to be functional and efficient, but there might be some opportunities in the area of usability.

*Table 7: Mean for items of the efficiency dimension of the UEQ*

| **Item** | **Mean** |
|---|---|
| slow/fast | 1.973 |
| cluttered/organised | 1.821 |
| impractical/practical | 1.696 |
| inefficient/efficient | 1.696 |
| Total | 1.797 |

*Source: own work.*

Attractiveness was another positively rated UEQ dimension of Apple Music, indicating that users generally perceive the application as visually appealing and enjoyable to use, making the users experience positive emotions. Table 8 shows that users rated Apple Music as good (1.911), friendly (1.875), and enjoyable (1.813), showing that the overall impression and tone of the application are welcoming and appealing and that the users enjoy using it. The ratings of 1.643 for pleasingness and 1.634 for attractiveness suggest that although the application is generally well received, some users may find aspects of the interface less visually engaging. The lowest score of 1.563 for unpleasant/pleasant, while still good, implies that there is minor room for improvement in enhancing the user experience.

*Table 8: Mean for items of the attractiveness dimension of the UEQ*

| Item | Mean |
|---|---|
| bad/good | 1.911 |
| unfriendly/friendly | 1.875 |
| annoying/enjoyable | 1.813 |
| unlikable/pleasing | 1.643 |
| unattractive/attractive | 1.634 |
| unpleasant/pleasant | 1.563 |
| Total | 1.740 |

*Source: own work.*

Stimulation was rated lower compared to the average of other UEQ dimensions, indicating that users perceive the application as moderately exciting or motivating and even though it may be functional and pleasant to use, it does not seem to strongly engage users. Mean for each item of the stimulation dimension is presented in Table 9. The score of 1.429 for demotivating/motivating shows that users see the application as relatively motivating, suggesting that it can occasionally encourage use but does not do so consistently. The score of 1.116 for inferior/valuable and 1.018 for boring/exciting indicates that users see the application as only moderately engaging and stimulating. The lowest rating of 0.920 for the application being interesting or not implies that many users believe that it lacks excitement.

*Table 9: Mean for items of the stimulation dimension of the UEQ*

| Item | Mean |
|---|---|
| demotivating/motivating | 1.429 |
| inferior/valuable | 1.116 |
| boring/exciting | 1.018 |
| not interesting/interesting | 0.920 |
| Total | 1.121 |

*Source: own work.*

Out of all the dimensions of the UEQ, novelty had the worst score in the case of Apple Music, which suggests that the application might still have some room for improvement in the area of new and innovative features. Table 10 shows that while Apple Music seems to function well, it does not stand out in terms of creativity and originality. Users rated the

application as moderately innovative (0.911) and somewhat creative (0.902), indicating that users believe that Apple Music occasionally demonstrates originality and freshness but does not consistently do so. The scores of 0.857 for conventional/inventive and 0.759 for usual/leading edge indicate that the application is perceived as relatively standard and familiar. When looking at the benchmark data, which includes UEQ results for many other products, it is seen that the novelty dimension generally scores lower than other dimensions, which is why the UEQ result for the novelty of Apple Music should not be surprising.

*Table 10: Mean for items of the novelty dimension of the UEQ*

| **Item** | **Mean** |
|---|---|
| conservative/innovative | 0.911 |
| dull/creative | 0.902 |
| conventional/inventive | 0.857 |
| usual/leading edge | 0.759 |
| Total | 0.857 |

*Source: own work.*

### 4.3 Simple Linear Regression

To gain a basic understanding of how each dimension relates to the user's overall satisfaction, I conducted 6 simple linear regression analyses. In each model, one dimension of the UEQ was used as the independent variable, while overall satisfaction served as the dependent variable. The results presented in Table 11 suggest that the majority of dimensions by themselves are positively and significantly associated with the user's overall satisfaction.

*Table 11: Results of linear regressions*

| | Coefficient | Standard Error | t Stat | P-value | R Squared |
|---|---|---|---|---|---|
| Attractiveness | 0.505 | 0.077 | 6.606 | <0.001 | 0.284 |
| Perspicuity | 0.352 | 0.078 | 4.534 | <0.001 | 0.157 |
| Efficiency | 0.466 | 0.077 | 6.032 | <0.001 | 0.313 |
| Dependability | 0.261 | 0.104 | 2.515 | 0.013 | 0.054 |
| Stimulation | 0.234 | 0.076 | 3.092 | 0.003 | 0.080 |
| Novelty | 0.046 | 0.079 | 0.574 | 0.567 | 0.003 |

*Source: own work.*

When observing the relationship between attractiveness and overall satisfaction, the coefficient of 0.505 indicates a strong positive association, meaning that for every one-unit increase in attractiveness, the user's overall satisfaction increases by 0.505. The standard error of 0.077 indicates that the estimated coefficient is relatively precise, suggesting that the relationship is measured with low variability across samples. The p-value is lower than 0.001, confirming that the association between the two variables is statistically significant, while the R-squared of 0.284 suggests that approximately 28.4% of the variance of the user's overall satisfaction can be explained by the attractiveness dimension.

A similar pattern can be observed for perspicuity, where the coefficient of 0.352 indicates a positive relationship with the user's overall satisfaction, meaning that a one-unit increase in perspicuity corresponds to an increase in overall satisfaction by 0.352. The standard error of 0.078 suggests a reliable estimate, and the p-value being lower than 0.001 confirms that the relationship is statistically significant. The R-squared value of 0.157 indicates that perspicuity explains 15.7% of the variance in the user's overall satisfaction.

Similar to attractiveness and perspicuity, efficiency shows a strong positive association with overall satisfaction. A coefficient of 0.466 suggests that a one-unit increase in efficiency is associated with a 0.466 increase in overall satisfaction. The standard error of 0.077 again indicates a precise estimate, and the p-value lower than 0.001 confirms that the relationship is statistically significant. The R-squared of 0.313 suggests that efficiency explains 31.3% of the variance in the user's overall satisfaction.

For dependability, the coefficient of 0.261 indicates a positive relationship with overall satisfaction, suggesting that a one-unit increase in dependability corresponds to an increase in overall satisfaction by 0.261. The standard error of 0.104 indicates slightly higher variability compared to the previous dimensions, but the p-value of 0.013 remains below the 0.05 threshold, confirming that the relationship is statistically significant. The R-squared value of 0.054 indicates that dependability explains 5.4% of the variance in overall satisfaction. Even though the relationship between dependability and the user's overall satisfaction seems to be statistically significant, it is important to consider that the conclusions drawn from this dimension can not be fully trusted, since they may not accurately reflect users' true perceptions, due to the low reliability of the results for the dimension.

Stimulation also demonstrates a positive and statistically significant relationship with overall satisfaction, with a coefficient of 0.234, suggesting that a one-unit increase in stimulation results in a 0.234 increase in overall satisfaction. The standard error of 0.076 indicates a relatively precise estimate, while the p-value of 0.003 confirms that the relationship between variables is statistically significant. The R-squared value of 0.080 suggests that stimulation explains 8.0% of the variance in overall satisfaction.

In contrast to other dimensions, novelty does not show a statistically significant relationship with overall satisfaction. Although the coefficient of 0.046 indicates a small positive

association, the standard error of 0.079 suggests greater uncertainty around the estimate, and the p-value of 0.567 is substantially higher than 0.05, indicating that the relationship is not statistically significant. The R-squared value of 0.003 further suggests that novelty explains only 0.3% of the variance in overall satisfaction, indicating a negligible explanatory power in this model.

Since the simple linear regression shows only the relationship between the individual UEQ dimension and the user's overall satisfaction, without accounting for other dimensions of the UEQ, multiple regression was used for the testing of hypotheses.

### 4.4 Hypothesis Testing

Before conducting the multiple regression analysis, I assessed the multicollinearity among independent variables by using the correlation matrix and VIF values. The results are presented in Tables 12 and 13.

*Table 12: Correlation matrix*

| | Attractiveness | Perspicuity | Efficiency | Stimulation | Novelty |
|---|---|---|---|---|---|
| Attractiveness | 1 | | | | |
| Perspicuity | 0.553 | 1 | | | |
| Efficiency | 0.705 | 0.574 | 1 | | |
| Stimulation | 0.636 | 0.410 | 0.534 | 1 | |
| Novelty | 0.429 | 0.204 | 0.392 | 0.747 | 1 |

*Source: own work.*

*Table 13: VIF values*

| | VIF |
|---|---|
| Attractiveness | 2.574 |
| Perspicuity | 1.645 |
| Efficiency | 2.265 |
| Stimulation | 3.218 |
| Novelty | 2.354 |

*Source: own work.*

The correlation matrix indicates that all independent variables are positively correlated and have coefficients ranging from 0.204 to 0.747. The strongest correlation can be seen between the dimensions of stimulation and novelty, with the correlation coefficient equal to 0.747, followed by the correlation between attractiveness and efficiency, with the coefficient of 0.705. Even though the relationship between UEQ dimensions suggests modest association levels, none of the correlation coefficients exceeds the commonly accepted threshold of 0.8, meaning that multicollinearity is not a serious concern based on pairwise correlations. Additionally, the VIF values range from the lowest of 1.645 for perspicuity to the highest of 3.218 for stimulation, meaning they are all below the threshold of 5, further confirming that multicollinearity among the UEQ dimensions is not problematic.

