MODUL UNIVERSITY
PRIVATE UNIVERSITY VIENNA

THE INFLUENCE OF AR APPS ON BEHAVIOURAL INTENTIONS IN THE FASHION INDUSTRY

Master Thesis submitted in fulfilment of the Degree Master of Business Administration in Digital Marketing

Submitted to Priv.-Doz. Mag. Marion Garaus, Ph.D.

Ekaterina Mousa

61904338

Vienna, 29 May 2023

AFFIDAVIT

I hereby affirm that this master's Thesis represents my own written work and that I have used no sources and aids other than those indicated. All passages quoted from publications or paraphrased from these sources are properly cited and attributed. In particular, I did not use any text generators or other paraphrasing tools. My thesis was proofread by Mr. Peter Mousa without changing or amending the core of my work.

The thesis was not submitted in the same or in a substantially similar version, not even partially, to another examination board and was not published elsewhere.

29 May 2023	*Ekaterina Mousa*
Date	Signature

ABSTRACT

The Augmented Reality (AR) technology market is growing, especially in the fashion industry. AR technology can enrich product presentation due to its innovative and interactive qualities. Various brands such as Pull and Bear, Louis Vuitton, Farfetch, and Gucci offer customers to virtually try on shoes, accessories, and sunglasses using their branded AR smartphone apps from the convenience of their homes. As a result, AR apps have emerged as a powerful platform for promoting products and become a part of companies' marketing strategies.

A growing body of literature studies the importance of AR technology as a retail marketing tool and its influence on customers' behavioural intentions. Some of these studies examined the IKEA AR app, Ray Ban AR-enabled website, and other AR make-up apps and websites. Evidence suggests that AR technology is among the most critical factors influencing customers' behavioural intentions and decisions. While there have been empirical investigations into AR apps' influence on customers' intentions, no known studies have examined smartphone apps such as the Gucci AR app, which offers various clothing items for customers to virtually try on using AR technology.

This thesis addresses the literature gap by quantitatively exploring the Gucci AR smartphone app's influence on customers' intentions. The research tested the hypotheses that brands can enrich customers' shopping experiences by leveraging the attributes of their branded AR smartphone apps such as Gucci app. These attributes include hedonic and utilitarian values of using AR smartphone apps, virtual interactivity with the products, and ease of trying on the products, which improve customers' attitudes towards the AR smartphone apps. The study validated the assumption that AR smartphone app can improve customers' attitudes towards using it. This improved attitude leads to more favourable behavioural intentions from the customers.

ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to Professor Marion Garaus for guiding me through writing this dissertation, and for the valuable feedback, understanding, patience, support, and advice. The feedback helped me to keep going and stay motivated.

I would like to extend my sincere thanks to the Modul University staff for providing me with an opportunity to explore a topic of my interest. Special thanks to the Modul Library staff for helping me with finding all the resources I needed.

This endeavour would not have been possible without my husband, who continuously supports me and my ideas, and encourages me to achieve my dreams.

I also want to thank my grandad, who used to always praise me.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AR – Augmented reality

VR – Virtual reality

QR – Quick response code

1 INTRODUCTION

1.1 Context and previous research

> "I am excited about augmented reality because unlike virtual reality, which closes the world out, it allows individuals to be present in the world but hopefully allows an improvement on what is happening presently."

Tim Cook, Apple CEO (Independent, 2017)

Retailers face various challenges in the market, including competition, rising costs, common issues in shopping such as deliveries and returns, and customer expectations for a seamless experience (Robertson, Hamilton, & Jap, 2020). Retailers found an option for staying competitive through online shopping and promoting products via digital devices such as laptops, tablets, and smartphones. With the help of these personal electronic devices, consumers enjoy the benefits such as saving time on store trips, quickly comparing products and prices, and easily accessing offers across multiple shops (Rahman, Aminul, Humyra, Nahida, & Sujan, 2018). With the convenience of smartphones, any store is now at the fingertips of customers, contributing to the rapid growth of e-commerce businesses. According to statistics, the global online retail market was valued at $4 trillion in 2020, with 1.92 billion people shopping online. By 2023, e-commerce will grow 22% in the global retail market (Samet, 2020). Furthermore, the Covid-19 pandemic significantly impacted the market, leading the closure of physical stores and a shift to online shopping during the lockdown (Sharma & Jhamb, 2020). Many consumers were hesitant to visit crowded places, adding further pressure on retailers to find new ways to interact with customers (Naeem, 2020). In the USA, online sales significantly increased since the pandemic. Even with the reopening of physical stores, many customers continued to shop online, resulting in a 39% growth in the e-commerce sector (Davis, 2020). This pandemic has affected not only the development of e-commerce but also companies' marketing and business strategies. According to a McKinsey study, the pandemic has accelerated the adoption of digital technologies, with retailers exploring their strategic role in the business (McKinsey & Company, 2020). Marketing teams need to search for new approaches to offer products in the digital world, and new technologies are helping brands to stand out in the market.

One of the currently available digital tools is augmented reality (AR) technology, which allows brands to create engaging content that sets them apart from the competition. It is important to note that augmented reality (AR) is often confused with virtual reality (VR). VR creates a new digital environment for its users, whereas AR integrates virtual objects into the real environment. AR technology is often employed as an element of smartphone apps, where the technology creates an intermediate layer with virtual objects in physical environment. Virtual objects, digital layers, and animation are displayed on the phones' screen along with actual surroundings of the user. As AR technology combines virtual objects and physical surroundings, it allows users to interact with these virtual objects. For example, users can reach and digitally touch digital items, view them from different angles, and take pictures of themselves with these items (Farshid, Paschen, Eriksson, & Kietzmann, 2018).

Many brands have realised the enormous potential of AR technology and are using it in their marketing campaigns to increase brand visibility and revenue (Berman & Pollack, 2021). This new promotion strategy brought the term AR marketing. AR marketing is setting a new trend for brands to communicate with their audience through smartphone apps using interactive content. AR technology made it possible to visualise many types of digital content, thus prominently provide information about a product's size, shape, and other product characteristics to the customers (Vilkina & Klimovets, 2019). According to a study, products advertised using augmented and virtual reality technologies have a 94% higher conversion. Moreover, 90% of Americans have already used or are considering using AR for shopping, and 43% of people who shop on their phones expect to be able to try out beauty products before buying (Viera, 2020). Statista (2020) remarks that 1.7 billion people tried AR technology in 2020, and this number should grow to 2.4 billion by the end of 2023. Therefore, it is becoming crucial for marketers to study the influence of AR technology as a marketing tool to stay competitive.

Researchers and business focused on how AR technology can influence the market and the customers' shopping experiences. Studies has established that implementation of AR technology revolutions the experience of smartphone shopping as it provides the product's three-dimensional visibility, interactivity, the effect of presence, and the feeling that the product is already in their hands, affecting customers' attitudes and behavioural intentions (Poretski, Lanir, & Nov, 2021). It is now established from a variety of studies that the interactivity of AR technology encourages users to interact with a product or business, creating a pattern that supports positive action and drives positive emotions, attitudes and behavioural intentions (Cowan & Ketron, 2019; Minjung & Yoo, 2020; Yussof, Salleh, & Ahmad, 2019).

1.2 Research aim and objectives

This study aims to enhance the current knowledge of how AR technology can influence customers' behavioural intentions and close a gap in the existing literature review. This paper will analyse the existing knowledge of AR technology to evaluate its influence on customers' behavioural intentions. Particularly, this research explores customers' behavioural intentions employing the AR smartphone app from Gucci with an option to virtually try on the brands' garments. This approach will close the gap of understanding how smartphone apps with extended variety of items such as the Gucci app can influence customers' behavioural intentions to continue using such apps. Hence, the study's research question is: "What is the influence of augmented reality apps on behavioural intentions in the fashion industry?" The objectives of the research are as follows:

- To define the marketing tool – AR smartphone apps.
- To understand customers' perceptions when using AR smartphone apps.
- To investigate the correlation between the customers' attitudes towards AR smartphone apps and behaviours towards these apps.
- To evaluate the importance of AR smartphone apps as a marketing tool in the fashion industry.

The theoretical contribution of the research is to review recent studies about AR technology. The paper seeks to understand customers' perceptions and intentions towards using AR technology as a shopping tool. Also, the study will evaluate which elements of AR technology can impact customers' behavioural intentions. The practical contribution of the research includes developing practical recommendations for the marketing field. The study will provide insights into the successful employment of AR technology as a marketing tool for brands willing to use this technology to promote their products and services. Moreover, the research should facilitate further studies which examine the relationship between AR technology as a marketing tool. The research consists of five parts. The first part is Chapter 1, which provides the research introduction, and outlines the research importance, as well as its aim and objectives. Chapter 2 reviews the existing literature, which investigates the current knowledge about the topic. Chapter 3 discusses the methodology of data collection and analysis. Chapter 4 reports critical findings, results interpretations, and a discussion of the Gucci smartphone app effect on customers behavioural intentions. Chapter 5 reports the conclusions and makes recommendations for future research.

2 LITERATURE REVIEW

2.1 Definition of AR technology

Augmented Reality (AR) means combining people's physical surroundings and virtual objects (Poretski, Arazy, Lanir, Shahar, & Nov, 2019). AR technology is usually found in devices such as smartphones, laptops, and tablets which generate these virtual objects. Unlike the traditional technology in computers and smartphones that only displays digital objects on their screens as a part of the digital environment of the screen, AR technology allows users to combine these digital objects with actual environment (Chen, Wang, Chen, & Song, 2019). AR technology utilises optical tracking of a user's sight through a digital device such as a phone camera and creates layers of digital objects in the user's physical surroundings. It allows users to observe three-dimensional digital objects along with their physical surroundings, enhancing the environmental perception of a person's senses, such as visual, auditory, and haptic (Hancock, Kaplan, Cruit, & Endsley, 2020). Thus, AR technology creates an immersive interactive experience, and augmenting, or leveraging, the user's physical reality (Smink, Reijmersdal, & Noort, 2022).

AR technology is commonly mistaken with virtual reality technology – VR (Mana, Paschena, Eriksson, & Kietzmannc, 2018). It is essential to highlight that these are two different technologies, as shown in Figure 1 that illustrates the differences. Virtual reality primarily uses a full headset to create a comprehensive, immersive three-dimensional experience for its users. The users of VR can interact with digital objects in this entirely new virtual environment and observe how this virtual reality responds to these interactions instantaneously (Blanco-Novoa, Oscar, Vilar-Montesinos, & Fernandez-Carames, 2020). VR technology consists of digitally simulated objects in a virtual environment generated by a computer (Regt, Plangger, & Barnes, 2021). On the other hand, AR technology does not produce computerised surroundings for its users. AR technology overlays digital images onto the users' vision of the real physical surroundings, often through a smartphone. Therefore, AR technology visually combines two independent realities – the world of a physical environment and virtual objects created on a computer. Contrary, virtual reality entails virtual environment and virtual objects only (Bellalouna, 2021; Smink, Reijmersdal, & Noort, 2022).

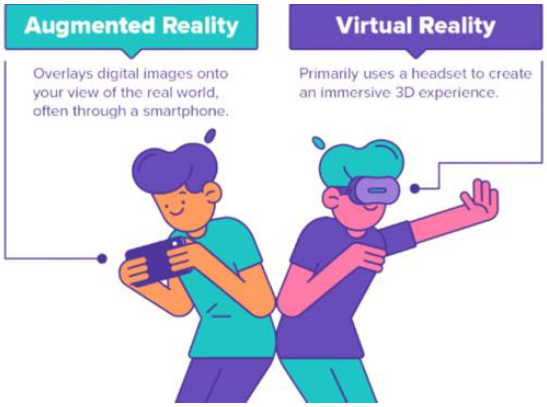

FIGURE 1: DIFFERENCES BETWEEN AR AND VR (KARNES, 2018)

2.2 Development of AR technology

2.2.1 Early development of AR technology

Over the past few decades, the AR technology market has rapidly developed. The technology became widely known when Niantic, an American start-up of Google Corporation, launched the Pokémon Go app. The technology has also got recognisable with social media face filters spread like Snapchat and Instagram, allowing to try digital dogs' and cats' ears using a frontal camera. However, AR technology is not limited to games, and AR technology is a recognisable and valuable instrument in different industries. The technology's implementation scope is extensive – from the entertainment industry to the education, military, aviation, and healthcare industries (Lerache, Mangiarua, Becerra, & Igarza, 2018).

The technology's origins date back to the 1960s. At that time, cinematographer Morton Heilig patented an immersive multisensory screening machine called Sensorama, as shown in Figure 2. This device was large and bulky and looked like the arcade game machines from the 1980s. Heilig used his cinematographic experience to enhance visual, auditory, and haptic stimuli for the machine users. The Sensorama users could virtually ride a motorcycle through the city of Brooklyn with a feeling of vibration and wind and even feel the smell of streets. However, as investors did not show interest in Sensorama due to the high costs of the equipment, further development of the device had to be revoked (Pope, 2018). Although Heilig's bulky machine was not a modern AR technology, Sensorama was the introductory device that allowed users to immerse themselves in augmented reality for the first time in history, leading to the commencement of a new era of immersive virtual and AR experiences (Sunger & Serkan, 2019).

FIGURE 2: SENSORAMA MACHINE AND A VIRTUAL VIEW FROM THE MACHINE (BASSO, 2017)

Another significant milestone in AR technology development belongs to Harvard professor Ivan Sutherland and his student, Bob Sproull. In 1968 they designed the first documented digital head-mounted helmet that could create an experience like modern AR technology. Once a user wore the head-mounted device, the technology projected a transparent virtual image of a cube layered on the user's sight of the physical surroundings. As the observer moved the head, the cube would move along in the surroundings aligned with the viewer's head movements, as shown in Figure 3. This device also augmented the users' reality with virtual objects. Based on this innovation, Sutherland was named the founder of computer graphics due to introducing

this new technology field (Sunger & Serkan, 2019). Although Sutherland and Sproull did not use the terminology AR in their technology innovation, they were the early discoverers and founders of the new technology that augmented the physical environment and offered a unique immersive experience to its users (Crofton, Botinestean, Fenelon, & Gallagher, 2019).

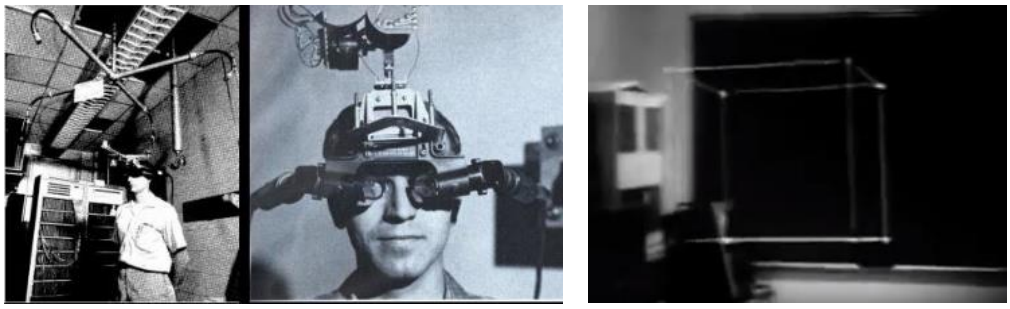

FIGURE 3: SPROUL'S HEAD-MOUNTED DISPLAY TO PROJECT VIRTUAL IMAGES (BASU, 2019)

In 1974 a further historic step was taken in AR development when computer specialist Myron Krueger established a laboratory called Videoplace (Akdag & Baydogan, 2018). The laboratory consisted of several rooms connected by a network, each with a large digital screen and a video projector. When a person entered a room, they could see their appearance as a primitive silhouette on the screen, along with the pre-recorded onscreen objects like skyscrapers, as shown in Figure 4. The laboratory's computer program allowed the viewers to witness their reflection presence on the screen and interact with onscreen objects and their unique silhouettes on these screens. Furthermore, it also facilitated interaction with other people's shapes on the screen who was in the same Videoplace environment. Krueger later renamed his experimental laboratory as artificial reality development work, and this laboratory was the prime workshop that developed an accurate human-machine interaction as an immersive experience (Pope, 2018).

FIGURE 4: VIDEOPLACE LABORATORY TO REPLICATE MOVEMENTS OF A PERSON (MAINSBRIDGE, 2016)

The ideas and inventions of Krueger, Sutherland, and Heilig could inspire the scientist Thomas Caudell to create his industrial version of AR technology in 1990. While working for Boeing Computer Services Lab in Seattle, Caudell developed software and a headset which displayed the position of wires and cables of an aeroplane for construction projects of Boeing's company. This system enabled Boeing's workers to assemble aircraft wires and cables conveniently and precisely, as shown in Figure 5. The digital head-mounted display with the AR software would blend virtual graphics of the computer-generated manufacturing process diagram with the

mechanics' physical reality to support the Boing airplanes assembly. Thomas Caudell used the term AR technology for the first time in history to describe the process of changing reality by conveying virtual objects in it (Sunger & Serkan, 2019).

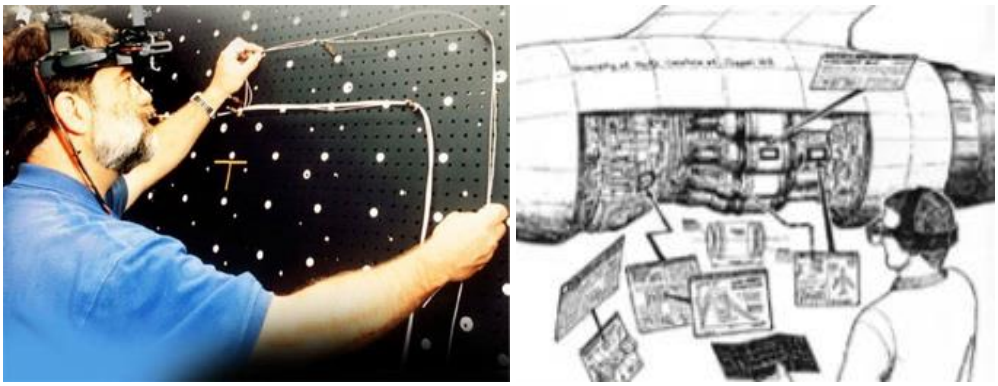

FIGURE 5: HEADSET FOR BOEING CO. TO VIRTUALLY DISPLAY FIXTURES OF AN AIRPLANE (RIVES, 2018)

In the following years, laboratories, universities, and national agencies continued working on developing AR technology. In 1992, the US Air Force Research Laboratory constructed the first immersive AR system called Virtual Fixture. Fixture refers to a physical fixture, such as a ruler, that allows a human to draw precisely straight lines (Ivanov, Pavlenko, Liaposhchenko, Gusak, & Pavlenko, 2021). Similarly, the Virtual Fixture system utilised AR technology to precisely track users' movements for accurate aiming when shootings targets (Rosenberg L. B., 2021). Virtual Fixture instrument included a user-manipulated robot with human-like arms and a full upper-body exoskeleton with pair of binocular magnifiers for the human user, as shown in Figure 6. The magnifiers would bring the view of the robot's arm closer to the users, allowing them to see the robot's arms instead of the users' physical arms. So once the user gets equipped with the exoskeleton set, they can see the robot's hands as their hands in the surroundings allowing accurate aiming. The Virtual Fixtures system was also used in the surgical environment to improve human performance in direct and remotely manipulated surgeries. The technology allowed surgeons and doctors to precisely use their medical instruments (Dinizo & Raman, 2022).

FIGURE 6: VIRTUAL FIXTURE BY US AIR FORCE RESEARCH LABORATORY (MA, ABDULLAH, HASLIZAM, & IDRIS, 2019)

At about the same time, in 1992, Steven Feiner, Blair MacIntyre, and Doree Seligmann presented the KARMA device, which stood for Knowledge-based AR for Maintenance Assistance, as shown in Figure 7. The team presented KARMA as an AR assistant at the Graphics Interface Conference. The device consisted of a clear head-mounted display that places virtual images of a laser printer's parts in a user's surroundings. The system monitored the user's head position and orientation, allowing them to accurately place the virtual images in their surroundings, thus augmenting reality. The focus of the KARMA device development was to demonstrate the ability of AR technology to assist in operating, supporting, or repairing a tool or equipment without a user manual book or instructions (Federico, Pizzigalli, & Sanna, 2019). The scientists also wanted to demonstrate that AR technology could be beneficial when a person view of a targeted object is constrained. These scientists considered that AR technology should not replace the physical surroundings but rather supplement the environment with valuable tools (Simran, Sinha, & Singh, 2022).

FIGURE 7: KARMA GLASSES TO CREATE IMAGES OF VIRTUAL OBJECTS (FEINER, MACINTYRE, & SELIGMANN, 1993)

Even though the devices mentioned above might not have had the typical characteristics of AR technology as it is comprehended nowadays, they were the earliest projects and prototypes of modern AR technology. As these gadgets produced meaningful progress milestones in AR development in laboratories, scientists shifted the focus of using the advantages of AR employment to other fields. In 1999 the Japanese professor Hirokazu Kato achieved another milestone in the AR development when he and his team released a unique sample of software called AR ToolKit at the Nara Institute of Science and Technology. The software made it possible to track video capture of a user's actions in the surroundings and combine it with virtual objects. The software could connect to a simple hand-held device or goggles with a camera and an internet connection. The development of the AR ToolKit enabled users to operate portable devices and personally experience AR in their hands (Jomsri, 2018). Some of the proposed technology usage included face-to-face AR collaboration, see-through observations, remote AR conferencing, and enhancing the users' physical environment field (Aggarwal & Singhal, 2019), as shown in Figure 8**Error! Reference source not found.**. Since its initial release of AR ToolKit, Professor Kato developed an open-source software library for creating AR apps on platforms such as Microsoft Windows, Mac OS X, Linux, iOS, and Android. AR Toolkit is now widely used augmented software and is available to everyone interested in the technology. Anyone can

download and run the software without a technical background (Terzopoulos, Kazanidis, Satratzemi, & Tsinakos, 2020).

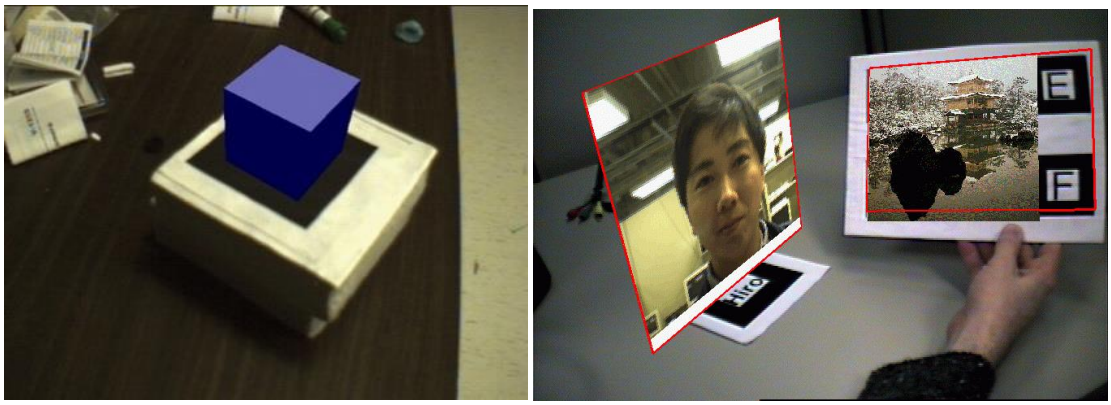

FIGURE 8: AR TOOLKIT TO CREATE: LEFT – SIMPLE VIRTUAL BLOCK ALIGNED WITH A PHYSICAL OBJECT; RIGHT – REMOTE CONFERENCING OPTION (KATO, BILLINGHURST, BLANDING, & MAY, 1999)

In its due course, AR technology advanced from bulky devices in universities and laboratories to portable personal computers. Subsequently, AR technology evolved in commercial industries such as healthcare, education, tourism, sightseeing, entertainment, and retail. In the case of the healthcare industry, AR technology is widely adopted in surgeries and catheterised interventions (Fida, Fabrizio, Franco, Ferrari, & Ferrari, 2018). Another example is the educational industry, where students learn how mechanisms work using virtual objects created by AR technology. Tourists can utilise AR to learn about landmarks and art pieces by simply pointing their phones at the objects of art (Elmqaddem, 2019). Other known scopes of AR technology implementation include archaeology, architecture, remote collaborations, flight training, industrial manufacturing, and navigation (Chiang, Shang, & Qiao., 2022; Bottani & Vignali, 2019; Bruno, et al., 2019; Noghabaei, Heydarian, Balali, & Han, 2020; Sung, Kim, & Lee, 2019). AR technology has received the peak attention of the general public in the entertainment field, such as immersive three-dimensional and five-dimensional cinemas (Rosenberg, 2021), as shown in Figure 9. As a result of the new immersive technologies, people could immerse themselves and experience the world of the movies from the other side of the screen, transforming the reality of the spectators. The three-dimensional immersive cinema technology combines the picture on the screen and the image seen through glasses to enhance the flat visuals to a three-dimensional view. In five-dimensional cinema, the effect of the presence of the viewer is formed not only due to the three-dimensional image but also due to other special dynamic, sensual effects. The dynamic effects included wind, water splashes, smoke and snow generators, various lights, touch and tingle simulators, lasers, and scent injectors (Garcia-Pereira, Vera, Aixendri, Portales, & Casas, 2020).

FIGURE 9: GOGGLES WITH AR TECHNOLOGY EMPLOYED IN CINEMAS (ROGERS, 2019)

Videogame producers also adopted AR technology as a part of the game visuals for their players. In 2000, Bruce Thomas from the University of South Australia Wearable Computer Lab developed the first game with AR technology, ARQuake, as shown in Figure 10. The game users wore a vesture set with digital goggles on their heads, allowing them to observe virtual objects in their surroundings, even when players were making movements. ARQuake was presented at the International Mobile Computing Symposium and had robust feedback from the public who was interested in experiencing the technology (Yao, Zheng, Wang, & Jiang, 2021).

FIGURE 10: ARQUAKE: OUTDOOR AR GAMING SYSTEM (PIEKARSKI & THOMAS, 2002)

Another AR solution soon appeared on iPhone smartphones and was launched as a navigation and worldview app called Wikitude Worldview, shown in Figure 11. The app allows one to look around using the smartphone camera with an AR option and get information about the surrounding objects (Yoo & Brownlee, 2020). Since then, the development of AR technology on smartphones has been growing quickly. In 2009, SPRXmobile launched the app Layar, an advanced variant of Wikitude that assisted users in locating nearby local services such as transportation stops, shops, and nature and cultural guides (Garcia, Lengua, & Acosta, 2020). Between 2010 and 2015, scientists and corporations presented the latest tracking and mapping software like QUALCOMM and ISMAR, which guided further advancement of AR technology (Arth, Gruber, Langlotz, Mulloni, & Wagner, 2015).

FIGURE 11: WIKITUDE WORLDVIEW: AR SMARTPHONE APP FOR PERSONAL USE (MUHANNA, 2015)

2.2.1 Modern development of AR technology

The following significant contribution to AR technology development belong to the giant technology organisations such as Google LLC, Apple Inc., and Microsoft Co. who became interested in AR technology, heavily investing in the future of it to make the technology more efficient and accessible to billions of users (Elmqaddem, 2019). The companies offered headsets and smartphone apps which can position and constantly update digital content in users' physical environment. These technologies facilitated viewing three-dimensional models of streets, art, and other visual elements in the physical surroundings of a user (Google LLC, 2022; Apple Inc., 2022; Microsoft Corporation, 2022).

Microsoft Corporation contributed to AR technology development when in 2016, the company combined virtual and augmented environments for users, creating the Microsoft HoloLens headset. The headset from Microsoft Corporation has advanced features, as the HoloLens could track the slightest movements of the user's head. The Microsoft device used a conventional gyroscope and accelerometer to supplement gesture control. HoloLens is a versatile device for visualising digital data on a computer display or complex three-dimensional graphics with animation. The headset was then improved to Microsoft HoloLens 2 and sold to the retail market (Park, Bokijonov, & Choi, 2021). In 2018, Microsoft Corporation won a tender to supply the US Army with 120,000 Microsoft HoloLens sets (Figure 12), and at the same time, the company also announced that it would stop working on the project Microsoft HoloLens (Kallberg, Mitsuoka, Pittman, Boyce, & Todd, 2022). Another significant input in the AR technology development is the Microsoft 365 Guides technology that is available on Android and iOS as a part of Microsoft's cloud-based business. The smartphone app uses AR technology to virtually place a product in a room for a user to demonstrate the features and size of an item, which is particularly valuable for bulky in their dimension products (Figure 12). Besides, Microsoft 365 Guides can facilitate employee product training, standardise processes, and accelerate employee learning with interactive, immersive AR technology (Microsoft Corporation, 2022). In 2021, Microsoft Corporation presented a new technology called MESH that allows users to observe other people's virtual holograms digitally placed in their physical surroundings. Users can connect to the virtual space using various devices, as the platform supports most VR headsets, tablets, smartphones, and PCs. MESH also works with Microsoft's HoloLens 2 mixed reality headset. The system is like a call on Microsoft Teams, and a user appears right in front of another person allowing them to see each other and communicate in one's physical environment. The platform allows meetings, product demonstration, and screening, and provides a collaborative experience. Microsoft Corporation expects MESH to be in demand among architects, engineers,

designers, and all other professionals who especially need to work together in the same room. For example, a speaker can conduct a speech in front of an audience of listeners on a different continent (Figure 12). The company plans to bring MESH to its Teams and Dynamics 365 products (Microsoft Corporation, 2022).

FIGURE 12: LEFT – MICROSOFT ARMY HOLOLENS; MIDDLE – MICROSOFT 365; RIGHT – MESH SYSTEM (PARK, BOKIJONOV, & CHOI, 2021; MICROSOFT CORPORATION, 2022; MICROSOFT CORPORATION, 2022)

The initial AR project introduced by Google LLC was their smart glasses – Google Glasses. The Google Glasses were introduced relatively recently – in 2012. After the presentation, the company released prototypes of the device for developers, and the product testing process began. Google Glasses became available to the public in May 2014. Despite the innovativeness, after a few years, it became clear that the Google glasses project had not succeeded, and the company stopped selling the device. One of the primary reasons was the data privacy issues as, according to Google's terms of use and privacy policy, the sounds, and images that the Google glasses records are not the property of the person wearing the glasses (Kudina & Verbeek, 2019). Moreover, the price positioning of the device was on the high end for a personal device (Zuraikat, 2020). Nevertheless, Google LLC continued to work in AR technology. In 2014, Google LLC announced Project Tango for smartphones. Project Tango is an AR technology computing platform for the Android system. The platform enabled devices to learn about space and movement tracking, area learning and depth perception of the surroundings. Google LLC delivered two models of smartphones with their preinstalled AR platform and sold these devices to software companies and enthusiasts so they could use this information to create their personal AR apps. However, the 2017 Project Tango got cancelled, and their next project was a brand-new AR project called ARCore, an advanced version of Project Tango (Voinea, Girbacia, Postelnicu, & Marto, 2018). ARCore allows users to create AR technology experiences in smartphone apps. It is available to everyone willing to try their digital skills and utilise the software for any device (Google LLC, 2022). Google LLC continues to work on their technological advancement in AR technology. The most recent innovations include Google Browser, Google Maps and Google Arts & Culture, with enabled AR experience, as shown in Figure 13. Google Maps lets users see digital directions on the surroundings that are layered through the camera. Google Browser allows to search for images via browser and then places these virtual images as 3-dimensional objects in the users' surroundings. Google Art & Culture works similarly where AR technology allows digital layer of description of art objects over the image seen through a smartphone's camera (Google LLC, 2022).

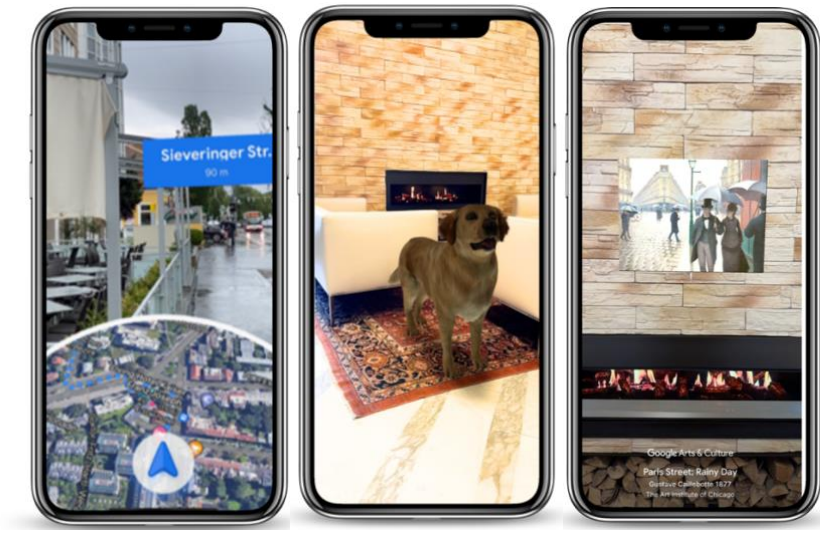

FIGURE 13: LEFT – GOOGLE MAPS; MIDDLE – GOOGLE SEARCH; RIGHT – GOOGLE ART AND CULTURE APP (MOUSA, 2023)

Apple Inc. has also significantly contributed to the development of AR technology. In 2017 Apple Inc. presented a software platform called ARKit for developing AR apps for Apple devices such as iPhones and iPads. The ARKit tool got its name following its primary technical function of providing a set of tools, also called a kit, to app developers. The developers could use ARkit to create unique apps with AR technology features. Whether a developer builds an app for entertainment or practical purposes, the final smartphone app with AR technology has the same settings. First, the device's cameras receive a visual image. Secondly, the camera's sensors read information about environmental changes. And then the phone system coordinates received data with the commands given by the app to create digital objects in physical surroundings. iPhones and iPads have a set of AR mechanisms managing the software to independently detect horizontal and vertical surfaces, identify light and shadow sources, distinguish between voices and faces, and much more. These functions allowed developers to create AR smartphone apps without spending much time and effort but independently teaching an iOS device to analyse the world around them (Devagiri, Niyaz, Yang, & Smith, 2022).

Apple Inc. also launched its own apps to showcase the possibilities of its unique toolkit. Some apps included collecting information about the physical surroundings, launching navigation, measuring distances and other units, three-dimensional drawing, modelling, simulating driving, flights, and other hand-managed processes, and entertainment and gaming apps utilising interaction with the physical environment. For example, Apple Inc. created an app called Measure, shown in Figure 14, which recognises the dimensions of any objects and considers lighting conditions to measure objects in front of a user as precisely as possible (Apple Inc., 2022). Another example is Apple Inc's app called Clips, shown in Figure 14, which enables users to enhance their users' physical environment with interactive, immersive experiences. For example, Clips can be an entertaining smartphone app that allows users to have confetti in the room, set up a virtual dance floor, or decorate the user's space in the camera with digital stars (Apple Inc., 2021). Apple Inc also launched [AR]TWalks tours organised with the New Museum of Contemporary Art. Participants of the tours get acquainted with the artworks of world-famous artists displayed as AR objects over city buildings, as shown in Figure 14. These unique tours are available in San Francisco, New York, London, Paris, Hong Kong, and Tokyo. Apple Inc.

is also working on an AR headset set and AR glasses estimated to be launched in 2023 (Bajarin, 2022). The company stated that iOS-compatible technology could become the main-stream AR platform in the world, given the customers' interest in other companies' products (Apple Inc., 2019).

FIGURE 14: LEFT – APPLE MEASURE; MIDDLE – APPLE CLIPS; RIGHT – APPLE (AR)TWALKS (APPLE INC., 2019)

One of the most famous app with AR technology was the Pokémon Go game was released by the Niantic company in collaboration with Nintendo company and launched in 2016 (Sunger & Serkan, 2019), as shown in Figure 15. The Pokémon Go game allows users to travel between the human world and the virtual Pokémon universe using iPhone and Android devices. A smartphone camera lets a player see a Pokémon character through the screen and try to catch it. When encountering a Pokémon, a player would aim using a smartphone's touch screen and throw a Poké Ball at a Pokémon character to catch it (Niantic, 2022). In 2019, the game had approximately 5 million active players who were looking for, capturing, and training virtual Pokémon creatures (Caci, Scrima, Tabacchi, & Cardaci, 2019). Although the app did not promote its own products, it allowed marketers of other companies use the game as a multi-channel marketing strategy for their product promotion. The most innovative companies quickly realised that people could be redirected from the streets directly to their stores by using the game's power. For example, the Huge Café in Atlanta found out that the game quickly drains the battery of the smartphone, and therefore began to offer players their recharging stations in their café and try their buns in order to increase the traffic (Al-Bahrani, Mahon, Mateer, & Murphy, 2018). Domino's Pizza has been posting content on their social media about what Pokémon can be caught at their establishments, which helped the brand to increase visitors to their stores (Chitra, 2021).