In order to test the hypotheses, a multiple regression analysis was conducted to examine the relationship between the individual dimensions of the UEQ and the user's overall satisfaction with Apple Music. The goal of the analysis is to determine if the selected user experience factors significantly predict the level of satisfaction that was reported by the users of the application. Results are presented in Tables 14 and 15. The independent variables used in the model are attractiveness, perspicuity, efficiency, stimulation and novelty, while the user's overall satisfaction serves as the dependent variable. Because the dependability dimension shows a concerning level of reliability, it was excluded from the multiple regression.

*Table 14: Regression model summary*

| | |
|---|---|
| R Squared | 0.368 |
| Adjusted R Squared | 0.338 |
| Standard Error | 0.598 |
| Observations | 112 |

*Source: own work.*

*Table 15: Regression coefficient and significance tests*

| | Coefficient | Standard Error | Standardized Coefficients | t Stat | P-value |
|---|---|---|---|---|---|
| Intercept | 2.920 | 0.165 | 0.000 | 17.668 | <0.001 |
| Attractiveness | 0.363 | 0.118 | 0.383 | 3.092 | 0.003 |
| Perspicuity | 0.049 | 0.088 | 0.055 | 0.559 | 0.578 |
| Efficiency | 0.242 | 0.109 | 0.259 | 2.232 | 0.028 |
| Stimulation | 0.083 | 0.115 | 0.100 | 0.725 | 0.470 |
| Novelty | -0.248 | 0.099 | -0.298 | -2.511 | 0.014 |

*Source: own work.*

The regression model demonstrates a moderate level of explanatory power. The R-squared value of 0.368 indicates that 36.8% of the variance in the user's overall satisfaction with Apple Music is explained by 5 dimensions of the UEQ. The adjusted R-squared value of 0.338 suggests that, after adjusting for the quantity of relevant predictors in the regression model, approximately 33.8% of the variance in the user's overall satisfaction can be explained by the 5 UEQ dimensions. This suggests that the selected variables account for a meaningful proportion of the user's overall satisfaction, although additional variables that were not included in the model may also influence users' perceptions. Based on 112 observations, the standard error of the regression model is 0.598, indicating that predicted values deviate from the observed values by about 0.598 units on average. The evaluation of each hypothesis was based on several statistical indicators, such as standard errors, unstandardized and standardised coefficients, t-statistics and p-values for each independent variable in the regression model.

H1: Attractiveness and overall satisfaction

The regression results indicate that attractiveness is positively associated with the user's overall satisfaction with Apple Music. The unstandardized coefficient for attractiveness is 0.363, which means that when holding other variables constant, a one-unit increase in attractiveness is associated with an increase in the user's overall satisfaction by 0.363 units. The standard error of 0.118 is relatively small compared to the coefficient, indicating that the estimate is reasonably precise, and the t-statistic of 3.092 and p-value of 0.003 suggest that the association between the two variables is statistically significant. The standardised coefficient of 0.383 indicates that attractiveness shows the strongest association with overall satisfaction among the 5 UEQ dimensions included in the model. Based on these results, the first hypothesis suggesting that attractiveness is positively associated with the user's overall satisfaction is supported.

H2: Perspicuity and overall satisfaction

The regression results indicate that perspicuity and the user's overall satisfaction are positively associated, but the association is not statistically significant. The unstandardized coefficient of 0.049 indicates that when holding other variables constant, a one-unit increase in perspicuity results in an increase in overall satisfaction by 0.049 units. The standard error of 0.088 is relatively large compared to the coefficient, suggesting that the estimate is relatively imprecise. The t-statistic of 0.559 and p-value of 0.578 suggest that the association between the two variables is not statistically significant. The standardised coefficient of 0.055 further indicates that perspicuity shows a very weak association with the user's overall satisfaction compared to other UEQ dimensions that were included in the model. Based on these results, the second hypothesis, suggesting that perspicuity is positively associated with the user's overall satisfaction, can not be supported.

H3: Efficiency and overall satisfaction

The regression results indicate that efficiency is positively associated with the user's overall satisfaction with Apple Music. The unstandardized coefficient for efficiency is 0.242, which means that when holding other variables constant, a one-unit increase in efficiency is associated with an increase in the user's overall satisfaction by 0.242 units. The standard error of 0.109 is moderately small relative to the coefficient, suggesting that the estimate is reasonably precise, and the t-statistic of 2.232 and p-value of 0.028 indicate that the association between the two variables is statistically significant. The standardised coefficient of 0.259 indicates that efficiency shows the third strongest association with overall satisfaction among the 5 UEQ dimensions included in the model. Based on these results, the third hypothesis suggesting that efficiency is positively associated with the user's overall satisfaction is supported.

H4: Dependability and overall satisfaction

The dependability dimension was excluded from the multiple regression analysis due to its insufficient reliability. As a result, its relationship with the user's overall satisfaction with Apple Music has not been tested within the regression model. Therefore, no conclusion can be drawn regarding this hypothesis.

H5: Stimulation and overall satisfaction

The regression results indicate that stimulation and the user's overall satisfaction are positively associated, but the association is not statistically significant. The unstandardized coefficient of 0.083 indicates that when holding other variables constant, a one-unit increase in stimulation results in an increase in overall satisfaction by 0.083 units. The standard error of 0.115 is relatively large compared to the coefficient, suggesting that the estimate has a considerable degree of variability. The t-statistic of 0.725 and p-value of 0.470 suggest that the association between the two variables is not statistically significant. The standardised coefficient of 0.100 further indicates that stimulation shows a weak association with the user's overall satisfaction compared to other UEQ dimensions that were included in the regression model. Based on these results, the fifth hypothesis, suggesting that stimulation is positively associated with the user's overall satisfaction, can not be supported.

H6: Novelty and overall satisfaction

The regression results indicate that novelty is negatively associated with the user's overall satisfaction with Apple Music. The unstandardized coefficient for novelty is -0.248, which means that when holding other variables constant, a one-unit increase in novelty is associated with a decrease in the user's overall satisfaction by 0.248 units. The standard error of 0.099 is moderately small relative to the coefficient, suggesting that the estimate is reasonably precise, and the t-statistic of -2.511 and p-value of 0.014 indicate that the association between the two variables is statistically significant. The standardised coefficient of -0.298 indicates that

novelty shows the second strongest association with overall satisfaction among the 5 UEQ dimensions included in the model. Based on these results, the sixth hypothesis, suggesting that novelty is positively associated with the user's overall satisfaction, is not supported, as the relationship is statistically significant but in the opposite direction than hypothesised.

# 5 DISCUSSION

The following chapter reflects on the results and what they mean in a broader context. It connects the findings back to theory and considers their significance.

## 5.1 Interpretation of Findings

The results from the UEQ conducted with Apple Music application users show a positive overall user experience, especially in the dimension of perspicuity, which received the highest score. The score fits well with Apple's user-centred design philosophy that specifically focuses on ease of use and intuitiveness, as well as with applications that closely follow the HIG principles. The results suggest that the users of Apple Music perceive the application as easy to learn, understandable and clear in its design and functionality, which directly aligns with HCI principles. With an excellent score of the perspicuity dimension, these results challenge the critique by Norman (2015), who suggested that Apple's focus on minimalism has come at the cost of usability. In the case of Apple Music, the evidence does not seem to support that concern. In the simple linear regression, perspicuity shows a positive association with overall satisfaction, with a coefficient of 0.352. However, when included in the multiple regression model, perspicuity appears to have a statistically insignificant relationship with overall satisfaction. This indicates that although it shows a positive association in the simple linear analysis, its unique explanatory power decreases when other UEQ dimensions are accounted for, suggesting that its variance overlaps with other independent variables.