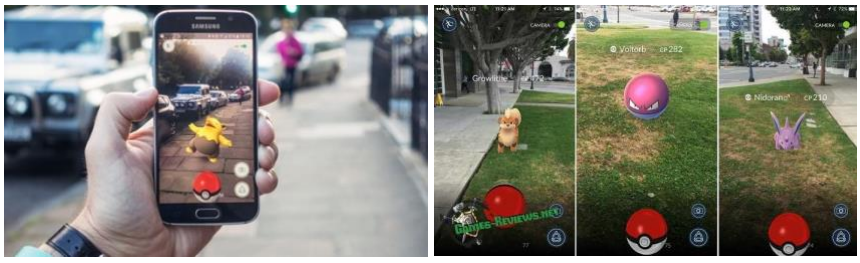

FIGURE 15: AR GAME POKÉMON GO (MALIK, 2016)

Moreover, in 2016 a research company called YouGov Reports worked on profiling a typical Pokémon Go player in the UK. As shown in Figure 16, the company established that Pokémon

Go players are regular customers of particular brands and have specific qualities that brands' marketing teams can use to make new promotional offers (YouGov Reports, 2016). While Pokémon GO's hyper-marketing activity may seem gone, it has proven to be a successful introduction to AR technology in marketing. The game enabled marketers of different companies to increase engagement, use local advertising for stores in the area, and drive traffic to local businesses by becoming a sponsored location of the game (Dunham, Xu, Papangelis, & Schwartz, 2022).

FIGURE 16: A CUSTOMER PROFILE OF A TYPICAL PLAYER OF POKÉMON GO (YOUGOV REPORTS, 2016)

2.3 AR technology as marketing tool in the fashion and retail industry

With time, the technology implementation area has shifted from research centres and large corporate offices to other industries, such as retail. As AR technology became widespread and available for more software developers, including high-tech giants like Apple Inc., Google LLC, and Microsoft Corporation, the technology created more opportunities for technological implementation outside of laboratories and scientific centres in other fields (Riethorst, Smink, & Ketelaar, 2020). As mentioned earlier, AR technology has already shown significant value by easing and improving user tasks and offering new opportunities to get their jobs done. For example, users could utilise the technology in an AR smartphone app Google Maps to navigate the area. Also, companies could make remote digital presentations of products for learning purposes using the AR smartphone app Microsoft 365 Guides. Apple users can accurately measure an object size using an AR smartphone app from Apple Inc. Other businesses are also joining the development of AR technology in their marketing strategy, with a wide range of brands from food, tourism, automobiles, furniture, and fashion industries (Alves & Reis, 2022; Boardman, Henninger, & Zhu, 2019; Jingen & Elliot, 2021). AR technology has allowed brands to offer digital visual access to products and showcase characteristics such as size, shape, and fitting. Marketers are making AR technology high-in-demand marketing omnichannel to communicate with customers and advertise products (Hilken, et al., 2019). Retail companies in the commercial sector use AR technology to get closer to the consumer by creating interactive content (Ozturkcan, 2021). The potential of using AR content lies in actively immersing customers in interacting with a virtual product in their physical surroundings (Chiang, Huang, & Chung, 2021).

The academic literature on AR technology has revealed several advantages for companies using this innovative technology in their marketing strategies. Firstly, integrating this technology in retail marketing can assist brands in creating a novel and remarkable experience for customers, as AR is a relatively new phenomenon for most consumers (Jung & Dieck, 2018; Plotkina, Dinsmore, & Racat, 2021). AR technology benefits brands by reaching customers' attention and bringing them excitement, positively affecting brand awareness, deepening relationships with buyers, and improving service perception by offering convenience (Hinsch, Felix, & Rauschnabel, 2020). Previous studies have reported that AR technology allows brands to stand out from competitors and increase competitive advantage as it has a differentiating marketing element of a new way of digital interaction with products (Grzegorczyk, Sliwinski, & Kaczmarek, 2019; Klimovets & Vilkina, 2019). AR technology can be an advantage for brands as it increases the number of potential customers via word-of-mouth. An AR technology user can share the novel experience with friends, for example, through social media networks, or verbally encourage their acquaintances to try on the new AR app (Osama, 2021; Riethorst, Smink, & Ketelaar, 2020; Tan, Chandukala, & Reddy, 2022; Watson, Alexander, & Salavati, 2018).

Furthermore, AR technology can also help increase interaction with the product and create new touch points or extend existing ones in customers' journeys. The studies of AR technology's influence on customer journey concluded that AR technology could help enhance touch points such as awareness, explorations, planning and behavioural intentions. Besides, AR technology creates a new touch point when the technology entitles virtual try-on or use of the product as a

part of a new customer journey (Henningsson & Vaidyanathan, 2022; Henningsson, Vaidyanathan, Archibald, & Lohse, 2020; Rauschnabel, Babin, Dieck, Krey, & Jung, 2022). Research paper on AR technology in marketing has also established that this technology can create either positive or negative sentiments towards a brand and products based on factors such as technology implementation and function (Petrovych, Vinnichuk, Krupka, Zelenenka, & Voznyak, 2021). A study on AR technology effectiveness established that implementing AR technology is most effective when the uncertainty associated with the product is highest. Therefore, brands may use AR technology to reduce customer doubtfulness about a product and reduce returns by offering smartphone apps in the retail industry (Tan, Chandukala, & Reddy, 2022).

Moreover, online retailers can use AR technology to learn more about customers by analysing their preferences and trying experimental marketing campaigns to analyse factors influencing customers' behavioural intentions (Lin, Fu, & Lin, 2020). For example, when a customer tries on a product in a virtual fitting room, the online store can employ a technology that gives the customer some assessment and personal suggestions or special discounts if a customer focuses on a particular product (Adam & Pecorelli, 2018). Therefore, AR technology is becoming an essential and effective marketing tool to help brands to interact with customers. The following chapters of this literature review will examine AR technology in the retail market and AR-enabled devices such as virtual mirrors for try-on, social media filters and masks, QR-code-enabled browsers for AR, smartphone apps for products catalogue, smartphone apps for virtual makeup, and AR smartphone apps for virtual try-on of clothes, accessories, and shoes.

2.3.1 AR virtual dressing mirrors as a marketing tool

As AR technology became available to more people, retailers employed this technology as a marketing tool to promote products and bring customers inside stores (Rejeb, 2021). One example is the smart digital mirrors in the fashion industry, also called magic mirrors, which have built-in AR technology to assist customers in product visualisation. This mirror device operates through several built-in cameras, displays, and sensors, allowing customers to see virtual clothes as a part of their outfits reflected on a mirror screen (Werdayani & Widiaty, 2021). When a person stands in front of a magic mirror, they can virtually try on clothes that would be digitally layered on the person's body without the need for undressing clothes. A study on magic mirrors has highlighted that technology is a new driver for attracting customers in fashion retail, as the technology brings a new experience that customers see as valuable and easy-to-use (Boardman, Henninger, & Zhu, 2019). One of the fashion companies that employed smart mirror technology is Timberland LLC, an American manufacturer and retailer of clothing and shoes. The company launched its creative advertising campaign using AR technology to offer people to try on clothes using a virtual mirror, as shown in Figure 17. The mirror layered digital clothes over a person's body accurately and dynamically, making the digital clothes look realistic. The main goal was to allow customers to try on clothes virtually to engage them and attract more shop visitors (Sanden, Willems, Poncin, & Brengman, 2020).

FIGURE 17: TIMBERLAND SMART MIRROR FOR CLOTHES VIRTUAL TRY-ON (LEMON&ORANGE, 2014)

Another example of a company employing AR technology is Ralph Lauren in the USA. Ralph Lauren's flagship clothing store in Manhattan has equipped fitting rooms with smart mirrors to digitalise a physical store and allow retailers to upgrade the customer experience. The virtual mirrors act as an extended shelf that provides the customers with garments' photos and product information. Customers can interact with the mirror to send a request to the shop assistants to bring other sizes or colours of the item they like, as shown in Figure 18. The mirror also recommends other items that match the outfits. If the customer wants to buy an article on a different day, the mirror can send information about this item to the customers' smartphones so they can decide to get the piece of garment on another day (Perry, Kent, & Bonetti, 2019).

FIGURE 18: RALPH LAUREN MAGIC MIRROR FOR CLOTHES VIRTUAL TRY-ON (PERRY, KENT, & BONETTI, 2019)

Another AR technology implementation example is digital mirrors for virtual makeup try-on. These makeup mirrors are like clothing mirrors, with built-in cameras, sensors, and touch screens. With the help of AR software, users can see a reflection of their face on the digital mirror and then digitally layer makeup over the face reflection on the mirror's surface (Alboaneen, et al., 2020). Using the mirrors, customers can try different makeup, such as eye shadows and lipstick, without physically applying makeup on their faces, as shown in Figure 19.

The options of beauty products that can be applied are not limited, allowing customers to try every possible shade presented in the digital mirror. Some famous makeup retailers using AR technology mirrors are the cosmetics retail companies Sephora and L'Oréal. The makeup magic mirror technology is a helpful tool for customers that can ease the shopping process by eliminating the need to physically put on and remove makeup (Prakash, Ghosh, Deborah, & Chandran, 2020).

FIGURE 19: DOUGLAS SMART MIRROR FOR MAKEUP VIRTUAL TRY-ON (MCQUARRIE, 2019)

Although different companies in various industries employ magic mirrors, they have some drawbacks. Disadvantages include the costs of mirrors, difficulties in managing inventories to keep the systems updated, and staff overload with duties to manage the mirror requests in addition to their existing daily routine (Lee, 2019). Moreover, the lockdown in 2020 has restricted people from visiting stores, which affected the usefulness of this in-store equipment. Nevertheless, virtual mirrors are one of the leading industries of using AR technology in retail activities (Silvestri, 2022).

2.3.2 AR and QR codes as a marketing tool

AR technology can serve as a tool for visualising a product and showcasing something that does not exist in a user's physical space. Companies use AR technology as a sales and engagement tool to promote products, raise brand awareness, and increase conversions (Yashvi, Shah, Shah, Bhavathankar, & Katchi, 2021). Some companies employ QR (Quick Response) codes – a type of barcode with certain encrypted information, such as a weblink to their website or a weblink to a restaurant menu. Customers can use their devices with a camera or scan a QR code, which will automatically open a link in a web browser to content without downloading a smartphone app or using any other devices. Retailers also employed QR codes and integrated AR technology in the links for AR experiences. Customers can scan such AR-QR codes to instantly observe virtual objects in physical surroundings using a personal device's browser (Lin, Wu, & Yang, 2021). An example of a QR-AR code for immersing a user in an AR experience is the virtual concept store called Machine-A in London, UK. The store digitally presents emerging designers' contemporary fashion garments and accessories. In their promotional campaign, paper posters with printed AR-QR codes were placed in the streets of London, allowing people to scan the code with their smartphones. Once the users scanned the AR-QR code, a web link launched on the smartphone,

digitally opening the doors to the Machine-A virtual showroom on the user's smartphone screen, as shown in Figure 20 (Machine-A Company, 2022).

FIGURE 20: MACHINE-A VIRTUAL FASHION SHOWROOM USING AR IN LONDON (CHITRAKORN, 2021)

Another example is Burberry Group PLC, which collaborated with Google to include its products in Google Search. Thus, when users want to search for a Burberry product in the Google web-search engine, they would experience virtual Burberry products in the physical surrounding at the convenience of their homes. For instance, customers could see an AR version of a Burberry bag at scale against physical objects, such as a table, as shown in Figure 21. The implementation of AR technology helped Burberry enrich its customers' online shopping experience making it valuable and fascinating (Burberry Group PLC, 2020).

FIGURE 21: BURBERRY PRODUCTS VIRTUALLY PRESENTED USING AR (BURBERRY GROUP PLC, 2020)

One example of the AR technology implementation in web-browsers becoming more available to retailers and small businesses is the company Shopify Inc., an e-commerce platform for online shops. Spotify Inc. developed a solution for its sellers to create AR content by filming their products on camera. Created products in Shopify's AR platform would appear on the brands' websites, so the customers can examine realistic interactive three-dimensional versions of products, as shown in Figure 22. AR technology in web browsers allows business owners to save

money on smartphone development and, at the same time, create a unique and convenient customer experience (Shopify, 2018). AR technology paired with QR codes and web pages created opportunities for brands considering innovative methods to engage their audiences.

FIGURE 22: OPTION BY SHOPIFY INC. TO VIRTUALLY PRESENT PRODUCTS USING AR (SHOPIFY, 2018)

2.3.3 AR social media filter as a marketing tool

At the same time, AR technology is developing and achieving full-scale implementation in various media and is already prominent on web social media platforms and social media apps (El Filali & Krit, 2019). One of the AR technology implementations on social media is AR masks. These AR masks, also called filters, are unique technological features of social media platforms that embed various visual effects over photos and videos on the smartphone's display through a smartphone camera (Hawker & Carah, 2021). The masks got popular with users who sought to augment and change their appearance for gaming and entertainment purposes. The social media platform Snapchat was the first social network to offer users this AR filter option in 2015 (Ikonen & Uskal, 2020). Initially, the users tried AR filters solely for entertainment purposes and shared screenshots of their augmented appearances on social media, as shown in Figure 23.

FIGURE 23: SNAPCHAT AR FILTERS FOR VIRTUALLY CHANGING PEOPLE'S APPEARANCE (SNAKE, 2017)

As retailers discovered the social media platform's filter feature, it became an effective business tool for creating sharable and trackable content. Companies use AR technology to showcase their products digitally and enable virtual try-on of products for the customers at the

convenience of their homes (Vilkina & Klimovets, 2019). One example of social media platforms cooperating with retail market platform is Snapchat, which offers to create filters within a few minutes. Snapchat provides access to the pre-developed platform's filters, making it easy to create a virtual image of a product. Access to the storage of existing elements for filters is free, and the cost is subject to the duration of the advertising campaign (Snapchat, 2022).

The possibility to remotely and virtually present products has become especially valuable and accommodating for customers due to the pandemic in 2020. During the lockdown, consumers spent most of their time at home and preferred shopping online over a physical store visit. Therefore, adopting various digital technologies, including AR technology, has become a service in demand. Snapchat filters have been widely used in advertising campaigns for the retail industry to promote shoes, clothing, accessories, and cosmetics. Snapchat allows tracking of different body parts body and adding virtual layers over the tracked points for the possibility of virtual clothes fittings and instantly buys (Tropp & Baetzgen, 2019). One example of such a virtual try-on occurred in 2021 when Snapchat facilitated Gucci's marketing campaign to draw attention to a new collection of sneakers (Williams, 2020). Using the Snapchat AR platform, Gucci offered Snapchat users a realistic virtual fitting of different pairs of sneakers, as shown in Figure 24. After trying on the sneakers, Snapchat users could go straight to the product page and click the "Buy Now" button on the screen. The advertisement benefited Gucci by creating a positive return on the advertisement (Snapchat, 2020).

FIGURE 24: SNAPCHAT AR ADVERTISEMENT FOR GUCCI (SNAPCHAT, 2020)

Another example is the e-commerce platform Farfetch, which offers the option to try on clothes using Snapchat. Users can try on different clothes from the Off-White brand by taking a selfie – a photo of themselves. Then the digital clothes are automatically projected onto users' body appearances, as shown in Figure 25. Snapchat users could pick the preferred and matching clothing styles, then share the screenshot of the outfit with their friends to collect opinions and visit the Farfetch website to buy the clothes online right after the virtual fitting (Snapchat, 2020).

FIGURE 25: SNAPCHAT AR ADVERTISEMENT FOR FARFETCH (SNAPCHAT, 2020)

Popular social platforms also allow brands to generate the attention they need for new product launches and market promotions. For instance, Prada used Snapchat collaboration to promote its new accessories and bags from the Prada Galleria Bag collection, as shown in Figure 26. The integration of lenses with product catalogues and virtual stores allowed users to find and buy items they have interacted with using the AR option in the social media platform (Snapchat, 2020).

FIGURE 26: SNAPCHAT AR ADVERTISEMENT FOR PRADA (SNAPCHAT, 2020)

Estée Lauder UK was one of the first beauty companies to use Snapchat's virtual try-on technology. The company implemented AR lenses in September 2020 with the launch of the Advanced Night Repair Serum. In 2021, a virtual AR fitting campaign was launched for Double Wear Stay-In-Place and Futurist Hydra Rescue SPF45 shades, as shown in Figure 27. Users could try over 60 shades to see what suits them best and swipe to buy the products. The campaign helped Estée Lauder reach over three million people and get a positive return on advertising, spending 3,47 British pounds on the conversion (Snapchat, 2020).

FIGURE 27: SNAPCHAT AR ADVERTISEMENT FOR ESTEE LAUDER (SNAPCHAT, 2020)

AR filters are also available on social media platforms such as Facebook, Instagram and TikTok (Mendoza, 2022). Integrating social media lenses with virtual product catalogues allowed customers to find and buy items they have tried using AR filters. AR technology is evolving as an integral part of social media campaigns, called viral marketing. This format allows brands to exceed the performance of the traditional forms of communication with customers and improve their experience (Sung, 2021). AR technology has enabled brands to merge the physical and digital worlds to elevate marketing strategies and create interactive shopping.

2.3.4 AR branded apps as a marketing tool

Some retail marketing tools, such as in-store promotions and billboards, are losing relevance due to the digital shift in marketing. Hence, marketers had to research contemporary creative strategies to find alternative promotion opportunities, such as new online marketing tools like AR technology (Ruiz, 2022). Introducing innovative digital technologies into marketing can open new promotional opportunities for various retail businesses, and rapid technological advancements enabled brands to employ AR technology to showcase products remotely and digitally to customers. Some brands recognise AR technology's power and employ this tool in their branded smartphone apps (Vilkina & Klimovets, 2019). Customers only require a smartphone with a camera to experience AR in marketing. The smartphone app utilises the smartphone's camera to recognise the surrounding space, measure its dimensions and scan reference points of the surrounding objects. Then the smartphone app layers digital elements over physical objects and enhances the user's view of the surrounding world.