Dependability received the second-highest score, suggesting that Apple Music users perceive the application as predictable, secure and supportive, consistently meeting their expectations. This finding directly reflects the theoretical importance of integrity, where trust in a developer's ability to handle sensitive data plays a critical role in user retention and the overall success of the application in the modern market. Users perceiving the application as predictable aligns well with the HIG principles, that emphasise giving users cues before an action is taken to help them anticipate the consequences. According to HCI theory, the predictability of the application reduces the cognitive load of interacting with a system, and positively contributes to the overall experience. However, the results for dependability should be interpreted with caution due to the low reliability of results for this dimension. In the simple linear regression, dependability shows a positive and statistically significant association with overall satisfaction, with a coefficient of 0.261. Despite this, due to the low

reliability, dependability was excluded from the multiple regression model, and therefore its relationship with overall satisfaction in that context was not assessed.

Efficiency received a score slightly lower than dependability, indicating that users find Apple Music to be functioning fast and enabling them to perform their tasks effectively with minimal effort. The users' perception of the application being fast aligns with current market trends, where performance, specifically responsiveness and low latency, is a critical factor in preventing user dissatisfaction. The results also suggest that users perceive the content inside the application to be organised and practical in its functionality, which directly relates to the concept of utility, suggesting that functional aspects and perceived usefulness of an application have a significant positive effect on the application's level of adoption. Maintaining a practical and organised interface is also in line with HIG principles, advocating for the creation of consistent and efficient systems. In the simple linear regression, efficiency is one of the most closely associated factors with overall satisfaction, with a coefficient of 0.466. In the multiple regression model, efficiency remains statistically significant, with a coefficient of 0.242, suggesting that users place a significant emphasis on the ability of the application to complete tasks in a fast and efficient way, have its content organised, and offer practical functionality.

Apple Music was rated as fairly attractive, although the score for attractiveness was not as high as for perspicuity, dependability, or efficiency. This suggests that users enjoy using the application and consider the overall design to be relatively pleasant, likable and friendly, but that there is still some room for improvement. The attractiveness dimension aligns well with a broader understanding of user experience, that suggests looking beyond usability, to also include hedonic, emotional and aesthetic elements with intention of providing users with experiences and not things. Given Apple's design philosophy specifically focusing on minimalism and sophisticated look to trigger emotional responses and attract users, a higher attractiveness score might have been expected. In the simple linear regression, attractiveness shows the strongest association with overall satisfaction, with a coefficient of 0.505. This finding is supported by the multiple regression analysis, where attractiveness also has the strongest and statistically significant association with overall satisfaction, with a coefficient of 0.363. This indicates that Apple Music users place a high value on the application being friendly, enjoyable, and visually attractive, and that these elements are strongly connected to overall satisfaction.

Stimulation shows a positive experience, but the score is significantly lower than the previously mentioned dimensions. This suggests that the Apple Music application is perceived as stimulating to use and provides a basic level of excitement, value, interest, and motivation, but that there is still considerable room for improvement. The finding relates to the holistic approach in experience design, which highlights that products should not only serve a functional purpose but also engage the sensual and emotional aspects of the user. While Apple's design philosophy aims to trigger emotional reactions, the moderate score for stimulation suggests that the application may not be delivering the level of interactivity that is

necessary to keep users emotionally invested over long periods. In the simple linear regression, stimulation has a positive association with overall satisfaction, with a coefficient of 0.234. However, in the multiple regression model, stimulation becomes statistically insignificant, indicating that its unique contribution to overall satisfaction is reduced when other UEQ dimensions are taken into account, again suggesting overlapping variance with other variables.

Novelty is the worst-rated dimension of the Apple Music application. Although, according to UEQ benchmark data, it is still interpreted as above average, it indicates that users may not find the application particularly innovative and that providing new and unique features is not one of its strengths. The score suggests that the application's functionality may not fully align with the broader market trend of integrating emerging technologies that are expected to transform user interactions. The relatively low novelty score indicates that users perceive Apple Music as a more conventional tool prioritizing established patterns over disruptive technological shifts. In the simple linear regression, novelty is not statistically significant, with a p-value of 0.567, meaning that its relationship with overall satisfaction cannot be interpreted when considered on its own. However, in the multiple regression model, novelty becomes statistically significant and shows a negative coefficient of -0.248. This suggests that users report lower satisfaction scores when the perceived novelty of the application is higher, holding other variables constant. This change in significance and direction indicates that the relationship between novelty and overall satisfaction is influenced by its correlation with other UEQ dimensions. The negative coefficient represents the residual part of novelty after controlling for other variables, which can be interpreted as a suppression effect, meaning that novelty shares variance with other positively associated dimensions, and once this shared variance is accounted for, its unique contribution appears negative. Novelty appearing to have a negative association with overall satisfaction may also be explained by the importance of consistency in HCI, where using familiar interface elements allows users to transfer skills and reduce learning time, making a standard experience more valuable than a novel one. Apple Music users may value predictability and consistency of the interface over novelty.

### 5.2 Implications and Recommendations

By providing valuable insights, this research contributes to the field of user experience, specifically to the user experience of Apple Music. The gathered data from the UEQ can be applied to further improve the design and overall user experience of Apple Music, as well as other applications with similar functionality. With the analysis of different dimensions of user experience, such as perspicuity, dependability, efficiency, attractiveness, stimulation, and novelty, conclusions can be drawn and applied to the application's current state and also provide recommendations for improvement in the future.

When creating Apple Music, Apple has been effective in designing an interface that is easy to understand, easy to learn and makes it possible for users to intuitively navigate through it. Since the design of Apple Music interface closely follows the principles of HIG, which

specifically highlight the ease of use and intuitiveness, it makes sense that the perspicuity dimension is one of the best-scoring dimensions of Apple Music. Apple should continue to keep the application's user interface easy to use and pay attention to not compromising its intuitiveness and simplicity when introducing new updates and features inside the application. Apple Music is found to be reliable, secure, and predictable and also seems to meet the users' expectations. The users seem to trust the application to consistently provide content without interruptions, which could play a significant role in long-term adoption, especially in applications that are used for streaming services, which involve continuous use. It may be important for Apple, as a developer of Apple Music, to keep investing and upgrading backend systems in order to keep the application's performance smooth, stable and responsive. It could also be beneficial for Apple to strengthen their customer support and troubleshooting mechanisms with the intention to quickly address potential issues that are associated with the application's dependability. The efficiency score may indicate that users are able to efficiently perform tasks, such as searching for songs, creating playlists, discovering new content, etc. Even though the efficiency dimension scored relatively well, it is lower than the score of perspicuity, which suggests that there is still some room for improvement. Apple and its users could benefit from optimizing and simplifying certain processes that require multiple steps in order to reduce the time needed to execute the task. The so-called intelligent features, such as voice commands, automatic playlist generation based on user preferences and personalised recommendations, could further improve the efficiency of the application. The overall impression of Apple Music, characterised by the attractiveness dimension, seems to be positive, but the score could be higher if Apple further improved the design of the interface, possibly by providing new aesthetic trends, smoother animations, and more vibrant elements. Even though it is necessary for Apple Music to align with Apple's overall minimalistic design, there could be some new elements implemented that are associated with the emotional aspect of the application, such as more customizable themes or an increased amount of visual effects while the music is playing. While Apple Music successfully serves its functional purpose, the stimulation score suggests that in comparison with previous dimensions, the application slightly lacks in providing excitement, stimulation and motivation that serve as a way to keep users engaged over a long period of time. A possible solution for increasing the stimulation of the application could be to introduce gamification elements and implement features that encourage social sharing, which might affect the users' motivation to use the application and stimulate them to discover new content. Novelty was the lowest-rated dimension of Apple Music, suggesting that users generally perceive the application as relatively standard when it comes to introducing new features and innovative elements. However, the multiple regression analysis showed a negative association between novelty and overall satisfaction, indicating that higher levels of perceived novelty may not be positively associated with the user experience. The findings suggest that users of Apple Music may value familiarity, consistency and ease of use more than frequent innovation. While the quickly evolving and highly competitive mobile application market often emphasises continuous innovation, Apple Music may benefit more

from optimizing its existing features rather than prioritising the introduction of new elements that could disrupt the user experience.

### 5.3 Research Contribution, Limitations, and Future Suggestions

This study contributes to the field of user experience of mobile applications, with a specific focus on Apple and its Apple Music application. With the usage of UEQ as the primary tool for analysis, the research provided information about how users perceive Apple Music and the overall evaluation of its design. In the study, I analysed how Apple's design philosophies translate into measurable user experience outcomes. By also implementing the measure of users' overall satisfaction with the application, the research provides a clearer understanding of which aspects of Apple Music's design are most strongly associated with the users' perception and experience of the application. It is important to note that, even though the overall study refers to customer experience in a broader sense, the empirical research focuses specifically on user experience, which represents only a part of the overall customer experience. Therefore, the findings of the empirical research should not be interpreted as an evaluation of customer experience, but rather as insights into user experience of the product, contributing to the broader customer experience framework.