A recent survey has proven the importance of employing AR technology as a marketing tool for achieving sales goals. Deloitte and Snapchat surveyed fifteen thousand people aged 13 to 50 from fifteen countries from February to April 2021. The results have shown that by 2025, about 75% of the sample will constantly use AR technology. This study found that 65% of users of all ages worldwide currently utilise AR technology. The majority of users find AR technology

through social networks, instant messengers, and other communication purposes, and most audiences perceive AR technology as a game, even in branding campaigns. However, 76% of people expect such content to become beneficial. They would like to use the technology in their everyday life. Finally, Deloitte and Snapchat research has established that the user's interaction with AR technology content from the brand leads to a 94% increase in conversion (Deloitte, 2021). Retail companies use AR technology to enable their customers to visualise many types of digital content. The AR elements include images, video and audio materials, and text (Bonetti, Warnaby, & Quinn, 2018). In addition, the 2020 pandemic lockdown has changed the overall concept of the retail world. Currently, smartphone apps with AR technology flourish among different industries, and various retail companies have implemented their AR smartphone apps as a part of their marketing strategy. Some examples of AR app implementation in fashion and retail include product demonstration, sampling make-up products, and virtual try-on of clothing, which are discussed further in this literature review.

- **AR apps for product demonstration**

In 2008, a German marketing agency for the BMW company created one of the first marketing campaigns using AR apps, Figure 28. A magazine included a BMW car advertisement with a photo of one of the BMW cars using an AR technology element. When a magazine reader pointed a smartphone camera towards the image of the car in the print, the car appeared on the phone screen. The viewer could move the car on the screen based on the camera and magazine movements. This BMW magazine advertisement used AR technology as an interactive tool that allowed the brand to increase brand awareness through interactive content. This BMW advertising campaign was the pioneer that allowed people a direct interaction with a virtual object for commercial purposes in a product advertisement (Wilson & Till, 2019).

FIGURE 28: ADVERTISEMENTS USING AR TECHNOLOGY BY BMW (WILSON & TILL, 2019)

In 2010, the Lego Group, a Danish toy manufacturer, installed AR terminals in their retail outlets. Customers could hold the box in front of the shop's terminal screen, which displayed an image of the assembled Lego Group set on top of the toy box (Wiebach & Send, 2019). As a next step, the company offered their AR smartphone app to view the latest Lego Group products from all angles in three-dimensional animations with sound effects. The smartphone app combines the physical and virtual worlds to create a unique, interactive, and entertaining user experience. Lego Group uses AR technology to enhance the user shopping experience by offering an

interactive smartphone app allowing kids to play with their toys virtually, as shown in Figure 29 (Lego Group, 2022).

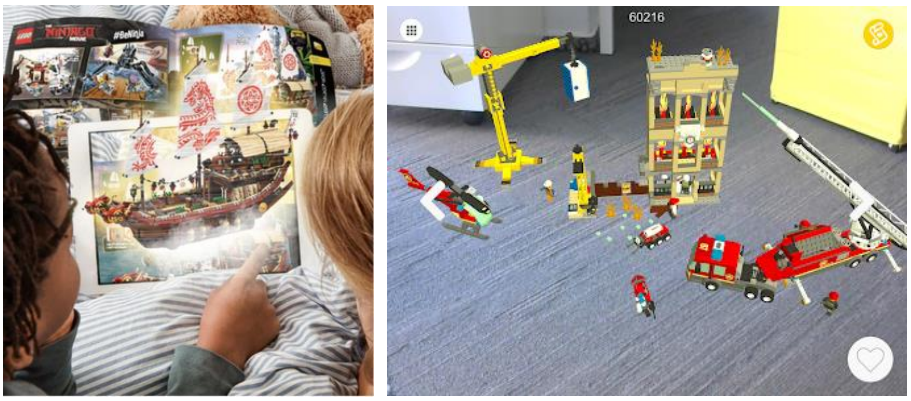

FIGURE 29: LEGO THREE-DIMENSIONAL CATALOGUE WITH AR TECHNOLOGY (LEGO GROUP, 2022)

Another forerunner in AR smartphone apps is a shopping app launched in 2017 by IKEA Group, a Swedish-Dutch furniture manufacturer and retailer. IKEA Group developed the IKEA Place smartphone app to assist their customers in visualising IKEA furniture products in their homes. The smartphone app offers a three-dimensional design developed using the ARKit by Apple (IKEA Group, 2022). IKEA has fully integrated AR technology in its app, which allows users to virtually fit furniture pieces like sofas in their actual size and colour in their homes, Figure 31. The app's purpose was to solve practical problems of buyers' visualisation problem of how the furniture would fit in their houses. IKEA Group allows its users to design their homes through interactive smartphone apps, helping the company to increase customer retention by motivating them to interact with the app again (Alves & Reis, 2022). The company is also testing an advanced smartphone app called IKEA Studio in Spain, Sweden, and South Korea. IKEA Studio allows users to scan rooms to make three-dimensional plans, including measured doorways, windows, and ceilings. The software also detects furniture and marks its location so potential buys can be digitally layered directly on them. The user can place furniture and accessories, change the colour of the walls, interact with objects by turning lamps on and off, and stack virtual things on each other such as by placing a light on a sideboard. Users can then export the project as a two-dimensional or three-dimensional model and share it with their friends (IKEA Group, 2017).

FIGURE 30: LEFT AND MIDDLE – IKEA PLACE; RIGHT – IKEA SPACE (IKEA GROUP, 2017)

A similar strategy was used by Amazon Inc., an American e-commerce platform for selling different items and products, who also launched its AR smartphone app in 2017 to provide personalised customer recommendations. Users can visualise furniture, kitchen gadgets, and other home items using the Amazon smartphone app, Figure 31. This option is convenient whenever a customer has doubt about buying an item. For example, a person is still determining which colour of kitchen appliances would suit the interior colours of the kitchen. In that case, the Amazon smartphone app would be useful for products virtual showcase (Amazon.com Inc., 2022). The branded smartphone apps are also used by electronics companies for their products demonstrations. For example, Apple Inc. also uses an AR smartphone app for its product demonstration, Figure 31. Users can virtually assess the colours and sizes of their products, such as iPhone, MacBook, Apple Watch, and other Apple products. Using the AR smartphone app by Apple Inc., potential customers can view and evaluate Apple products without physically interacting with them. Buyers can use AR technology to select the sizes and colours of products without visiting the store (Apple Inc., 2022).

FIGURE 31: APPLE AR SMARTPHONE APP FOR PRODUCTS VIRTUAL SHOWCASE (MOUSA, 2023)

- **AR apps for sampling makeup products**

Another common purpose of branded AR smartphone apps in the commercial sector is makeup try-on. AR technology has become a helpful tool for cosmetics brands where a customer can match the colour of a lipstick or blush without using a physical tester. The user only needs a smartphone camera and install a makeup brand's smartphone app, stay in natural light, and place the camera directly in front of the face to try on different beauty products (Riar, Korbel, Xi, Zarnekow, & Hamari, 2021). Leading brands such as Sephora, Lancôme, M.A.C, L'Oréal, NARS, and other beauty retailers have also shown their interest in AR smartphone apps which are available for both iPhone and Android smartphone users (Apple Inc., 2022; Google LLC, 2022). These beauty companies offer customers a try-on product at home experience through smartphone apps. For example, the retailer of personal care and beauty products, Sephora, offers their smartphone app users to try different makeup and beauty products using smartphones with cameras, Figure 32. The users can also share the results of their creativity on their social networks with their friends. These marketing campaigns create engaging and interactive commercial advertisement content to communicate with potential consumers (Smink, Reijmersdal, Noort, & Neijens, 2020).

FIGURE 32: SEPHORA AR SMARTPHONE APP FOR MAKEUP VIRTUAL TRY-ON (WEST, 2017)

In 2017, L'Oréal S.A. also offered their customers their branded AR smartphone app. The company collaborated with YouCam Makeup to include its products in the YouCam Makeup AR smartphone app. The app allows makeup enthusiasts to test cosmetics products virtually, as show in Figure 33. Also, L'Oréal brought professional makeup artists to develop complimentary looks to help users select new products. Users can also try different pre-set makeup styles with just a few clocks on their smartphone app. Among its features, the app reflects any changes that make the image on users' smartphone displays look realistic through an interactive screen (L'Oréal S.A., 2017; L'Oréal S.A., 2023).

FIGURE 33: LOREAL AR SMARTPHONE APP FOR MAKEUP VIRTUAL TRY-ON (L'ORÉAL S.A., 2023)

Another prominent beauty brand, Orly Inc., offers users to test and try on different colours of nail polish using AR technology, Figure 34. Orly partnered with the company Wannaby Inc. specialised in AR technology to allow people to virtually sample different colours of Orly nail polish. The smartphone app enables users to try on and buy nail polishes and experiment with colour selection or combinations depending on the lighting, skin colour and style. Computer vision algorithms in the Orly branded app provide natural colours and shades making t look natural. The smartphone app allows users to view hands in video and picture modes, and share results with friends on social media platforms (WannaBy Inc., 2022; Brown, 2018).

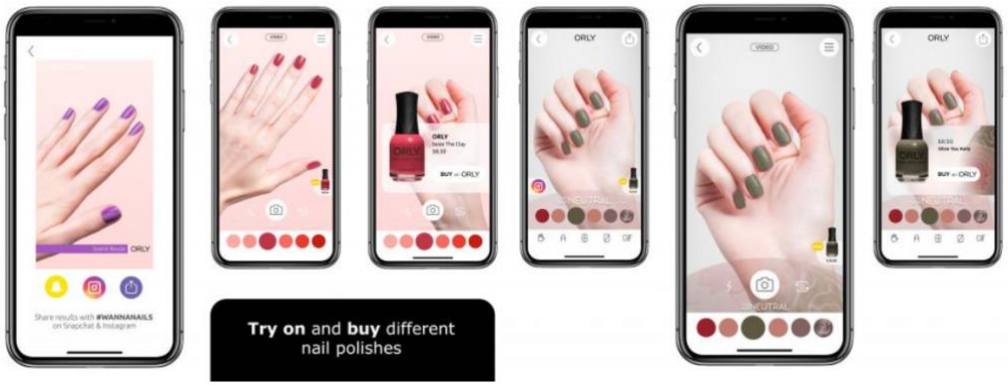

FIGURE 34: ORLY AR SMARTPHONE APP FOR NAIL POLISH VIRTUAL TRY-ON (BROWN, 2018)

- **AR apps for virtual try-on in fashion**

Retailers' marketing strategies are rapidly undergoing digitalisation to maintain their competitive advantage. In addition to standard shopping offerings such as having online websites where customers can make products comparison, list favourite products, compare products, and remotely order products, retailers are constantly looking for new solutions to enhance customer experience (Bethan & Cano, 2020). Customers would like their experience to be more convenient to make purchases online, and often they have difficulty picturing how a garment would look or fit in real life. Some fashion retailers have solved the problem of trying on clothes in a non-traditional way. Customers get clothes delivered to their door by a delivery company, try them on, and choose the clothes that fit them. The clients pay for the items only

after the try-on and return the rest of the clothes to the deliveryman (Cohen, 2018). However, with the help of AR technology in smartphone apps, it is possible to simplify the customer experience further. Customers can try on a piece of clothing at home and save time on a store trip or shipping time and returning items (Watson, Alexander, & Salavati, 2018).

Clothing retail companies like Pull and Bear, Massimo Dutti, Gucci, and others already use AR technology to help customers visualise how the shoes would look on a customer's feet. For example, Figure 35 shows how Pull and Bear, a Spanish clothing and accessories retailer, developed an AR smartphone app that allows customers to experience shoes fitting in the comfort of their homes (Pull&Bear, 2022). Customers of Pull and Bear shoes can also take a picture of the shoe option they like and share it on social networks, which helps boosting brand awareness (Sung, Han, & Choi, 2022). Massimo Dutti, another Spanish clothing retailer, recently updated its smartphone app to include a Shoe Experience service, Figure 35, that allows customers to use AR technology to try shoes and boots (Massimo Dutti, 2022). The luxury Italian retail company Gucci also introduced their smartphone app, allowing digital try-on of shoes, Figure 35. A user can open the Gucci smartphone app, choose a pair of sneakers they like, point their smartphone device's camera at their feet, and immediately, the sneakers layer digitally on a person's feet (Gucci, 2022).

FIGURE 35: AR SMARTPHONE APPS FOR SHOES VIRTUAL TRY-ON: LEFT – PULL AND BEAR; MIDDLE – MASSIMO DUTTI; RIGHT – GUCCI (MOUSA, 2023)

Jewellery companies offer jewellery try-on using AR smartphone apps. With smartphone apps, users can check the dimensions of jewellery pieces, available colours of metal and stones, and combinations with other products on their hands. For example, Diamond Hedge offers a smartphone app for virtual try-on of diamond rings, Figure 36. A customer needs to take a picture of the hand with a smartphone camera. The smartphone app automatically scans finger contours, simulates a virtual image of the fingers on a smartphone display, and places a virtual image of a ring over a finger. Customers of Diamond Hedge have the opportunity not only to choose a piece of jewellery for themselves but also virtually to try it on, choose the perfect size and see how the ring looks on the finger (Diamond Hedge, 2022).

FIGURE 36: DIAMOND HEDGE AR SMARTPHONE APP JEWELLERY VIRTUAL TRY-ON (DIAMOND HEDGE, 2022)

Virtual try-on of sunglasses on smartphone apps is also available to customers. A user only needs a smartphone with a camera to start trying on thousands of glasses. AR technology lets users see the selected glasses immediately on the face and try many eyewear options. Companies like Gucci employ AR smartphone technologies for their eyewear models (Gucci, 2022). The app benefits users by saving try-on time and allowing them to shop for the glasses directly in its smartphone app. Apart from being a functional tool, these smartphone apps have a fun and entertaining element behind trying on the glasses (Javornik, et al., 2021). It also helps customers to shop for the newest items at Gucci at the convenience of their homes. The screenshots in Figure 37 showcase the Gucci campaign on their branded app for virtual sunglasses try-on.

FIGURE 37: GUCCI AR SMARTPHONE APP FOR SUNGLASSES VIRTUAL TRY-ON (MOUSA, 2023)

Another example of AR smartphone apps is the virtual try-on of watches. Companies like IWC have already launched smartphone apps for customers to ease the process of choosing watches at the convenience of customers' homes, which was especially useful during the lockdown. The IWC smartphone app allows customers to try on a virtual watch based on AR technology, as shown in Figure 38. Customers only need to point their smartphone camera at the wrist, and the newest IWC designs would appear in actual size on the wrist. For now, the IWC APP is available only to owners of Apple phones, but there are plans to adapt it to the Android system (IWC, 2021).

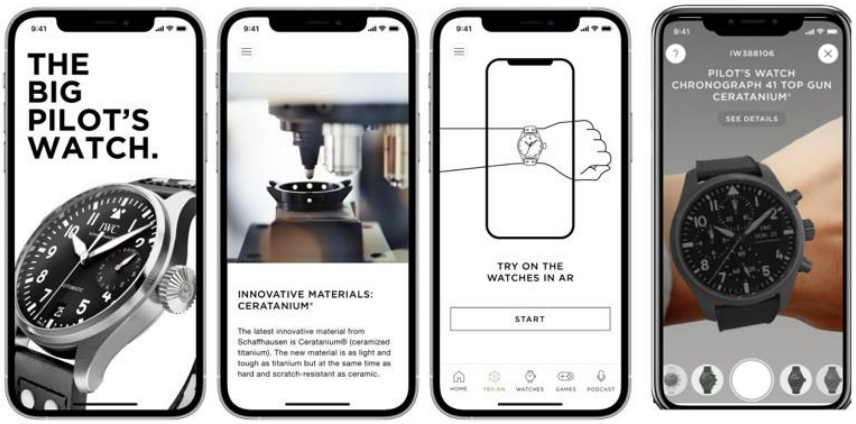

FIGURE 38: IWC AR SMARTPHONE APP FOR WATCH VIRTUAL TRY-ON (IWC, 2021)

Another example is the virtual try-on of clothing garments. AR smartphone app allows customers not only to find information about a product but also to try on the product anytime and anyplace, thereby saving the customers' time on visiting physical stores. Although retailers struggle to offer smartphone apps with virtual try-on of clothes due to the complexity of different body shapes and sizes, some companies are working towards bringing this technology to the clothing sector (Kumari & Polke, 2018). For example, the online clothing retail company ASOS is testing the "See My Fit" AR smartphone app. The app covers 800 dresses that can be virtually tried on 16 models in sizes 4 to 18, as shown in Figure 39. The company took photos of these 16 models and maintained a library with their photos. Once customer favours a dress, they can look for fashion models with similar body shapes. As a customer selects a model with a similar body shape, the ASOS' AR technology virtually layers selected dresses on the fashion models (ASOS Plc, 2022).

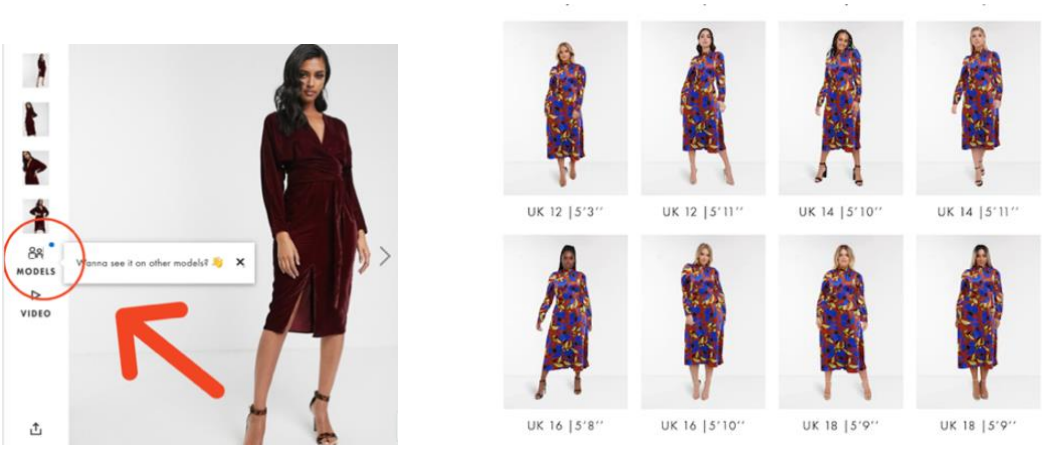

FIGURE 39: ASOS AR SMARTPHONE APP FOR DRESS VIRTUAL TRY-ON (ASOS PLC, 2022)

2.3.5 Further development of AR in the fashion industry

As mentioned in this literature review, AR technology's popularity has grown because of its usefulness, ease of use, playfulness, interactivity, and practicality. While retail giants from Gucci, Timberland, L'Oréal, and PRADA adopt AR technology to showcase their products and develop virtual fitting services, other creative companies have taken a new direction for AR technology direction in digital fashion. The new approach has no relationship with the actual clothes produced today by manufacturers, and those creative brands make digital clothes exclusively for the virtual world. These digital clothes are digital assets representing unique digital data called NFTs, non-fungible tokens, the only existing piece of data (Ghelani, 2022). Companies like Louis Vuitton, Balenciaga, Gucci, Dolce & Gabbana, Gap, and Adidas already sell their NFT accessories and clothes (Wang, Ren, Li, Qi, & Zhou, 2022).