Despite its contributions, there are several limitations to the study that should be taken into account. An important limitation to acknowledge is the internal consistency of the dependability dimension, where Cronbach's alpha of 0.52 suggests a very low level of reliability. The score indicates poor internal consistency among items measuring this dimension, which means that respondents' responses may have been inconsistent, potentially due to the misunderstanding of the asked questions, unclear wording, or differences in how users perceive the concept of dependability. Therefore, the results for this particular dimension should be interpreted with caution, because they may not reflect a real picture of how users perceive Apple Music's dependability. Due to the low reliability, the dependability dimension was excluded from the multiple regression. In order to diagnose and fix potential low reliability of dimensions, additional collection of qualitative data could be the appropriate method. By implementing short in-depth interviews or focus groups, the researchers could gain additional insights into how respondents interpret items within dimensions and what certain dimensions mean to them. By doing so, it would be easier to understand why results for some dimensions show low reliability, and by gaining the understanding of that, the results could be interpreted in a different way and with more precision and certainty. Another limitation of the study is the fact that the research relied on subjective measures that are vulnerable to individuals' perception biases. Factors, such as device familiarity, prior experiences, momentary mood, etc., may have influenced respondents' responses and how they rated different aspects of user experience. For example, individuals who are highly familiar with Apple's ecosystem design might rate aesthetics more favourably, due to brand association and not because of the actual interaction quality. In order to mitigate this limitation and minimise its disruption, future studies could implement additional measures, such as task performance metrics (e.g., completion time, error rate, etc.)

or eye tracking analyses, in order to capture a more objective view of the user experience. An implementation of complementary qualitative analysis, such as post-survey interviews, could help understand how users interpret different items of the questionnaire, which would provide an explanation of the reasons behind the ratings. A further limitation of the study is the absence of relevant control variables that could influence the user's overall satisfaction with the application. Factors such as the type of device used, length of Apple Music usage, subscription status, intensity of listening, and the specific ways they use the application were not taken into account in the analysis. These could result in potentially blurred interpretations of the findings, because differences in user experience ratings may reflect personal usage patterns rather than the quality of the interface design itself. Without these control variables, the explanatory power of the results is limited. Additionally, the research is focused on the users of Apple devices, who often share similar expectations and values when it comes to usability and aesthetics, which can significantly influence their experience. Design philosophies and user expectations can differ across alternative systems, which is why the results do not fully capture the principles of other devices and design philosophies, which limits the generalisability of the findings and makes the conclusions mostly applicable in the context of Apple devices and their users. Future research could include multiple design ecosystems, which would make it possible to identify universal user experience principles and research the influence of a system-specific design.

It is also worth acknowledging my personal experience and prior beliefs that could potentially influence the interpretation of results. However, my experience with Apple products is limited to approximately two years of iPhone use, while not owning any other Apple devices. However, I am satisfied with the product, and based also on my belief that Apple is one of the few companies that consistently delivers above-average experiences to its users, I anticipated that Apple Music would achieve high scores in the user experience analysis. To ensure objectivity, all analyses were conducted based on empirical data collected through the questionnaire and compared to scientifically approved theoretical frameworks of user experience. Both positive and negative perspectives on Apple's overall design were considered, and an evidence-based approach was implemented throughout the entire study.

# 6 CONCLUSION

The purpose of this master's thesis was to explore and find ways to optimize the user experience in the context of Apple applications, using Apple Music as the primary example. Although the thesis title refers to customer experience, the empirical part focuses primarily on user experience with Apple Music, measured using the UEQ. Therefore, the findings reflect only the experience of using the product itself, which is why broader conclusions related to customer experience should be interpreted with caution. The objective of the research was to identify how specific user experience dimensions relate to the user's overall

satisfaction and to find areas where design could be improved to even better meet users' wishes and expectations.

First, the foundation for the study was established by introducing the key concepts of the user-centred approach, discussing Apple's design philosophy and providing an overview of the overall application market. The concept of user-centred design emphasises designing systems around user needs and preferences, ensuring that products are intuitive, efficient and satisfying to use. Apple's way of doing business is a good example of how user-centred design can increase customer loyalty and significantly contribute to the overall success of a company. By focusing on creating seamless user experiences, Apple has built a strong reputation for making users emotionally connected, which positively affects brand trust and loyalty. Overview of the application market highlighted how these design philosophies contribute to the application industry and influence the way developers create digital products by prioritising users' needs and expectations. Companies within the application market are able to deliver digital products that not only meet functional requirements, but also significantly increase the user's overall satisfaction and improve the user experience.

The empirical part of the study was based on quantitative research using the User Experience Questionnaire, which uses six dimensions with which the user experience can be measured and quantified. These six dimensions are attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Besides the UEQ, an additional measure of the user's overall satisfaction was included in order to directly connect the perceived user experience quality and the general satisfaction with the application. The respondents of the questionnaire were users of Apple Music, which is an application designed according to Apple's design principles, which makes it a suitable example for analysing how Apple's user-centred approach is applied in practice and how it associates with the user experience and overall satisfaction.

The results show that Apple Music performs well in the dimensions of perspicuity, dependability, efficiency, and attractiveness, while the dimensions of stimulation and novelty still have room for improvement. However, the dependability dimension showed a relatively low level of internal consistency and weak reliability, which is why the results for this dimension should be interpreted with caution. The overall satisfaction scores showed that approximately 22% of Apple Music users are very satisfied with the application, about 54% are satisfied, roughly 21% are neutral, fewer than 3% of the users are dissatisfied, and none of the respondents reported being very dissatisfied. The overall satisfaction scores indicate relatively high satisfaction, meaning that the majority of respondents perceive Apple Music as a well-designed and enjoyable application. Findings of the research were then linked to theoretical and practical implications, where it was explained how Apple's design philosophy associates with different dimensions of the user experience and the overall satisfaction.

A particularly important finding of this study is the negative association between novelty and overall satisfaction in the multiple regression model. The result indicates that users may

prefer familiarity, predictability, and consistency over innovation, and it can be further explained by a suppression effect caused by the inclusion of other UEQ dimensions. This makes the finding one of the most significant insights of the research, as it indicates that increasing novelty in Apple Music does not necessarily associate with higher user satisfaction. Besides the novelty dimension having a negative coefficient, the dimensions of perspicuity and stimulation appear to be statistically insignificant, when the other UEQ dimensions are controlled for. The multiple regression model indicates that only attractiveness and efficiency have a positive and statistically significant relationship with overall satisfaction.

To conclude, the study demonstrates the relationship between design philosophy, user experience and the user's overall satisfaction, showing that Apple's design philosophy results in a positive experience for its users, even though the results reveal some opportunities for improvement. By identifying both strengths and areas for improvement, this research not only deepens the understanding of how Apple's design principles are reflected in practice, but also provides insights for future application development focused on creating more engaging, intuitive and user-centred experiences.

## KEY REFERENCES


1. Acs, Z. J., Song, A. K., Szerb, L., Audretsch, D. B., & Komlósi, É. (2021). *The evolution of the global digital platform economy: 1971–2021. Small Business Economics, 57(4), 1629–1659.* https://doi.org/10.1007/s11187-021-00561-x

2. Bergvall-Kåreborn, B., & Howcroft, D. (2013). *The Apple business model: Crowdsourcing mobile applications. Accounting Forum, 37(4), 280–289.* https://doi.org/10.1016/j.accfor.2013.06.001

3. Chammas, A., Quaresma, M., & Mont'Alvão, C. (2015). *A Closer Look on the User Centred Design. Procedia Manufacturing, 3(3), 5397–5404.* https://doi.org/10.1016/j.promfg.2015.07.656

4. Edson, J., & Beck, E. (2012). *Design like Apple : seven principles for creating insanely great products, services, and experiences.* Design Like Apple: Seven Principles For Creating Insanely Great Products ... - John Edson - Google Knjige

5. Keyser, D., Lemon, K., Klaus, P., Keiningham, T., & De Keyser, A. (2015). *"A Framework for Understanding and Managing the Customer Experience".* https://thearf-org-unified-admin.s3.amazonaws.com/MSI/2020/06/MSI_Report_15-121.pdf

6. Norman, D. (2015). *How Apple Is Giving Design A Bad Name.* https://www.brandknewmag.com/wp-content/uploads/wp-post-to-pdf-enhanced-cache/1/how-apple-is-giving-design-a-bad-name.pdf

7. Roma, P., & Ragaglia, D. (2016). *Revenue models, in-app purchase, and the app performance: Evidence from Apple's App Store and Google Play. Electronic Commerce Research and Applications, 17(1), 173–190.* https://doi.org/10.1016/j.elerap.2016.04.007