For example, Danish start-up The Fabricant, which claims to be the world's first all-virtual clothing fashion house, has sold a unique digital outfit for 9,500 US Dollars at a blockchain conference (The Fabricant, 2022). Figure 40 shows an example of their electronic garment. Another example is the retailer DressX. They launched a virtual three-dimensional clothing collection that only exists digitally, as shown in Figure 40. The DressX system works in a way that a customer uploads an entire body and face image to the DressX website, pays for the clothes of their choice, and then gets back the picture already in the bought outfit. The DressX idea of virtual clothes focuses on contemporary styles for young designers. The company also states they are eco-friendly as there is no need to produce a piece of the garment just for the purpose of taking a photo for social media, and designers do not need to spend materials for physical clothes (Dressx, 2022).

FIGURE 40: LEFT – VIRTUAL CLOTHING OF THE FABRICANT; RIGHT – VIRTUAL CLOTHING OF DRESSX (THE FABRICANT, 2022; DRESSX, 2022)

2.4 AR branded apps and customers behavioural intentions

Earlier employment of AR smartphone apps was only considered for the entertainment games like Pokémon Go and Snapchat facial filters. However, this technology can be a practical addition to a marketing campaign for different brands. AR technology is evolving to become a comfortable and interactive user experience. Especially during the lockdown, AR technology has become an essential tool for product visualisation for customers to assess it remotely. Companies employ AR technology in smartphone apps for its helpfulness, demonstrating the actual dimensions of products, size, shape, available colours, combinations with other products, prices and discounts, and product packages. Customers can conveniently use AR smartphone apps to view products without the need to hold the product in their hands or be physically located in the store, and they can interact with these products in their location. The AR apps offer customers virtual try-on of products to see goods from different angles and compare different models and colours of a product to help customers decide which options fit their style and preferences (Riar, Korbel, Xi, Zarnekow, & Hamari, 2021).

Companies also employ AR smartphone apps to capture the attention of potential buyers. Their marketing promotional activities include virtual product demos, storytelling, virtual tours, engaging social media, branding, and local promotions (Berman & Pollack, 2021). These companies are also experimenting with AR technologies to provide personalised advice, information, or value-added services for their customers aiming to create functional and entertaining advertisement campaigns (Feng & Xie, 2018). The existing body of research on AR technology suggests that AR stimulates enjoyment, confidence and convenience towards products and brands and reduce customers' uncertainty, which can positively influence customers' behavioural intentions (Alves & Reis, 2022; Ozturkcan, 2021; Zagorc & Bernik, 2022). A study on the significance of AR technology for customers found that AR technology creates an element of entertainment and a valuable element of usefulness for customers (Grzegorczyk, Sliwinski, & Kaczmarek, 2019).

AR technology as a marketing tool allows companies to increase brand awareness, reputation, and consumer confidence in the brand, and to digitally showcase their products as three-dimensional objects, influencing customers' perceptions and intentions (Dacko, 2017). Thus, brands focus on offering AR smartphone apps to enhance the shopping experience for customers, which would influence customers' attitudes and behavioural intentions. The following sub-chapters 2.4.1-2.4.5 will discuss the elements of AR smartphone apps that can influence customers' attitudes and behavioural intentions towards using such apps.

2.4.1 Influence of AR interactivity and telepresence on customers' attitudes

AR technology sets a new path for brands to communicate with their audience using interactive content through different platforms, including smartphones. Due to the growth in the number of smartphone users, the capability of AR technologies to enhance the experience of online interaction with a brand is also increasing. Several authors have reported evidence that interactive content is one of the fastest-growing digital marketing tools to facilitate interaction with consumers, and there is an industry-wide transformation from traditional text-based web content towards interactive marketing that provides an immersive experience (Naji & Shafiq,

2021; Wang & Chan-Olmsted, 2020; Wang, Shawl, Neware, & Dylik, 2021). As per Kotler's definition, interactive marketing is the promotion of goods and services through indirect advertising in conjunction with active two-way communication with the client. Furthermore, this communication links customers' attitudes to the quality of interaction with the seller (Kotler & Keller, 2009).

A growing body of literature has investigated the interactivity element of AR technology that enables marketing teams to create interactive campaigns to demonstrate their products and engage customers with the product. Studies revealed that interactivity is one of the furthermost distinguishing elements that can influence customer experience, cognitive and behavioural responses, attitudes, and intentions of customers (Fuadi, Hidayanto, Inan, & Phusavat, 2021; Javornik, 2016; Kowalczuk, Siepmann, & Adler, 2021). Previous research has also indicated that interactive marketing provides a responsive experience as potential buyers interact with the product in real time in their surroundings (Peak, Prybutok, & Qin, 2021). The interactivity aspect allows users to experience the products themselves in their environment, and it is controllable, responsive, and playful. Interactivity makes consumers feel connected and more involved in purchase activity (Parka & Yoob, 2020). User experience becomes unique, memorable, and more likely to elicit the desired response from customers (Fuadi, Hidayanto, Inan, & Phusavat, 2021). Researchers also established that interactivity enhances consumer engagement, an element of marketing strategies to attract customers and maintain brand loyalty. As customers' brand loyalty grows, actions evolve from the emotional influence generated when customers interact with content. The customer becomes part of the sales process, which creates the user's inclusion and relationship with the brand (Cheung, Pires, Rosenberger, & Oliveira, 2020; Cowan & Ketron, 2019).

Besides, previous research has recognised that the virtuality element of AR technology links to interactive digital image technologies, also called telepresence (Cowan & Ketron, 2019; Zagorc & Bernik, 2022). Telepresence means digitally creating a sense of the physical presence of a virtual object in a user's environment. Interactivity and telepresence make shopping convenient by instantly offering customers different digital and personalised options. For example, in the case of using AR smartphone apps for sneakers virtual try-on, a company employs the technology to virtually showcase their branded sneakers over consumers' feet. The users can see how the shoes look on their feet and choose the model they like. Thus, AR technology allows customers to sample a product and experience its telepresence, which creates an impression of complete immersion (Baytar, Chung, & Shin, 2020). The telepresence aspect is intermediate in triggering consumers' cognitive and affective responses, such as feeling the product's physical presence, a sense of ownership and positive or negative emotions, which improves customers' attitudes (Prophet & Ayoung, 2018). Other studies have also shown that interacting with a product affects a person's experience, as engaging with the product improved the customers' attitude which in turn will have an impact on their behavioural intentions (Fan & Fuyuan, 2017; Kim & Lee, 2019). Thus, the interactivity element of AR smartphone apps can become a powerful motivator for customers' behavioural intentions. Therefore, this research paper proposes that the virtual interactivity aspect is a potential stimulus for consumers' attitudes and behavioural intentions using AR in smartphone apps, and the first hypothesis for this research is:

H1: The interactivity and telepresence of an AR smartphone app positively influence attitudes towards using the AR app.

2.4.2 Influence of AR utilitarian value on customers' attitudes

According to retailing research, 82% of shoppers want to view and feel products before buying these products online (Fedorenko, 2018). However, when customers shop online, they miss the possibility to hold and touch a product to evaluate its colour, size, texture, and quality. In this case, AR combines remote shopping opportunities and direct product evaluation experiences for customers, enabling users to examine products using the three-dimensional digital model (Hilken, et al., 2019). AR technology provides an opportunity to digitally experience and view products from 360 degrees. Moreover, potential customers can examine and try on makeup, garments, and home goods without the need to go to a shop and directly interact with these products. Employing AR technology simplifies the user experience as a person can try on a product in his home. Thus, customers' interaction with a product for a remote try-on through a digital solution such as an AR smartphone app increases its utilitarian value (Vieira, Rafael, & Agnihotri, 2022). Utilitarian value means a total value of a product offering, product information, benefits, and convenience (Chiu, Wang, Fang, & Huang, 2014). Studies confirmed that AR technology shopping combines benefits such as value for money and level of convenience and time saved comparing to the efforts to physically visit shops (Kusumawati, Nimran, & Yulistyawati, 2020; Leeb & Overby, 2022). The utilitarian value of employing AR technology also means helping its users to make reasonably informed decisions about a potential purchase when people assess the products remotely (Peak, Prybutok, & Qin, 2021). Previous research has established that the utilitarian value of AR technology derives from the consumer's need for efficiency, helpfulness, functionality, necessity, practicality, and rationality reasons in case of deciding (Alzayat & Lee, 2021).

Recent evidence also suggests that utilitarian value is a mediator that can influence customers' attitudes and decision-making and thus impact behavioural intentions. AR technology reduces risks for customers by providing the opportunity to view the product before making a purchase decision. It minimises customer dissatisfaction, as the brand appears to customers as a seller who cares about the convenience and comfort of customers (Lavoye, Mero, & Tarkiainen, 2021; Vieira, Rafael, & Agnihotri, 2022). Empirical studies investigated that AR experience increases utilitarian value through improved interactivity with the product for its assessment (Alzayat & Lee, 2021; Kumar, Gupta, & Chauhan, 2022). In addition, the usefulness of AR technology in the remote shopping experience can save time and effort for the consumer compared to the traditional online shopping where it is impossible to visualise products in a three-dimensional format, which makes the shopping experience more enjoyable, affecting the attitudes of the customers (Egaji, Asghar, Warren, Griffiths, & Evans, 2019). Besides, AR technology in an e-commerce strategy improves the user experience and impacts overall customer satisfaction with the company and technology (Li, Gupta, Zhang, & Flor, 2020). Thus, the utilitarian value of AR technology in apps reflects its value as saving time and efforts, being effective, helpful, functional, necessary, practical, and rational in acquiring information about a product. Therefore, this research paper proposes that the hedonic aspect is a potential stimulus for consumers' attitudes and behavioural intentions towards using AR technology in smartphone apps, and the second hypothesis for this research is as follows:

H2. The utilitarian value of an AR smartphone app positively influences attitudes towards using the AR app.

2.4.3 Influence of AR hedonic value on customers' attitudes

Companies try to increase customer satisfaction through emotional interaction with them and influence the hedonic value of the customers by employing AR technology (Arghashi, 2022). As functional benefits and sacrifices determine utilitarian value, in contrast, hedonic value refers to experiential benefits and sacrifices (Leeb & Overby, 2022). Elizabeth Hirschman and Morris Holbrook formulated one of the first theories of hedonic value in customer consumption. As per their study, the hedonic model refers to those aspects of consumer behaviour that relate to the multisensory, fantasy and emotional aspects of the experience caused by the product (Holbrook & Morris, 1982). The American Marketing Association defines hedonism as focusing on sensual pleasures or hedonic benefits resulting from interaction with a product or service (AMA, 2020). This idea explains consumer behaviour as an irrational person acting based on experience. Hedonism represents the emotional element of a product and the feelings associated with the product's interaction (Wang, Wang, Wei, & Chung, 2020).

Hedonistic value is the ability to satisfy a customer's emotional needs. In other words, a product is attractive to a consumer if its consumption promises to provide pleasure (Vieira, Rafael, & Agnihotri, 2022). For example, when a consumer comes to a store, they often choose a product based on associated pleasure, not the product's benefits. It does not mean that hedonism is the opposite of utilitarianism. An attractive store can be productive and technologically advanced compared to similar stores, and a product buying decision will favour one shop at that time. It has been found through a recent study that positive experiences greatly influence customers' attitudes. Customers' interest in the product is affected when they expose themselves to appealing and relevant promotions. Additionally, using AR technology has simplified the transfer of various types of information. The features such as contextuality, immersion, and interactivity can significantly enhance the positive interaction experience with the product (Andrew, 2018).

Previous studies of AR technology and hedonic value found that AR smartphone apps have a playfulness element that can drive hedonic value (Hsu, Tsou, & Chen, 2021; Pallant, Romano, & Sands, 2021). AR technology transforms static objects into interactive ones, helping marketers create new experiences that engage and entertain customers. When customers can interact with a product using AR technology, it creates a positive engagement that will leave a lasting impression. Moreover, there have been several additional investigations into the outcomes of playfulness that influenced customers' attitudes (Heller, Chylinski, Ruyter, Mahr, & Keeling, 2019; Sung, 2021). Customers using AR technology for product assessment get an emotional connection with a product, which can lead to increased interest and a change of attitude (Beck & Criea, 2018). Another study also suggest that playfulness and the interactive environment's controllability influence a customer's mental imagination and mental immersion. AR technology creates the effect of a game that provides an enjoyable, beneficial experience in terms of pleasure and satisfaction — establishing a positive mental image can correlate to creating positive attitudes. Other studies also showed that positive experiences significantly impact customers' attitudes (Kowalczuk, Siepmann, & Adler, 2021; Park & Yoo, 2020). Therefore, this research paper proposes that the hedonic aspect is a potential stimulus for consumers' attitudes

and behavioural intentions using AR technology in smartphone apps, and the third hypothesis for this research is as follows:

H3. The hedonic value of an AR smartphone app positively influences attitudes towards using the AR app.

2.4.4 Influence of AR ease of use on customers' attitudes

As mentioned earlier in Chapter 1 of this study, companies are constantly searching for new ways to satisfy the needs of consumers, such as by offering remote online shopping during the past lockdown period. One of the prominent marketing tools is personal electronic devices, and smartphones that have evolved into practical media tools to interact with customers and influence their attitudes and behavioural intentions. The smartphones that consumers already have got in their hands are an instrument to promote the implementation of AR marketing campaigns by brands. It was established in the Deloitte and Snapchat survey that 65% of people already use AR technology, and 73% of people could identify what AR technology is when they observe the technology in use (Deloitte, 2021).

Previous studies have discovered that, although AR technology might provide favourable outcomes, unless the system is easy to use, the desired change in customers' attitudes might not be achievable (McLean & Wilson, 2019; Zagorc & Bernik, 2022). In addition, the ease of use of AR technology can improve customers' attitudes who have never tried online shopping. The researchers hypothesised that AR could reduce shopping anxiety, or fear of making a buying decision, in those who find traditional two-dimensional online shopping uncomfortable (Riethorst, Smink, & Ketelaar, 2020; Tan, Chandukala, & Reddy, 2022).

Some studies of the topic of AR technology established that the ease of use of the online shopping experience is a significant predictor of attitudes towards technology and, consequently, user intentions, as theorised in the TAM – Technology Acceptance Model (Oyman, Bal, & Ozer, 2022; Pantano, Reseb, & Baierc, 2017). The original TAM first appeared in a case study of a computer-related job, stating that a user's acceptance of the technology correlates with its ease of use (Davis, 1989). Several studies discussed AR technology studies in terms of the TAM model and the respective technology effectiveness. The findings revealed in these studies were that ease of use of technology is a motivation towards using AR technology (Kim, Hwang, Zo, & Lee, 2016; Pantano, Reseb, & Baierc, 2017; Rese & Baier, 2017).

A study on AR apps in the fashion industry found that the ease of use of AR technology could significantly impact customers' attitudes. If the technology is easy to use, individuals will have a positive experience and a favourable view of the technology. It has been also noted that the technology is easier adaptable for smartphone owners who already understand how to operate their devices and apps (Cho & Kim, 2019). So, the apps in smartphone devices that consumers already use can be employed to facilitate the implementation of AR marketing campaigns. For example, AR technology is becoming popular on smartphones is the social media filters on Snapchat. Users find AR technology filters easy to use because they are already acquainted with the Snapchat smartphone app and only need a smartphone to try the technology. The

technology is already a part of the smartphone app, meaning the users do not need additional technical knowledge, making it easy to use the AR settings.

The academic literature on AR technology implementation in marketing strategies has also revealed that ease of use indirectly impacts the users' utilitarian and hedonic values and attitudes (Yang, 2021; Pantano, Reseb, & Baierc, 2017; Rauschnabel, Babin, Dieck, Krey, & Jung, 2022). The technology's ease of use can also mean usefulness, which is also a part of the utilitarian value. Moreover, AR technology leads to customer enjoyment and engagement when it is easy to use. As customers have easy interaction and playfulness with a product, it brings enjoyment and convenience, which correlates with hedonic value (Yavuz, Çorbacıoğlu, Başoğlu, Daim, & Shaygan, 2021). Other studies also confirmed that the perceived easiness of using AR technology could be considered a part of utilitarian value, as well as the perceived enjoyment is a part of the hedonic value that improves the overall performance of tasks and the attitude of the technology user (Cho & Sagynov, 2015; Zagorc & Bernik, 2022; Yang, 2021). Hence, AR technology's ease of use can influence customers' attitudes towards AR smartphone apps. Therefore, this research paper proposes that ease of use is a potential stimulus for consumers' attitudes while using AR technology in smartphone apps, and the next hypothesis is as follows:

H4: The ease of use of an AR smartphone app positively influences attitudes towards using the AR app.

2.4.5 Influence of customers attitudes on behavioural intentions

AR technology brings the brand and the buyer closer, allowing the customer to plunge into the interactivity environment and fully engage with the goods of their interest. As mentioned in this literature review, AR technology enhances the consumer journey and creates new touchpoints for the contact between brands and customers. Shoppers become more involved in the selection and shopping process. At the same time, brands get opportunities to implement their shopping strategies and increase conversions with the benefit of these touchpoints (Henningsson & Vaidyanathan, 2022; Henningsson, Vaidyanathan, Archibald, & Lohse, 2020; Chen & Lin, 2022; Rauschnabel, Babin, Dieck, Krey, & Jung, 2022).