8. Schrepp, M., Hinderks, A., & Thomaschewski, J. (2014). *Applying the User Experience Questionnaire (UEQ) in Different Evaluation Scenarios. Design, User Experience, and Usability. Theories, Methods, and Tools for Designing the User Experience, 383–392.* https://doi.org/10.1007/978-3-319-07668-3_37

9. Shamaileh, O., & Sutcliffe, A. (2023). *Why people choose Apps: An evaluation of the ecology and user experience of mobile applications. International Journal of Human-Computer Studies, 170, 102965.* https://doi.org/10.1016/j.ijhcs.2022.102965

10. Wright, P., Wallace, J., & McCarthy, J. (2008). *Aesthetics and experience-centered design. ACM Transactions on Computer-Human Interaction, 15(4), 1–21.* https://doi.org/10.1145/1460355.1460360

## REFERENCES

1. Al-Maroof, R. S., Akour, I., Aljanada, R., Alfaisal, A. M., Alfaisal, R. M., Aburayya, A., & Salloum, S. A. (2021). *Acceptance determinants of 5G services. International Journal of Data and Network Science, 5(4), 613–628.* https://doi.org/10.5267/j.ijdns.2021.8.006

2. Andrews, D., Nonnecke, B., & Preece, J. (2007). *Conducting Research on the Internet: Online Survey Design, Development and Implementation Guidelines. Auspace.athabascau.ca.* https://auspace.athabascau.ca/handle/2149/1336

3. Apolinário-Hagen, J., Menzel, M., Hennemann, S., & Salewski, C. (2018). *Acceptance of Mobile Health Apps for Disease Management Among People With Multiple Sclerosis: Web-Based Survey Study. JMIR Formative Research, 2(2), e11977.* https://doi.org/10.2196/11977

4. Ashtari, N., Bunt, A., McGrenere, J., Nebeling, M., & Chilana, P. K. (2020). *Creating Augmented and Virtual Reality Applications: Current Practices, Challenges, and Opportunities. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems.* https://doi.org/10.1145/3313831.3376722

5. Azfar, A., Choo, K.-K. R., & Liu, L. (2016). *Forensic taxonomy of android productivity apps. Multimedia Tools and Applications, 76(3), 3313–3341.* https://doi.org/10.1007/s11042-016-3718-2

6. Bailey, S. K. T., Schroeder, B. L., Whitmer, D. E., & Sims, V. K. (2016). *Perceptions of Mobile Instant Messaging Apps Are Comparable to Texting for Young Adults in the United States. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 60(1), 1235–1239.* https://doi.org/10.1177/1541931213601288

7. Balapour, A., Nikkhah, H. R., & Sabherwal, R. (2020). *Mobile application security: Role of perceived privacy as the predictor of security perceptions. International Journal of Information Management, 52, 102063.* https://doi.org/10.1016/j.ijinfomgt.2019.102063

8. Beig, F. A., & Nika, F. A. (2019). *Brand Experience and Brand Equity. Vision: The Journal of Business Perspective, Sagepub.* https://doi.org/10.1177/0972262919860963

9. Brown, J., (2015). *Characteristics of sound quantitative research. Testing and Evaluation SIG Newsletter., 24-26.* https://teval.jalt.org/sites/default/files/Shiken_19-02_Complete-1.pdf#page=26

10. Byun, D.-H., Yang, H.-N., & Chung, D.-S. (2020). *Evaluation of Mobile Applications Usability of Logistics in Life Startups. Sustainability, 12(21), 9023.* https://doi.org/10.3390/su12219023

11. Cai, Q., & Chen, S. (2024). *Analysis of the Influencing Factors of Marketing Strategy on Consumer Purchasing behaviour: A Case Study of Apple. SHS Web of Conferences,* https://doi.org/10.1051/shsconf/202418803005

12. Camilleri, M. A., Troise, C., & Kozak, M. (2023). *Functionality and usability features of ubiquitous mobile technologies: the acceptance of interactive travel apps. Journal of Hospitality and Tourism Technology, 14(2), 188–207.* https://doi.org/10.1108/jhtt-12-2021-0345

13. Chen, D., & Zhang, R. (2022). *Exploring Research Trends of Emerging Technologies in Health Metaverse: A Bibliometric Analysis. Papers.ssrn.com.* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3998068

14. COTW (2017). *Apple's new initiative targets Android users to Switch to iPhone - Best Advertising Campaigns & Marketing Strategy. Campaigns of the World.* https://campaignsoftheworld.com/digital-campaigns/switch-to-iphone-by-apple/

15. Dangi, R., Lalwani, P., Choudhary, G., You, I., & Pau, G. (2021). *Study and Investigation on 5G Technology: A Systematic Review. Sensors (Basel, Switzerland), 22(1), 26. NCBI.* https://doi.org/10.3390/s22010026

16. Daniel, S. F. (2016). *Apple Watch app development. Packt Publishing, 1-31.* https://books.google.si/books?hl=sl&lr=&id=cvnJDAAAQBAJ&oi=fnd&pg=PP1&dq=developing+apple+applications&ots=cPsH8uBco3&sig=7exnY_oQ1yo6dBvZ7qW7_Rag3cA&redir_esc=y#v=onepage&q=developing%20apple%20applications&f=false

17. Dudovskiy, J. (2023). *Apple Ecosystem: closed and effective - Research-Methodology. Research-Methodology.* https://research-methodology.net/apple-ecosystem-closed-effective/

18. Esanov, B., & Dahanayake, A. (2022). *Personalized Virtual Campus Journey Adaptation to User Controlled Experience. Frontiers in Artificial Intelligence and Applications.* https://doi.org/10.3233/faia210494

19. French, D., McKillop, D., & Stewart, E. (2021). *Personal finance apps and low‐income households. Strategic Change, 30(4), 367–375.* https://doi.org/10.1002/jsc.2430

20. Gallo, C. (2012). *The Apple experience : the secrets of delivering insanely great customer service. Mcgraw-Hill.* Apresentação do PowerPoint

21. Geradin, D., & Katsifis, D. (2021). *THE ANTITRUST CASE AGAINST THE APPLE APP STORE. Journal of Competition Law & Economics, 17(3), 503–585.* https://doi.org/10.1093/joclec/nhab003

22. Golzar, J., Tajik, O., & Noor, S. (2022). *Convenience sampling. International Journal of Education and Language Studies, 1(2), 72-77.* https://www.ijels.net/article_162981_06fc448b8914d42316b8d44829c88188.pdf

23. Gordon, W. J., Landman, A., Zhang, H., & Bates, D. W. (2020). *Beyond validation: getting health apps into clinical practice. Npj Digital Medicine, 3(1).* https://doi.org/10.1038/s41746-019-0212-z

24. Griggio, C. F., McGrenere, J., & Mackay, W. E. (2019). *Customizations and Expression Breakdowns in Ecosystems of Communication Apps. Proceedings of the ACM on Human-Computer Interaction, 3(CSCW), 1–26.* https://doi.org/10.1145/3359128

25. Hamad, A., & Jia, B. (2022). *How Virtual Reality Technology Has Changed Our Lives: An Overview of the Current and Potential Applications and Limitations.*

*International Journal of Environmental Research and Public Health, 19(18).* https://doi.org/10.3390/ijerph191811278

26. Hammouri, Q., Al-Gasawneh, J. A., Abu-Shanab, E. A., Nusairat, N. M., & Akhorshaideh, H. (2021). *Determinants of the continuous use of mobile apps: The mediating role of users awareness and the moderating role of customer focus. International Journal of Data and Network Science, 5(4), 667–680.* https://doi.org/10.5267/j.ijdns.2021.7.014

27. Hamzah, N., Othman, Y. & Cheumar, M. (2023). *The Influence of Facilitating Condition and Perceived Usefulness on Intention to Use Mobile Applications in Uganda. Malaysian Journal of Social Sciences and Humanities, 8(4), e002257–e002257.* https://doi.org/10.47405/mjssh.v8i4.2257

28. Holzer, A., & Ondrus, J. (2011). *Mobile application market: A developer's perspective. Telematics and Informatics, 28(1), 22–31.* https://doi.org/10.1016/j.tele.2010.05.006

29. Hort, M., Kechagia, M., Sarro, F., & Harman, M. (2022). *A Survey of Performance Optimization for Mobile Applications. IEEE Transactions on Software Engineering, 48(8), 2879–2904.* https://doi.org/10.1109/TSE.2021.3071193

30. Huebner, J., Frey, R. M., Ammendola, C., Fleisch, E., & Ilic, A. (2018). *What People Like in Mobile Finance Apps. Proceedings of the 17th International Conference on Mobile and Ubiquitous Multimedia.* https://doi.org/10.1145/3282894.3282895