A principal AR technology study was conducted with a major cosmetics retailer to explore the potential of the technology. The project partner first updated the store functionality, allowing users to try on cosmetic products virtually. Subsequently, AR interfaces appeared in retail stores as a more convenient way to test samples. When using AR, the buying probability was 19.8% higher than in a typical in-store experience (Tan, 2022). Research conducted on AR app usage in the fashion industry found that customers' attitudes towards the technology can significantly influence their behavioural intentions (Jiang, Wang, & Yuen, 2021; Wu & Kim, 2022). It is reasonable to assume that positive attitudes towards AR correlate with a higher likelihood of customers using the technology for shopping. The Harvard Business Review article "How AR Is Redefining Retail in the Pandemic" remarks on the experience of the online shopping platform Shopify, noting that in the stores with AR or three-dimensional product displays, the conversion increased by 94% (HBR, 2020).

In 1985 scientists introduced the theory of planned behaviour (TPB), where attitudes can forecast the intentions of a specific behaviour (Nimri, Patiar, & Jin, 2020). Behavioural intentions refer to the degree of behaviour in which people are interested in proceeding with a specific action, and their attitudes can influence this behavioural intention (Osatuyi, Qin, & Xu, 2021). Therefore, the conclusion is that customers' positive attitudes significantly impact their behaviour. Studies of AR technology reported that as positive attitudes increase, positive behavioural intentions also increase (Pena-Garcia, Gil-Saura, Rodriguez-Orejuela, & Siqueira-Junior, 2020; Zagorc & Bernik, 2022).

Several studies reported that the elements of AR technology, such as hedonic value, utilitarian value, and ease of use, are an essential part of effective technology implementation for achieving desired customers behavioural intentions (Fan, Chai, Deng, & Dong, 2020; Kowalczuk, Siepmann, & Adler, 2021; Nikhashemi, Knight, Nusaira, & Liat, 2021). An example of these elements integrating is the study of 2017 of the IKEA AR smartphone app. The AR smartphone app is easy to use, valuable and practical, as customers can add new virtual goods to an actual apartment. The IKEA app also entertains users through interactivity, enabling them to solve specific problems, such as whether the new sofa fits in the room and whether this chair matches other interior items (Zagorc & Bernik, 2022). This finding correlates to the Smith and Swinyard cognitive response theory, which established that a customer directly experiences a product and creates favourable attitudes compared to an indirect product experience (Smith & Swinyard, 1988). Therefore, this research paper proposes that customers' attitudes towards using AR smartphone apps have a positive influence on behavioural intentions, and the last hypothesis is as follows:

H5: Attitudes towards an AR apps increase behavioural intentions to continue using this AR app.

2.5 Conceptual research framework

Based on the literature review, there is a correlation between the elements of ease of use, interactivity, utilitarian and hedonic values, customer's attitudes towards using an app. These attitudes may predict customers' future behavioural intentions when using an AR app. Furthermore, these elements are crucial to any AR app's success and adoption. Firstly, AR smartphone app has an interactive telepresence element, allowing customers a direct product experience positively affecting customers' attitudes. This literature review demonstrated that people interested in the three-dimensional product viewing or interacting in an immersive environment get more interested in continuing using the technology. Secondly, such a virtual product presentation creates utilitarian value. As AR technology has the immersive effect of a three-dimensional product demonstration, a person becomes more involved in the content due to the technology usefulness, when comparing to a two-dimensional presentation of a product. So, the utilitarian value of AR apps is affecting customers' attitudes. Thirdly, as various studies have assessed, hedonic value can arouse the curiosity of users and the desire to continue using the technology. Positive emotions correlate with positive experiences and influence customers' attitudes. Fourthly, this literature review established that AR technology would only deliver the desired results of influencing consumer attitudes if AR technology were easy to use for consumers. Fifthly, the interactivity and telepresence, utilitarian and hedonic values, and ease of use impact attitudes when the technology creates informative, useful, and entertaining

conditions. The customers' attitudes, in turn, will affect the customers behavioural intentions to continue using the app.

The combination of these elements is taken into the theoretical framework for this paper, focusing on how these elements can influence consumers' usage intentions in the fashion retail industry. Figure 42 illustrates how the different variables identified in the literature relate and how they are considered in the current thesis. As Figure 42 shows, the AR smartphone app's characteristics that include interactivity and telepresence, utilitarian and hedonic values, and ease of use, may influence customers' attitudes towards using the AR smartphone app. As also shown in Figure 42, the relation of attitudes towards behavioural intentions is established, where higher attitudes towards the AR smartphone app would increase the behavioural usage intentions of the app. The model in Figure 42 presents hypotheses to conduct the research. The hypotheses in the thesis will provide an opportunity to achieve the study's goal and answer the research question.

H1: Interactivity and telepresence of an AR smartphone app positively influences attitudes towards using the AR app.

H2. Utilitarian value of an AR smartphone app positively influences attitudes towards using the AR app.

H3. Hedonic value of an AR smartphone app positively influences attitudes towards using the AR app.

H4: Ease of use of an AR smartphone app positively influences attitudes towards using the AR app.

H5: Attitudes towards using an AR app increase behavioural intentions to continue using the AR app.

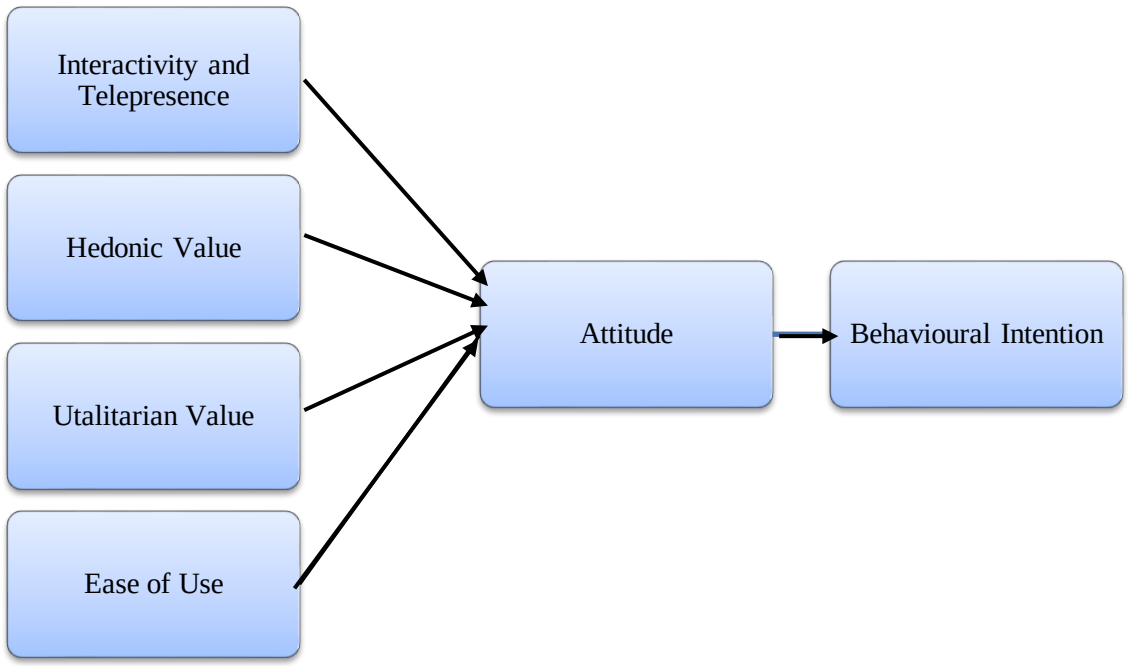

FIGURE 41: THEORETICAL FRAMEWORK OF THE RESEARCH

3 METHODOLOGY

3.1 Philosophical worldview of the research

This research investigates the assumption that AR smartphone apps influence customers' behavioural intentions to use the app and describes the phenomenon of such influence. Based on the focus of the research, the proposed worldview for this research question is postpositivism, anticipating that it is possible to validate the assumption to a certain extent but also considering factors that can influence the phenomena. According to postpositivists, a scientific theory is employed in the first place instead of experience, where the empirical study of reality leads to the creation of an accurate interpretation of the phenomena (Creswell, 2017). This worldview suggests putting ideas into sets, such as variables constructed as part of the hypotheses and the research question. Creswell (2017) also states that the postpositivist worldview has five key assumptions for research:

1. The study does not prove a hypothesis but validates the assumption.
2. The study is about making claims and testing them.
3. The data is collected from measures such as interview surveys.
4. Research explores the relationship between variables that create a hypothesis.
5. Reliability analysis is mandatory for the study to validate the data.

The study is aligned with these assumptions. The question of the study is: "What is the influence of augmented reality apps on behavioural intentions in the fashion industry?" and the objectives of the data analysis are:

- To validate the assumption that the interactivity and telepresence of an AR smartphone app influence attitudes towards using it.
- To validate the assumption that the utilitarian value of an AR smartphone app influences attitudes towards using it.
- To validate the assumption that the hedonic value of an AR smartphone app influences attitudes towards using it.
- To validate the assumption that the ease of use of an AR smartphone app influences attitudes towards using it.
- To validate the assumption that customer attitudes towards an AR app increase their behavioural intentions to continue using it.

As per the postpositivist worldview described by Creswell (2017), the study includes creating the theory, data collection to test this theory and data analysis. This worldview shapes the approach

to this research, including theory development and testing the data using dependent and independent variables.

3.2 Research instrument

The study employed a quantitative, non-experimental survey design. The selection of the quantitative research design links to the research question, and Goertzen (2017) states that quantitative research is effective in answering the "How" and "What" of a phenomenon, which applies to this research study. As per Creswell (2017), quantitative research focuses on gathering information about existing phenomena and describing what influences them, which is, in the case of this research, the influence of elements of AR smartphone apps on customers' behavioural intentions.

There are several reasons for selecting a quantitative design for this research. Firstly, scientists often prefer quantitative studies since this type of research enables measuring, assessing and interpreting data that produces numeric output. Therefore, this type of design allows the researcher to have validated, reliable, and consistent data (King, Keohane, & Verba, 1996). Quantitative research is independent of the researcher, allowing to test hypotheses and describe the theory impartially, which offers non-biased results compared to other research design approaches. Another reason for selecting the quantitative analysis is that the collected data is collected from many respondents, which makes the theory applicable to larger samples. The quantitative design was employed in this survey because the data is more structured using pre-set surveys. Besides, this research offers reliability and consistency in the results, allowing the study to be repeated (Creswell, 2017).

As a part of the quantitative design, a questionnaire with ten questions was used for collecting respondents' answers. The survey was in English, and the online survey platform was SoSci. The completion time was about 10 minutes. Attention checks ensured the results were accurate and consistent, and if a respondent answered them incorrectly, they could not complete the questionnaire. The study employed convenience sampling, and the recruitment happened through the online panel provider Clickworker. The panel offers to choose interviewees based on the pre-selected criteria and distributes the questionnaire to the interviewees on behalf of the researcher. This method eases the data collection, as the researcher must only provide a link to the questionnaire and pay the cost per respondent. The remuneration for each respondent who completed the survey and passed the attention checks questions was 1,4 euros. The data collection took place between 27 February 2023 and 1 March 2023. Figure 41 summarises the methodology framework for this research.

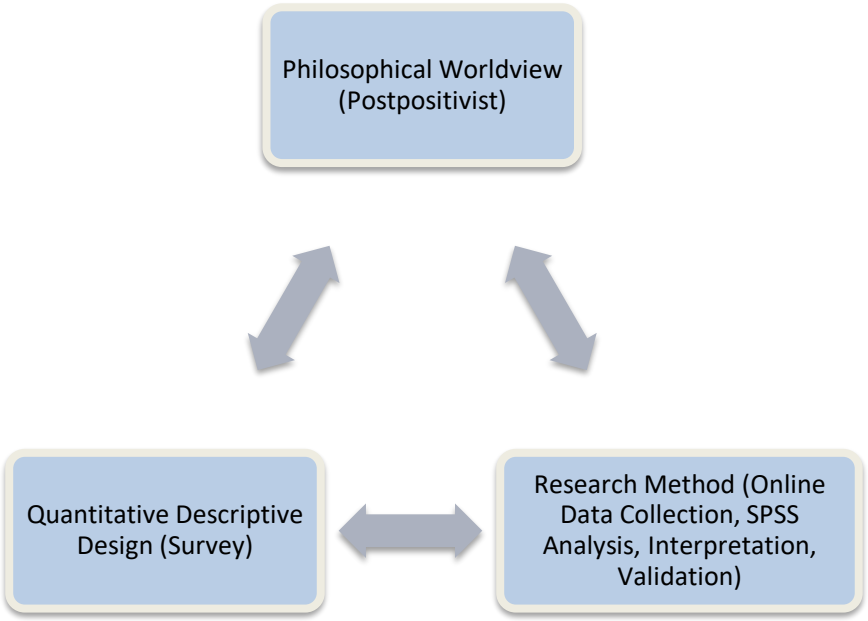

FIGURE 42: DESIGN FOR THE RESEARCH (ADAPTED FROM CRESWELL, 2017)

3.3 The survey stimuli – Gucci AR smartphone app

The survey was conducted online, and the Gucci AR smartphone app was a stimulus for the participants. This AR smartphone app was employed as a part of a survey since it is available on both Apple and Google platforms, and it has options of traditional two-dimensional images of products for shopping and three-dimensional AR-enabled objects of products for shopping. The app is also easy to navigate, compared with other AR-enabled smartphone apps in the Apple Store and Google Play Store. Respondents downloaded the app before they started with the survey. The screenshots in Figure 43 demonstrate how to navigate the Gucci app.

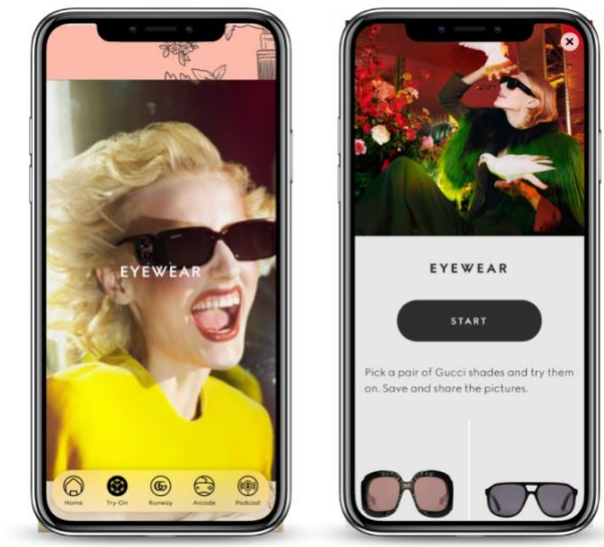

FIGURE 43: SURVEY'S STIMULUS: GUCCI AR SMARTPHONE APP (MOUSA, 2023)

The products promoted in the Gucci smartphone app were Gucci sunglasses. The survey's instructions demonstrated how to try AR-enabled products to the survey group, where participants were free to try on any product available as AR objects using the Gucci smartphone app. The interviewees downloaded and launched the AR app, selected the eyewear option in the AR-product list, and were able to see their faces on the screen with sunglasses digitally layered on their faces. This procedure was necessary to test the effect of AR technology in the smartphone app as a stimulus on behavioural intentions. Figure 44 demonstrates the options to try on the eyewear and the opportunity to instantly purchase a pair of sunglasses. It is important to note that the respondents were not required to provide their photos due to the privacy matters, and the pictures in Figure 44 are images of the researcher of this thesis.

FIGURE 44: SURVEY'S STIMULUS: GUCCI EYEWEAR VIRTUAL TRY-ON (MOUSA, 2023)

3.4 Questionnaire development

The questions for the survey adapted existing scales from the literature review. The original constructs are part of the Pantano (2017) research about Ray Ban eyewear. Hence this survey's adapted the Pantano (2017) research constructs. The survey questionnaire measures these constructs, as shown in Table 1:

TABLE 1: ORIGINAL SURVEY MEASURES AND ADAPTED CONSTRUCTS

Variables	Original Constructs	Adapted Constructs
Interactivity & Telepresence	The virtual try-on allows me to interact with it to receive tailored information about glasses.	The virtual try-on allows me to interact with it to receive tailored information about glasses.
	The virtual try-on has interaction features, which help me to come to	The virtual try-on has interaction features, which help me to come

	a decision in the selection of eyewear.	to a decision in the selection of eyewear.
	I am able to interact with the virtual try-on in order to get information tailored to my specific needs.	I am able to interact with the virtual try-on in order to get information tailored to my specific needs.
	The degree of interaction with the virtual try-on is sufficient.	The degree of interaction with the virtual try-on is sufficient.
Utilitarian Value	For me the virtual try-on has great value.	For me the virtual try-on has great value.
	The virtual try-on provides beautiful ideas for eyeglasses.	The virtual try-on provides beautiful ideas for eyeglasses.
	The virtual try-on is very inspiring in terms of eyeglasses.	The virtual try-on is very inspiring in terms of eyeglasses.
	The virtual try-on is a perfect aid to come to a decision in the selection of eyewear.	The virtual try-on is a perfect aid to come to a decision in the selection of eyewear.
Hedonic Value	Using the virtual try-on is really funny.	Using the virtual try-on is really funny.
	The virtual try-on is a nice gimmick.	The virtual try-on is a nice twist.
	It is fun to discover virtual try-on.	It is fun to discover the virtual try-on.
	The virtual try-on invites you to discover Ray-Ban online shop.	The virtual try-on invites me to discover GUCCI online shop.
Ease of use	I found the virtual try-on to be very easy to use.	I found the virtual try-on to be very easy to use.
	The virtual try-on was intuitive to use.	The virtual try-on was intuitive to use.
	It was easy to learn how to use the virtual try-on.	It was easy to learn how to use the virtual try-on.