31. Hustak, T., & Krejcar, O. (2015). *Principles of Usability in Human-Computer Interaction. Lecture Notes in Electrical Engineering, 51–57.* https://doi.org/10.1007/978-3-662-47895-0_7

32. Mackenzie, S. (2024). *Human-computer interaction : an empirical research perspective, 1-3.* https://books.google.si/books?hl=en&lr=&id=f1vbEAAAQBAJ&oi=fnd&pg=PP1&dq=human+computer+interaction&ots=J2y0QRZu2z&sig=U3u91T52pioE0hFitsCnW7TXfVc&redir_esc=y#v=onepage&q=human%20computer%20interaction&f=false

33. International Organization for Standardization (2019). *Iso.org.* https://www.iso.org/obp/ui/#iso:std:iso:9241:-210:ed-1:v1:en

34. Jetter, H.-C., & Gerken, J. (2007). *A Simplified Model of User Experience for Practical Application. Kops.uni-Konstanz.de.* https://kops.uni-konstanz.de/entities/publication/53b4c2d4-77e2-4dc8-ad8c-8b654604cb40

35. Kalgotra, P., Raja, U., & Sharda, R. (2022). *Growth in the development of health and fitness mobile apps amid COVID-19 pandemic. DIGITAL HEALTH, 8(1), 205520762211290.* https://doi.org/10.1177/20552076221129070

36. Karagkiozidou, M., Ziakis, C., Vlachopoulou, M., & Kyrkoudis, T. (2019). *App Store Optimization Factors for Effective Mobile App Ranking. Strategic Innovative Marketing and Tourism, 479–486.* https://doi.org/10.1007/978-3-030-12453-3_54

37. Kataria, A., & Nandal, N. (2020). *Measuring innovation: Challenges and best practices. International Journal of Advanced Science and Technology, 29(5s), 1275–1285.* https://www.researchgate.net/publication/362519052_Measuring_Innovation_Challenges_and_Best_Practices

38. Kelly, S., Kaye, S.-A., & Oviedo-Trespalacios, O. (2022). *What Factors Contribute to Acceptance of Artificial Intelligence? A Systematic Review. Telematics and Informatics, 77(77), 101925.* https://doi.org/10.1016/j.tele.2022.101925

39. Kesler, R., Kummer, M., & Schulte, P. (2020). *Competition and Privacy in Online Markets: Evidence from the Mobile App Industry. Academy of Management Proceedings, 2020(1), 20978.* https://doi.org/10.5465/ambpp.2020.203

40. Khrais, L. T., & Alghamdi, A. M. (2021). *The Role of Mobile Application Acceptance in Shaping E-Customer Service. Future Internet,* https://doi.org/10.3390/fi13030077

41. Kollnig, K., Shuba, A., Binns, R., Van Kleek, M., & Shadbolt, N. (2022). *Are iPhones Really Better for Privacy? A Comparative Study of iOS and Android Apps. Proceedings on Privacy Enhancing Technologies, 2022(2), 6–24.* https://doi.org/10.2478/popets-2022-0033

42. Lan, B. (2021). *Analysis of Apple's marketing strategy. Proceedings of the 2021 6th International Conference on Social Sciences and Economic Development (ICSSED 2021), 543(1), 128–132.* https://www.atlantis-press.com/proceedings/icssed-21/125955105

43. Lee, H.-J., Katie, K.-H., Lee, & Choi, J. (2018). *A Structural Model for Unity of Experience: Connecting User Experience, Customer Experience, and Brand Experience, 8–34.* https://uxpajournal.org/wp-content/uploads/sites/7/pdf/JUS_Lee_Nov2018.pdf

44. Lewis, C. (2014). *Irresistible apps : motivational design patterns for apps, games, and web-based communities. Apress.* https://books.google.si/books?hl=en&lr=&id=wpiJAwAAQBAJ&oi=fnd&pg=PP3&d

q=what+makes+apps+exciting&ots=PgRGPRpqHr&sig=020JPVA-M5Knje7R6VXtpfYsPIM&redir_esc=y#v=onepage&q=what%20makes%20apps%20exciting&f=false

45. Li, W. (2024). *The Impact of Apple's Digital Design on Its Success: An Analysis of Interaction and Interface Design. Academic Journal of Sociology and Management, 2(4), 14–19.* https://doi.org/10.5281/zenodo.12738020

46. Li, X., Zhao, X., Xu, W. (Ato), & Pu, W. (2020). *Measuring ease of use of mobile applications in e-commerce retailing from the perspective of consumer online shopping behaviour patterns. Journal of Retailing and Consumer Services, 55(102093), 102093.* https://doi.org/10.1016/j.jretconser.2020.102093

47. Luisa Maria Ortiz-Escobar, Mario Andrés Chavarria, Klaus Schönenberger, Hurst, S., Michael Ashley Stein, Mugeere, A., & Minerva Rivas Velarde. (2023). *Assessing the implementation of user-centred design standards on assistive technology for persons with visual impairments: a systematic review. Frontiers in Rehabilitation Sciences,* 1-4. https://doi.org/10.3389/fresc.2023.1238158

48. Marti, P., & Bannon, L. J. (2009). *Exploring User-Centred Design in Practice: Some Caveats. Knowledge, Technology & Policy, 22(1), 7–15.* https://doi.org/10.1007/s12130-009-9062-3

49. McAran, D., & Shaw, N. (2020). *Insights from the Apple Human Interface Guidelines on Intuitive Interaction. HCI in Business, Government and Organizations, 128–140.* https://doi.org/10.1007/978-3-030-50341-3_11

50. Meskó, B., & Görög, M. (2020). *A short guide for medical professionals in the era of artificial intelligence. Npj Digital Medicine, 3(1).* https://doi.org/10.1038/s41746-020-00333-z

51. Milija Bogavac, Zivanka Miladinovic-Bogavac, & Zeljka Marcinko Trkulja. (2023). *Economic and Social Development: 96th International Scientific Conference on Economic and Social Development - "Era of Global Crises", 81-91.*

52. Molyneaux, I. (2014). *The Art of Application Performance Testing. "O'Reilly Media, Inc.", 1-10* https://books.google.si/books?hl=sl&lr=&id=187UBQAAQBAJ&oi=fnd&pg=PR3&dq=app+performance&ots=V_-VHLwrr9&sig=Lf_SQyP6XAkUkxeKTFvAOqaaGTY&redir_esc=y#v=onepage&q=app%20performance&f=false

53. Nguyen, T. T. H., Nguyen, N., Nguyen, T. B. L., Phan, T. T. H., Bui, L. P., & Moon, H. C. (2019). *Investigating Consumer Attitude and Intention Towards Online Food Purchasing in an Emerging Economy: an Extended TAM Approach. Foods, 8(11), 576.* https://doi.org/10.3390/foods8110576

54. Peters, C. (2023). *Apple and Google App Stores v. Developers. Washington University Global Studies Law Review, 22, 87.* https://heinonline.org/HOL/LandingPage?handle=hein.journals/wasglo22&div=9&id=&page=

55. Pinchot, J., & Morris, R. (2020). *USER EXPERIENCE (UX) DESIGN CONCEPTS FOR MOBILE APP DEVELOPMENT COURSES. Issues in Information Systems, 202-2011* https://doi.org/10.48009/4_iis_2020

56. Qian, R. (2024). *Decoding the Apple Inc: The Detailed Analysis of Innovation, Marketing, and Brand Image. Journal of Education, Humanities and Social Sciences, 30, 117–122.* https://doi.org/10.54097/cxytrv06

57. Ramírez-Correa, P., Rondán-Cataluña, F. J., Arenas-Gaitán, J., & Martín-Velicia, F. (2019). *Analysing the acceptation of online games in mobile devices: An application of UTAUT2. Journal of Retailing and Consumer Services, 50, 85–93.* https://doi.org/10.1016/j.jretconser.2019.04.018

58. Ruiz, P. H., Agredo-Delgado, V., & LuizA. (2021). *Human-Computer Interaction. In Communications in computer and information science. Springer Science+Business Media, 1-6.* https://doi.org/10.1007/978-3-030-92325-9

59. Sällberg, H., Wang, S., & Numminen, E. (2022). *The combinatory role of online ratings and reviews in mobile app downloads: an empirical investigation of gaming and productivity apps from their initial app store launch. Journal of Marketing Analytics.* https://doi.org/10.1057/s41270-022-00171-w

60. Sällberg, H., Wang, S., & Numminen, E. (2022). *The combinatory role of online ratings and reviews in mobile app downloads: an empirical investigation of gaming and productivity apps from their initial app store launch. Journal of Marketing Analytics.* https://doi.org/10.1057/s41270-022-00171-w

61. Sarker, I. H., Hoque, M. M., Uddin, Md. K., & Alsanoosy, T. (2020). *Mobile data science and intelligent apps: Concepts, ai-based modeling and research directions. Mobile Networks and Applications, 26(1), 285–303.* https://doi.org/10.1007/s11036-020-01650-z

62. Sauro, J., & Zarolia, P. (2017). *SUPR-Qm: A Questionnaire to Measure the Mobile App User ExperienceJ.* https://uxpajournal.org/supr-qm-measure-mobile-ux/

63. Schmitt, B. (2009). *The concept of brand experience. Journal of Brand Management, 16(7), 417–419.* https://doi.org/10.1057/bm.2009.5

64. Schrepp, M. (2020). *On the Usage of Cronbach's Alpha to Measure Reliability of UX Scales. Journal of Usability Studies, 15(4), 247–258.* https://uxpajournal.org/wp-content/uploads/sites/7/pdf/JUS_Schrepp_Aug2020.pdf

65. Scott, I. A., Scuffham, P., Gupta, D., Harch, T. M., Borchi, J., & Richards, B. (2018). *Going digital: a narrative overview of the effects, quality and utility of mobile apps in chronic disease self-management. Australian Health Review, 44(1).* https://doi.org/10.1071/ah18064

66. Seesuk, W. (2020). *Facilitating Condition, Attitude, Trust, Perceived Usefulness, and Effort Expectancy Affecting Mobile Banking Application Adoption of Consumers in Bangkok. Bu.ac.th.* http://dspace.bu.ac.th/jspui/handle/123456789/4744

67. Shmatko, O., Fedorchenko, V., & Senik, V. (2023). *The new approach for assessing the dependability of mobile applications. InterConf, 33(155), 461–469.* https://doi.org/10.51582/interconf.19-20.05.2023.040

68. Siahaan, M. (2023). *Analysis and Evaluation of the Business Innovation Strategy: a Case Study of Apple Inc. Enigma in Economics, 1(2), 42–48.* https://doi.org/10.61996/economy.v1i2.30

69. Srivastava, V., Kishore, S., & Dhingra, D. (2021). *Technology and the future of customer experience. In Crafting customer experience strategy, 91-116.* https://www.researchgate.net/profile/Vandana-Srivastava/publication/351741406_Technology_and_the_Future_of_Customer_Experience/links/6306118d5eed5e4bd1177767/Technology-and-the-Future-of-Customer-Experience.pdf

70. Tam, C., Santos, D., & Oliveira, T. (2018). *Exploring the influential factors of continuance intention to use mobile Apps: Extending the expectation confirmation model. Information Systems Frontiers, 22.* https://doi.org/10.1007/s10796-018-9864-5

71. Tang, A. K. Y. (2016). *Mobile App Monetization: App Business Models in the Digital Era. International Journal of Innovation, Management and Technology, 7(5), 224–227.* https://doi.org/10.18178/ijimt.2016.7.5.677

72. Tarp, S., & Gouws, R. (2020). *Reference Skills or Human-Centered Design: Towards a New Lexicographical Culture. Lexikos, 30(1).* https://doi.org/10.5788/30-1-1600

73. Thomas, C. G., & Jayanthila Devi, A., (2021). *A Study and Overview of the Mobile App Development Industry. International Journal of Applied Engineering and Management Letters (IJAEML), 5(1), 115-130.* http://doi.org/10.5281/zenodo.4966320

74. Villamil, S., Hernández, C., & Tarazona, G. (2020). *An overview of internet of things. Telkomnika, 18(5), 2320–2327.* https://doi.org/10.12928/TELKOMNIKA.v18i5.15911

75. Visnapuu, K. (2023). *Consistency, Efficiency, and Scalability in Design Systems: A Comparative Analysis of Material Design, Apple's Human Interface Guidelines, and IBM Design Systems.* https://www.diva-portal.org/smash/get/diva2:1802144/FULLTEXT01.pdf

76. Wade, J. (2015). *FCJ-181 There's a History for That: Apps and Mundane Software as Commodity. The Fibreculture Journal, Issue 25 2015: Apps and Affect.* https://twentyfive.fibreculturejournal.org/fcj-181-theres-a-history-for-that-apps-and-mundane-software-as-commodity/

77. Weichbroth, P. (2020). *Usability of Mobile Applications: A Systematic Literature Study. IEEE Access, 8, 55563–55577.* https://doi.org/10.1109/access.2020.2981892

78. Williams, J., & Rothenberg, L. (2022). *The Online Apparel Shopping Experience of Blind Consumers. Breaking Boundaries.* https://doi.org/10.31274/itaa.13672

79. Stocchi, L., Pourazad, N., Michaelidou, N., Tanusondjaja, A., & Harrigan, P. (2021). *Marketing research on Mobile apps: past, present and future. Journal of the Academy of Marketing Science, 50(2), 195–225.* https://doi.org/10.1007/s11747-021-00815-w

# APPENDICES

## Appendix 1: Linear regression and correlation matrix

Attractiveness and overall satisfaction with Apple Music

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.532970301 |
| R Square | 0.284057342 |
| Adjusted R Square | 0.277548772 |
| Standard Error | 0.624166949 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 17.00286091 | 17.00286091 | 43.64358976 | 0.00000000145402468 |
| Residual | 110 | 42.85428194 | 0.3895843813 | | |
| Total | 111 | 59.85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 3.084898975 | 0.1455934001 | 21.18845341 | 0 | 2.79636703 | 3.373430921 | 2.79636703 | 3.373430921 |
| X Variable 1 | 0.505446550 | 0.07650943666 | 6.606329522 | 0.000000001 | 0.3538228048 | 0.657070295 | 0.3538228048 | 0.6570702955 |

Perspicuity and overall satisfaction with Apple Music

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.396800278 |
| R Square | 0.157450461 |
| Adjusted R Square | 0.149790919 |
| Standard Error | 0.677110224 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 9.424534734 | 9.424534734 | 20.55612151 | 0.00001481455332 |
| Residual | 110 | 50.43260812 | 0.4584782557 | | |
| Total | 111 | 59.85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 3.278322743 | 0.1642690281 | 19.957035 | 0 | 2.952780086 | 3.6038654 | 2.952780086 | 3.6038654 |
| X Variable 1 | 0.351614886 | 0.07755265422 | 4.533885917 | 0.000014814 | 0.1979237292 | 0.505306044 | 0.1979237292 | 0.5053060445 |

Stimulation and overall satisfaction with Apple Music

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.282819217 |
| R Square | 0.079986709 |
| Adjusted R Square | 0.071622952 |
| Standard Error | 0.707552548 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 4.787775898 | 4.787775898 | 9.563490154 | 0.002515769554 |
| Residual | 110 | 55.06936696 | 0.5006306087 | | |
| Total | 111 | 59.85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 3.702356388 | 0.1079062494 | 34.3108616 | 0 | 3.488511529 | 3.916201246 | 3.488511529 | 3.916201246 |
| X Variable 1 | 0.233753662 | 0.07558754073 | 3.092489314 | 0.002515769 | 0.08395689797 | 0.383550425 | 0.08395689797 | 0.3835504259 |

Dependability and overall satisfaction with Apple Music

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.233163669 |
| R Square | 0.054365296 |
| Adjusted R Square | 0.045768617 |
| Standard Error | 0.717337194 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 3.254151344 | 3.254151344 | 6.323988155 | 0.01335755979 |
| Residual | 110 | 56.60299151 | 0.5145726501 | | |
| Total | 111 | 59.85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 3.49390444 | 0.198951209 | 17.56161452 | 0 | 3.099629842 | 3.888179039 | 3.099629842 | 3.888179039 |
| X Variable 1 | 0.261452618 | 0.1039674692 | 2.514754094 | 0.013357559 | 0.05541349789 | 0.467491739 | 0.05541349789 | 0.4674917396 |

Efficiency and overall satisfaction with Apple Music

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.498525333 |
| R Square | 0.248527507 |
| Adjusted R Square | 0.241695939 |
| Standard Error | 0.639467081 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 14.87614653 | 14.87614653 | 36.37927684 | 0.00000002222054816 |
| Residual | 110 | 44.98099633 | 0.4089181484 | | |
| Total | 111 | 59.85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 3.127320523 | 0.1513499846 | 20.66284004 | 0 | 2.827380378 | 3.427260668 | 2.827380378 | 3.427260668 |
| X Variable 1 | 0.465789323 | 0.07722581478 | 6.031523592 | 0.000000022 | 0.3127458851 | 0.618832762 | 0.3127458851 | 0.6188327624 |