	Handling the virtual try-on was easy.	Handling the virtual try-on was easy.
Attitudes towards using the AR smartphone app	I am positive about the virtual try-on.	I am positive about the virtual try-on.
	The virtual try-on is so interesting that you just want to learn more about it.	The virtual try-on is so interesting that you just want to learn more about it.
	It just makes sense to use the virtual try-on.	It just makes sense to use the virtual try-on.
	The virtual try-on is a good idea.	The virtual try-on is a good idea.
	Other people should also use the virtual try-on.	Other people should also use the virtual try-on.
Behavioural Intentions	If I were to buy glasses in the future, I would...	If I were to buy glasses in the future, I would...
	…use Ray-ban shop and the virtual try-on immediately.	…use GUCCI shop and the virtual try-on immediately.
	...give Ray-ban shop and the virtual try-on priority over an optician's shop.	...give GUCCI shop and the virtual try-on priority over an optician's shop.
	...give Ray-Ban shop and the virtual try-on priority over other online shops.	...give GUCCI shop and the virtual try-on priority over other online shops.
	I will recommend using Ray-Ban shop and the virtual try-on to my friends.	I will recommend using Gucci shop and the virtual try-on to my friends.
	I will use Ray-Ban shop and the virtual try-on regularly in the future.	I will use GUCCI shop and the virtual try-on regularly in the future.

The survey employed a 7-point Likert scale. Likert scales measure degrees of attitudes or opinions of the participants (Creswell, 2017). The scale consisted of questions or statements with seven possible answer options, and the responses reflected different levels of respondents' agreement with the questions. The respondents indicated their agreement or disagreement with the statements mentioned above in Table 1 regarding the object under study using a scale

containing seven categories. The extreme categories include Strongly Disagree to Strongly Agree for the statements. Figure 45**Error! Reference source not found.** is an example of one of the Likert scale questions from the survey. This question measures interviewees' perception of the easiness of the smartphone app. The questionnaire also included standard questions about age, gender, location, and previous experience of usage of the app.

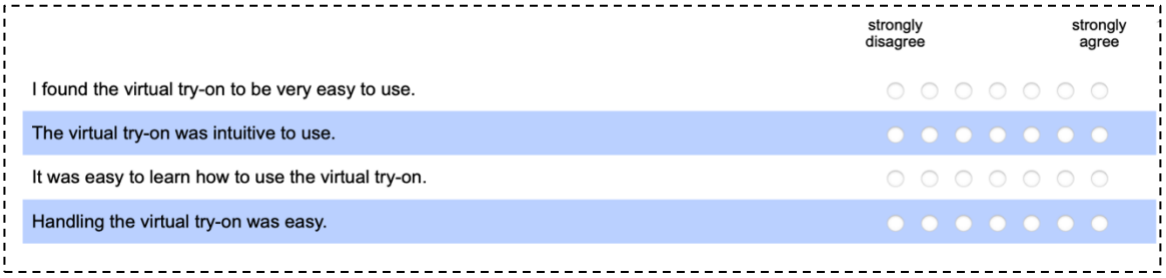

FIGURE 45: EXAMPLE OF A QUESTION FROM THE SURVEY QUESTIONNAIRE

3.5 Pre-test

A pre-test study took place to ensure the accuracy of the data collected. The pre-test examinate the logical flow of the questions and gathered data to improve the quality and efficiency of the main study (Ruel, Wagner, & Gillespie, 2020). The pre-test of this research collected feedback from respondents required to review and modify the questionnaire to increase the validity of the results. Therefore, five individuals got the pre-test questionnaire to evaluate the clarity of the questions, as well as to make sure that the smartphone application is the same for both iOS and Android users. After conducting the pre-test and receiving feedback from the respondents, the interview questions were updated accordingly to the received comments. The modified version of the interview questions was used in the research.

3.6 Sample description

The quantitative survey requires sufficient respondents, and a minimum of 50 respondents is compulsory. Otherwise, the research becomes impossible due to the small number of interviewees (White, 2022). Therefore, for the primary research, although a total of 320 responses started with the questionnaire, 100 participants' answers were used for the data analysis, as 220 of the survey were not completed. The respondents were from countries of the EU (Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden) and the UK, as shown in Figure 46.

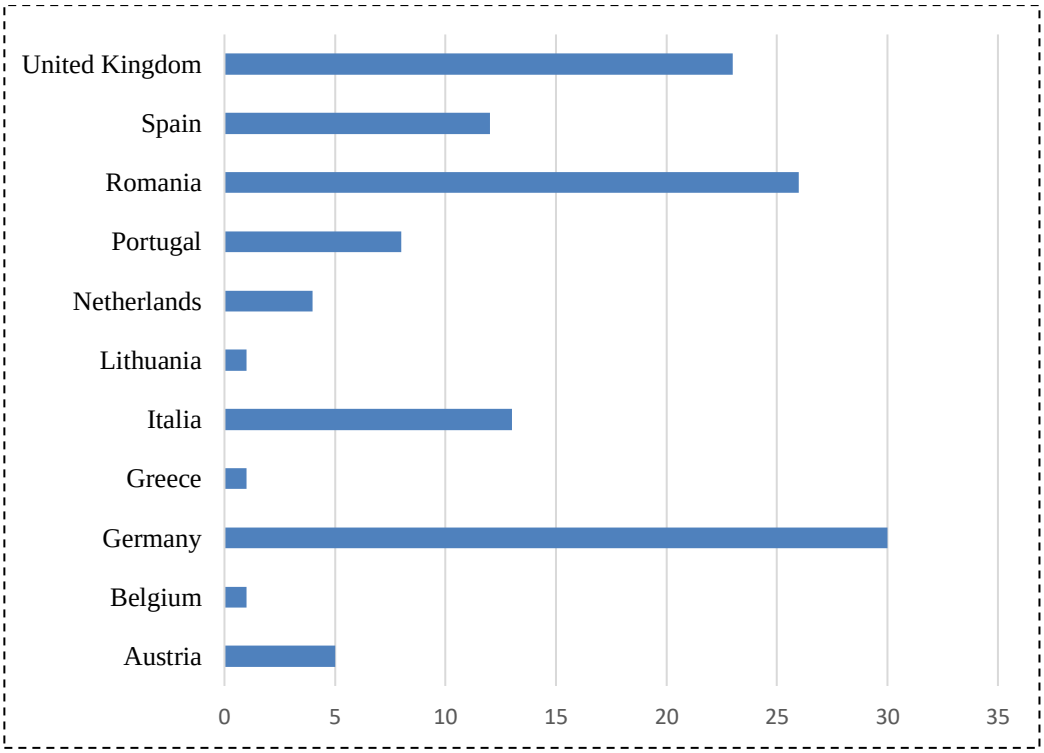

FIGURE 46: ORIGINS OF THE RESPONDENTS IN THE RESEARCH

The age of the respondents for the survey was set between 18 and 80 years old. The results are that 15% of the respondents were 18-25 years old, and another 15% were 45-66 years old. The majority was 35-46 years old, constituting 70% of the respondents. The target sample was chosen based on their interests, including fashion, accessories, and online shopping, ensuring that the respondents are interested in the stimulus used for this research. The selection of genders of the respondents was male, female, and other. 53% of interviewees identified themselves as male, and 47% of respondents stated that their sex is female. Moreover, to ensure that the survey includes both technically advanced users and beginners, a question was asked to the interviewees: “Have you ever tried the AR try-on Gucci smartphone app before this survey?”, and the results were to satisfaction as it included all types of users as shown in the below Figure 47. This approach also ensured that the first-time and experienced users would give their impression opinions in the survey.

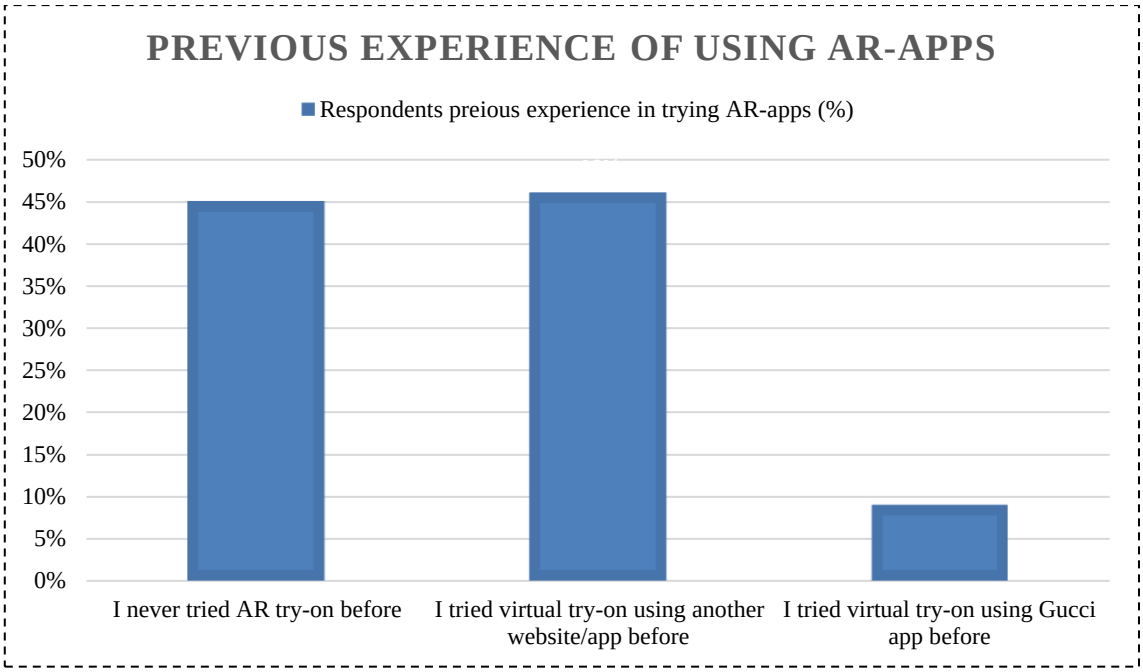

FIGURE 47: PREVIOUS EXPERIENCE OF THE RESPONDENTS IN USING AR BEFORE THE SURVEY

3.7 Data preparation

The survey's data preparation and analysis method used the statistical approach employing the IBM SPSS Statistics software. SPSS is an analytical software that allows statistical data analysis, covering all steps of data analysis from planning and data collection to direct examination and reporting (IBM Corporation, 2023). As a part of data preparation for the research, the results from the respondents with at least one missing value was eliminated. Also, those respondents who did not complete the survey were not considered for the data analysis. If a participant had one missing value, the data analysis did not include this participant's answer. Additionally, the data collected from the pre- test participants are not part of the analysed data set, as the questionnaire had some changes after completing the surveys in the pre-test stage. Also, the test answers from the Clickworkers website were also removed. Using the SPSS option case processing summary, 220 respondents did not qualify as they either did not answer the check questions or abandoned the survey.

As mentioned, attention check questions were part of the survey to ensure people have downloaded the Gucci smartphone app. Therefore, if a survey respondent did not answer these questions correctly, their answers were not part of the data analysis. Figure 48 illustrates one of the survey's attention checks questions. Utilising this question ensured that people downloaded the Gucci app, launched the app, and experienced the AR virtual try-on. At the beginning of the survey, the instruction warned the participants that if they did not answer this check question correctly, the survey would end without possibly retaking it.

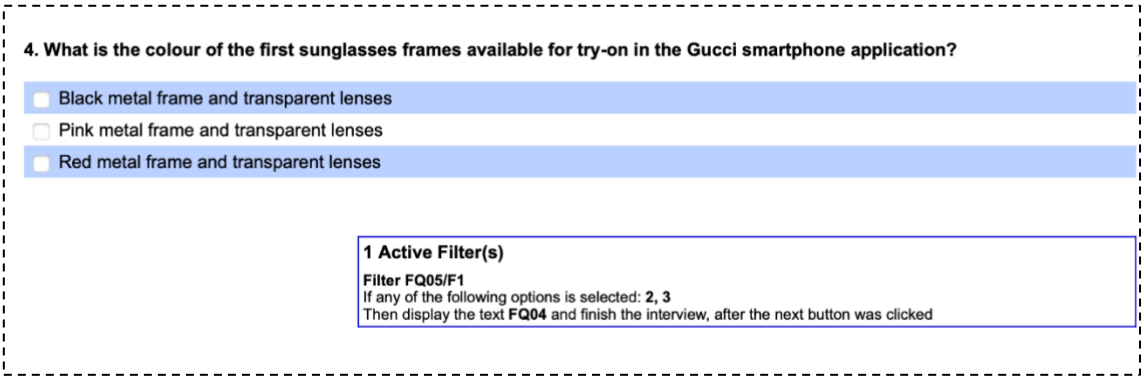

FIGURE 48: EXAMPLE OF AN ATTENTION CHECK QUESTION IN THE SURVEY

4 RESULTS AND DISCUSSION

4.1 Scale reliabilities check

In the data analysis stage, scale reliabilities assessment ensured satisfactory psychometric properties of the employed scales. Reliability comes to the forefront when objective models use variables derived from summed scales as predictive components (Creswell & Clark, 2011). Because the added scales consist of interrelated items that measure underlying variables, it is essential to know whether the same set of items would result in the same responses to the same questions if they were reformulated and re-asked to the same respondents. Variables are reliable only if they give stable and reliable answers over several test runs (Creswell, 2017). The SPSS option to calculate Cronbach's Alpha asserted the reliability of variables, and the results are presented in Table 2.

TABLE 2: RELIABILITY ANALYSIS

Construct & items measuring the construct	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Interactivity and Telepresence			**.839**
The virtual try-on allows me to interact with sunglasses to receive tailored information about this eyewear.	0.623	.818	
The virtual try-on has interaction features, which help me to come to a decision in the selection of eyewear.	0.592	.831	
I am able to interact with the virtual try-on in order to get information tailored to my specific needs.	0.768	.753	

The degree of interaction with the virtual try-on is sufficient.	0.732	.772	
Utilitarian Value			**.910**
For me the virtual try-on has great value.	0.792	.886	
The virtual try-on provides beautiful ideas for eyeglasses selection.	0.762	.897	
The virtual try-on is very inspiring in terms of eyeglasses selection.	0.784	.897	
The virtual try-on is a perfect aid to come to a decision in the selection of eyewear.	0.852	.864	
Hedonic Value			**.787**
Using the virtual try-on is really funny.	.533	.774	
The virtual try-on is a nice twist.	.602	.742	
It is fun to discover the virtual try-on.	.736	.666	
The virtual try-on invites me to discover Gucci smartphone app.	.565	.755	

Ease of Use			**.930**
I found the virtual try-on to be very easy to use.	.843	.907	
The virtual try-on was intuitive to use.	.801	.925	
It was easy to learn how to use the virtual try-on.	.853	.905	
Handling the virtual try-on was easy.	.868	.901	
Attitude			**.894**
I am positive about the virtual try-on.	.803	.856	
The virtual try-on is so interesting that you just want to learn more about it.	.642	.903	
It just makes sense to use the virtual try-on.	.778	.861	
The virtual try-on is a good idea.	.708	.880	
Other people should also use the virtual try-on.	.825	.852	
Behavioural Intentions			**.906**

…use Gucci smartphone app and the virtual try-on immediately.	.802	.878
…give Gucci smartphone and the virtual try-on priority over an optician`s shop.	.683	.903
…give Gucci smartphone and the virtual try-on priority over other online shops.	.738	.892
I will recommend using Gucci smartphone app and the virtual try-on to my friends.	.809	.876
I will use Gucci smartphone app and the virtual try-on regularly in the future.	.799	.878

Andy Field (2019) stated that Cronbach's Alpha should typically be more significant than 0.70. However, it is pointed out in the book that if a construct has less than ten items on a scale, it is difficult to get a high Alpha number. So, in this case, the number should be greater than 0.5, and the item should be deleted if there is a number less than 0.5. In the case of this study, all Cronbach's Alpha numbers are more significant than 0.78, and the constructs were maintained in the survey.

Moreover, excluding one of the items from the constructs will not increase Cronbach's alpha value. Therefore, all items in each construct are maintained. Also, by examining the corrected item-total correlation values, they are more significant than 0.3. According to Andy Field (2019), it indicated internal consistency, so no items need to be deleted.

4.2 Hypotheses testing

The research hypotheses were tested using regression analysis. The regression analysis identifies the relationship between dependent and independent variables (Field, 2019). Figure 49 presents the hypotheses and the methods used to test the hypotheses in this research paper.

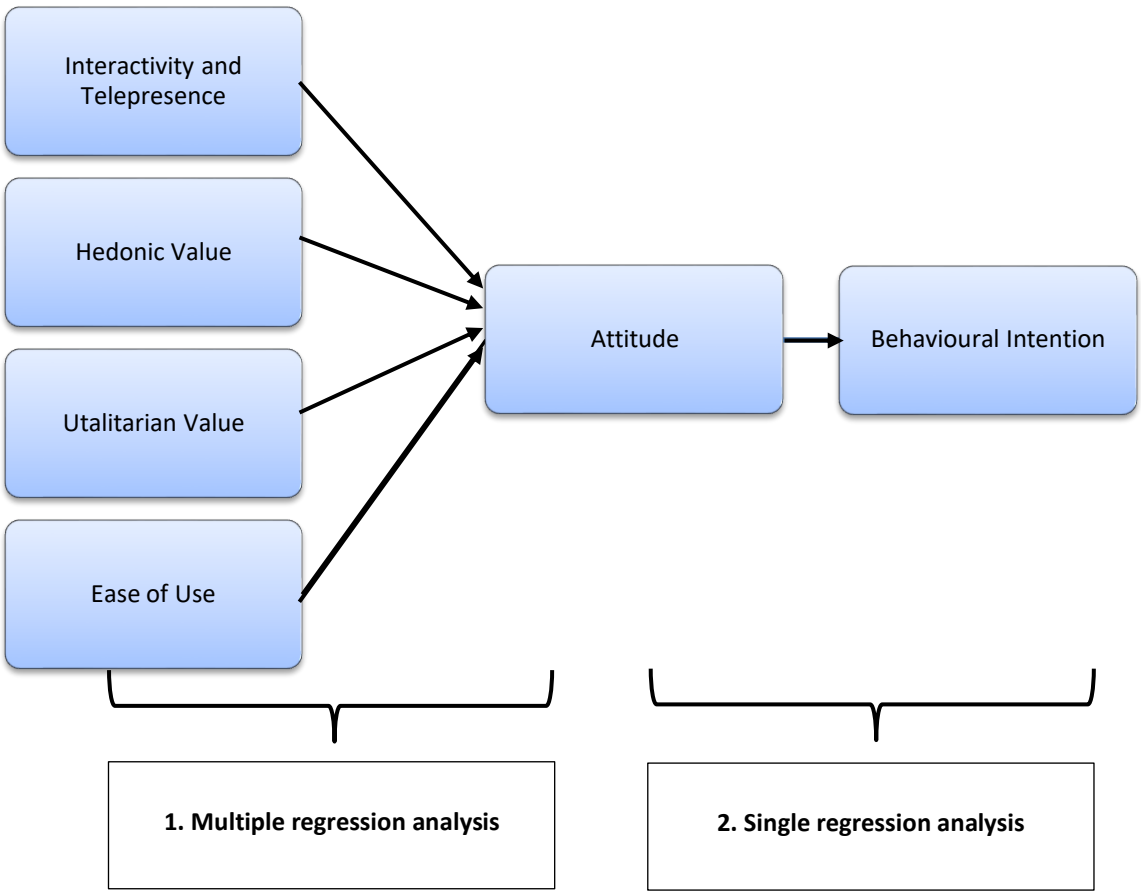

FIGURE 49: RESEARCH HYPOTHESES AND METHODS FOR TESTING THE HYPOTHESES

4.2.1 Stage 1 – multivariate regression analysis

As the first stage of the analysis, the influencing factors of the attitude towards the app were assessed to test H1 – H4 using multivariate regression analysis. In this analysis, the independent variables are interactivity and telepresence, utilitarian value, hedonic value ease of use, and the dependent variable is the attitude towards smartphone apps. As shown in the model summary in Table 3, the R square equals 0.808, and the adjusted R square is 0.800, meaning that the independent variables account for 80% of the variance in the dependent variable.