Novelty and overall satisfaction with Apple Music

| *Regression Statistics* | |
|---|---|
| Multiple R | 0,054647769 |
| R Square | 0,002986379 |
| Adjusted R Square | -0,006077382 |
| Standard Error | 0,736566894 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 0,178756094 | 0,178756094 | 0,329485621 | 0,567134007 |
| Residual | 110 | 59,67838676 | 0,542530789 | | |
| Total | 111 | 59,85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
|---|---|---|---|---|---|---|---|---|
| Intercept | 3,925284385 | 0,09726575 | 40,35628566 | 9,10739E-68 | 3,732526499 | 4,118042271 | 3,732526499 | 4,118042271 |
| X Variable 1 | 0,045501551 | 0,079269838 | 0,574008381 | 0,567134007 | -0,111592661 | 0,202595763 | -0,111592661 | 0,202595763 |

Correlation matrix

| | *Attractiveness* | *Perspicuity* | *Efficiency* | *Dependability* | *Stimulation* | *Novelty* |
|---|---|---|---|---|---|---|
| Attractiveness | 1 | | | | | |
| Perspicuity | 0,553037073 | 1 | | | | |
| Efficiency | 0,705243092 | 0,574131595 | 1 | | | |
| Dependability | 0,460821695 | 0,549175192 | 0,47026281 | 1 | | |
| Stimulation | 0,635630495 | 0,410360242 | 0,533693382 | 0,346820693 | 1 | |
| Novelty | 0,428833604 | 0,203714276 | 0,391531886 | 0,253050268 | 0,747207095 | 1 |

## Appendix 2: Multiple regression

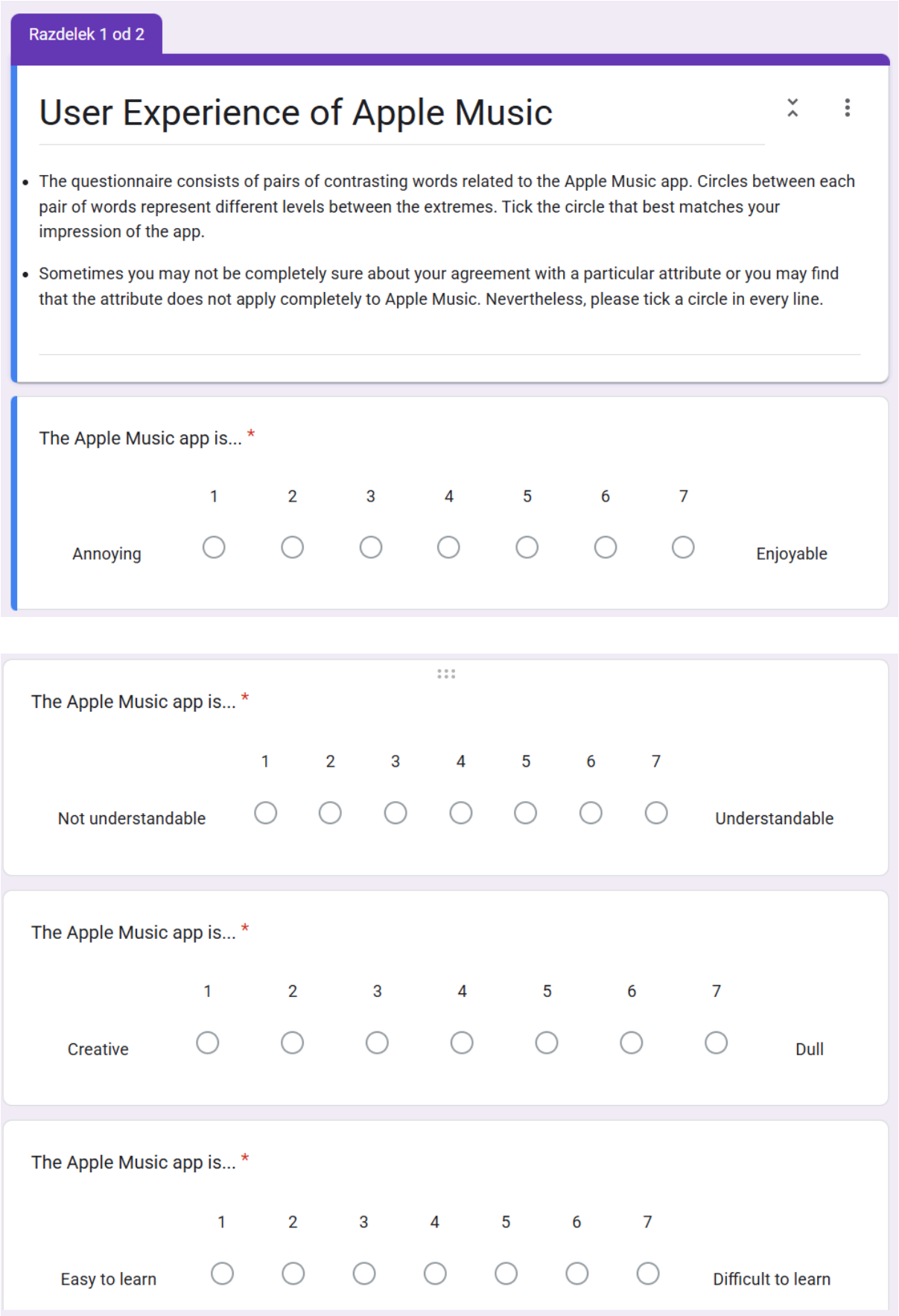
| *Regression Statistics* | |
|---|---|
| Multiple R | 0,606344689 |
| R Square | 0,367653882 |
| Adjusted R Square | 0,337826234 |
| Standard Error | 0,597561333 |
| Observations | 112 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 5 | 22,00671091 | 4,401342182 | 12,3259431 | 1,98286E-09 |
| Residual | 106 | 37,85043195 | 0,357079547 | | |
| Total | 111 | 59,85714286 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* | *VIF* | *R squared* |
|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | 2,920189803 | 0,165278807 | 17,66826521 | 2,291E-33 | 2,592508492 | 3,247871114 | 2,592508492 | 3,247871114 | | |
| Attractiveness | 0,363373501 | 0,1175181 | 3,092064118 | 0,00254048 | 0,130382437 | 0,596364565 | 0,130382437 | 0,596364565 | 2,57404 | 0,61151 |
| Perspicuity | 0,049051147 | 0,087791888 | 0,558720718 | 0,57753075 | -0,12500481 | 0,223107103 | -0,12500481 | 0,223107103 | 1,64539 | 0,39224 |
| Efficiency | 0,242386556 | 0,108604799 | 2,231821781 | 0,02773088 | 0,027066979 | 0,457706133 | 0,027066979 | 0,457706133 | 2,26488 | 0,55847 |
| Stimulation | 0,083022897 | 0,114517063 | 0,724982761 | 0,47005999 | -0,144018319 | 0,310064113 | -0,14401832 | 0,310064113 | 3,21805 | 0,68925 |
| Novelty | -0,247766269 | 0,098662313 | -2,511255435 | 0,01353931 | -0,4433739 | -0,05215864 | -0,4433739 | -0,05215864 | 2,35367 | 0,57513 |

## Appendix 3: Questionnaire



Razdelek 1 od 2

# User Experience of Apple Music

- The questionnaire consists of pairs of contrasting words related to the Apple Music app. Circles between each pair of words represent different levels between the extremes. Tick the circle that best matches your impression of the app.
- Sometimes you may not be completely sure about your agreement with a particular attribute or you may find that the attribute does not apply completely to Apple Music. Nevertheless, please tick a circle in every line.

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Annoying | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Enjoyable |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Not understandable | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Understandable |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Creative | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Dull |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Easy to learn | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Difficult to learn |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Valuable | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Inferior |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Boring | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Exciting |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Not interesting | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Interesting |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Unpredictable | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Predictable |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Fast | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Slow |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Inventive | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Conventional |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Obstructive | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Supportive |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Good | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Bad |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Complicated | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Easy |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Unlikable | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Pleasing |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Usual | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Leading edge |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Unpleasant | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Pleasant |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Secure | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Not secure |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Motivating | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Demotivating |

The Apple Music app... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Meets expectations | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Does not meet expectations |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Inefficient | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Efficient |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Clear | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Confusing |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Impractical | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Practical |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Organized | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Cluttered |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Attractive | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Unattractive |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Friendly | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Unfriendly |

The Apple Music app is... *

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|
| Conservative | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Innovative |

Po razdelku 1 Naprej na naslednji razdelek

Razdelek 2 od 2

Naslov strani (neobvezno)

Opis (neobvezno)

How often do you use Apple Music? *

- Daily
- A few times per week
- A few times per month
- Once a month or less
- Never

What is your overall satisfaction with Apple Music? *

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied

Which gender are you? *

- Male
- Female
- Prefer not to say