TABLE 3: R-VALUES FOR MULTIVARIATE REGRESSION ANALYSIS

R	R Square (R^2)	Adjusted R Square
0.899	0.808	0.800

Moreover, these independent variables are all positively related, as shown in Table 4, so the higher an individual unit of any of these four attributes of the smartphone app, the more they seem to change their attitude towards it. However, it is essential to note that correlation does not mean causation (Field, 2017). This approach implies that, for example, a change in

interactivity and telepresence would influence other variables, including utilitarian value, hedonic value, and ease of use, and vice versa.

TABLE 4: PEARSON'S CORRELATION FOR MULTIVARIATE REGRESSION ANALYSIS

Pearson Correlation					
	(1)	(2)	(3)	(4)	(5)
(1) Attitude Towards the AR Smartphone App	1.000	.753	.846	.787	.648
(2) Interactivity and Telepresence	.753	1.000	.755	.648	.427
(3) Utilitarian Value	.846	.755	1.000	.766	.515
(4) Hedonic Value	.787	.648	.766	1.000	.671
(5) Ease of Use	.648	.427	.515	.671	1.000

The coefficients table, Table 5, presents the regression analysis results for H1-4 and whether the variables are statistically significant or lack statistical significance. Table 5 also shows the relationship in change between dependent and independent variables.

- Firstly, by looking at unstandardised coefficients in Table 5 for the interactivity and telepresence variable, the attitude towards the AR smartphone app increases by 0.204 for every unit of change in the interactivity and telepresence variable. Respectively, for every unit of change of the utilitarian value, the attitude towards the AR smartphone app increases by .396. Then, for every unit of change of the hedonic value, the attitude towards the AR smartphone app increases by .155. Also, for every unit of change of the ease of use, the attitude towards the AR smartphone app increases by .221.
- Secondly, examining the standardised coefficients Beta presented in Table 5, the utilitarian value has the highest coefficient with the attitude towards the AR smartphone app (.448), followed by the interactivity and telepresence variable (.223), and ease of use variable (.221). The hedonic value variable has a minor coefficient with the attitude towards the AR smartphone app (.150).

- Thirdly, Table 5 presents that the interactivity and telepresence variables have positive and statistically significant coefficients with the dependent variable (attitude towards the AR smartphone app) as p = .002. The same applies to utilitarian value and ease of use where p is <.001, which also means these two variables influence the attitude towards the AR smartphone app. Therefore, the independent variables of interactivity and telepresence, utilitarian value, and ease of use affect the attitude towards the AR smartphone app variable as they are < 0.05, as shown in Table 5. However, the hedonic value is not statistically significant as p equals .069, so the p-value is above 0.05, which indicates that the hedonic value has no significant influence on attitude.

Thus, the H1, H2, and H4 hypotheses are confirmed and maintained. The H3 hypothesis is rejected. These results show that interactivity and telepresence, utilitarian value, and ease of use positively increase the individual's attitudes towards using the AR smartphone app. The analysis also indicates that the hedonic value variable did not influence the individual's attitude towards using the AR smartphone app in this study.

TABLE 5: COEFFICIENTS FOR MULTIVARIATE REGRESSION ANALYSIS

Independent variables	Unstandardised coefficients B	Standardised coefficients Beta	Significance
Interactivity and Telepresence	.204	.223	.002
Utilitarian Value	.396	.448	<.001
Hedonic Value	.155	.150	.069
Ease of Use	.221	.221	<.001

As per the heterogeneity of variance shown in Figure 50, the standardised residuals are reasonably distributed and constant across the variable, as shown in the histogram of the dependent variable. Also, as displayed in the P-P Plot, the dots are lined up moderately close to the diagonal line. Besides, the standardised residuals plotted against the standardised predicted values correlate with the downward slope as per the Scatterplot diagram. This diagram shows accurate estimates of coefficients, which may have been disturbed by the hedonic value variable.

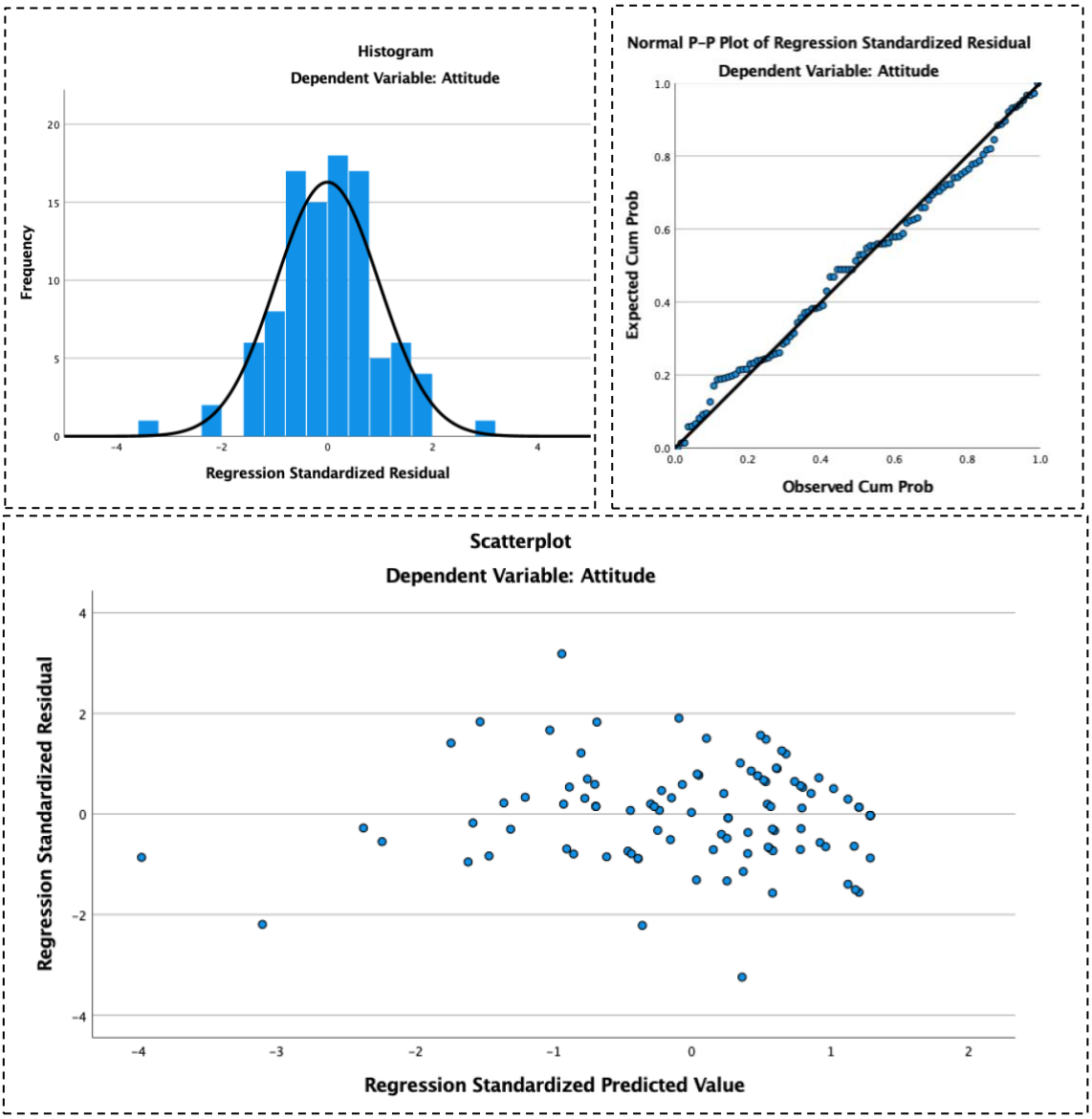

FIGURE 50: GRAPHICAL REPRESENTATION OF MULTIVARIATE REGRESSION ANALYSIS

4.2.2 Stage 2 – single regression analysis

In the second data analysis stage, hypothesis H5, the impact of attitudes towards the AR smartphone app variable on the behavioural intentions' variable, was tested using a single regression analysis. The independent variable is an attitude towards the AR smartphone app, and the dependent variable is behavioural intentions towards using the AR smartphone app. R square is 0.43, indicating that about 43% of the variance can be explained as a function of the predictor of attitude towards the AR smartphone app variable, as shown in Table 6.

TABLE 6: R-VALUES FOR SINGLE REGRESSION ANALYSIS

R	R Square (R^2)	Adjusted R Square

0.662	0.438	0.433

Also, in the case of the independent variable (attitude towards the AR smartphone app), the higher an individual unit of attitude towards the AR smartphone app, the more they seem to change their behavioural intentions, as shown in Table 7.

TABLE 7: PEARSON'S CORRELATION FOR SINGLE REGRESSION ANALYSIS

Pearson's Correlation	
	Behavioural Intention
Attitude Towards the AR Smartphone App	.662

As shown in Table 8, the corresponding p-value is below <.001. That confirms that there is a relationship between the variables, and this is a positive relationship between the attitude towards the AR smartphone app and behavioural intentions, where for every unit change of the attitude variable, the behavioural intentions variable changes by .847 (unstandardised coefficients B). The change in coefficient is also confirmed by the standardised coefficients Beta equal to .662.

TABLE 8: COEFFICIENTS FOR SINGLE REGRESSION ANALYSIS

Independent variables	**Unstandardised coefficients B**	**Standardised coefficients Beta**	**Significance**
Attitude	.847	.662	<.001

The histogram in Figure 51 shows a roughly normal distribution of the standardised residuals aligned with the black line of normality. Also, observing the P-P Plot, the values of the dots are lined up close to the diagonal, again with some violation in the values that deviate slightly from the line at a few points. The scatterplot data shows the relationship between the regression standardised predicted value and the regression standardised residual, which indicates that there might be a negative correlation indicating a potential heteroskedasticity issue. However, it is not very strong, so the assumption is that it is minor and has no effect on the variances.

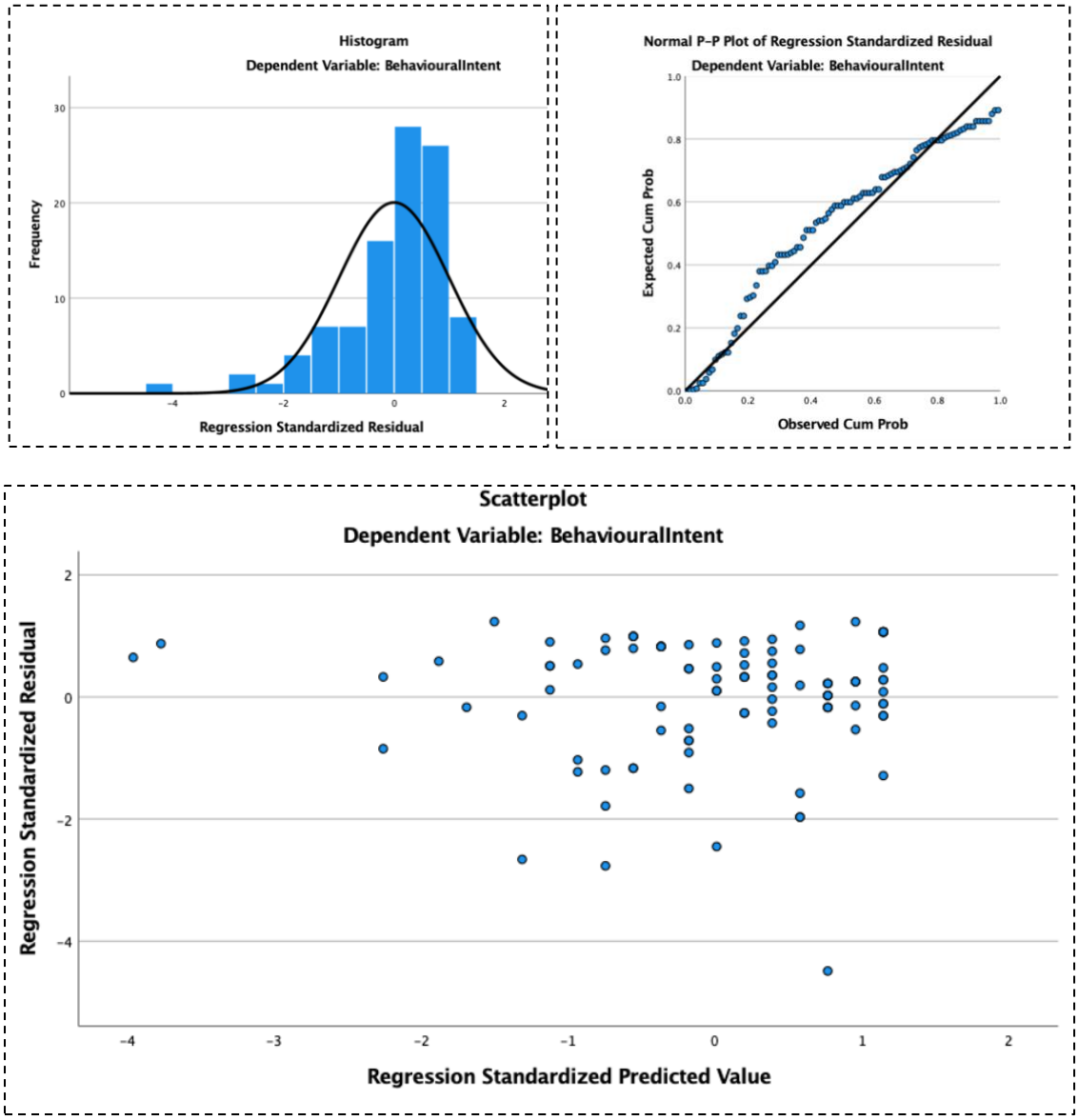

FIGURE 51: GRAPHICAL REPRESENTATION OF SINGLE REGRESSION ANALYSIS

Based on the data analysis of the single regression analysis show, H5 can also be accepted. Therefore, hypotheses H1, H2, H4 and H5 are retained in this research, and hypothesis H3 is rejected. Consistent with the literature review of this study, this research found that participants who reported using the AR smartphone app were also keener to continue using the AR smartphone app in the future. These results further support the hypotheses that AR smartphone apps as a marketing tool influence customers' behavioural intentions in the fashion industry. Below, Table 9 is a summary of the hypotheses and the analysis approach.

TABLE 9: SUMMARY OF HYPOTHESES AND ANALYSIS APPROACH

Hypotheses	Analysis Approach	Conclusion
H1: Interactivity and telepresence of an AR smartphone app positively influences the attitude towards using the AR app.	Multiple regression analysis	H1 maintained
H2. Utilitarian value of an AR smartphone app positively influences the attitude towards using the AR app.	Multiple regression analysis	H2 maintained
H3. Hedonic value of an AR smartphone app positively influences the attitude towards using the AR app.	Multiple regression analysis	H3 rejected
H4: Ease of use of an AR smartphone app positively influences the attitude towards using the AR app.	Multiple regression analysis	H4 maintained
H5: Attitudes towards using an AR smartphone app increase behavioural intentions to continue using the AR app.	Single regression analysis	H5 maintained

5 CONCLUSION

5.1 Summary

This research explored the impact of the Gucci AR smartphone app on customers' behavioural intentions in the fashion industry. Chapter 1 discussed the context of the previous research on the subject, highlighted the significance of this topic in marketing, established a gap in the matter of augmented reality, and then outlined the research objectives and the central research question – "What is the influence of augmented reality apps on behavioural intentions in the fashion industry?". Chapter 2 explored the definition of augmented reality and the history of employing AR technology in different industries, including fashion. Chapter 2 also discussed how AR technology shifted from laboratories to the retail sector and how retail brands now employ technology in their marketing strategy. Key technology implementation areas include AR virtual dressing mirrors, AR-QR codes, AR social media filters, and AR smartphone apps. In addition, Chapter 2 identified several attributes of the AR apps that may influence customers' attitudes towards such apps and behavioural intentions to use these apps. Interactivity, telepresence, hedonic, utilitarian, and ease of use appeared to be influencers on customers' attitudes towards AR smartphone apps and behavioural intentions. Chapter 2 also proposed five hypotheses based on the literature review to validate the assumption that AR smartphone apps may influence customers' behavioural choices. Chapter 3 discussed the methodology for testing the hypotheses, including the philosophical worldview of the research, the research design, research methods and instruments. Chapter 3 also identified that the most suitable worldview of the study is postpositivist, which includes theory development and testing the data through testing variables correlations. The employed research design was quantitative to gather numerical information about the phenomenon and statistically evaluate the properties of the phenomenon. The research instruments included online tools such as the soSci online survey tool to collect data and the Clickworker tool to implement the data collection. Chapter 3 also described the survey stimuli, the Gucci smartphone app available on Android and Apple devices. Chapter 3 also discussed the questionnaire development, pre-test, and study sample. Chapter 4 presented the data analysis results and a discussion of these results. This part of the study also discussed how hypotheses were tested to gain conclusions. Hypotheses testing was conducted using multivariate regression analysis for hypotheses H1-4 and single regression analysis for hypothesis H5. The results were interpreted and presented as figures, tables, and graphs. The last Chapter 5 is this section, which puts the research findings into the context of previous literature and summarises this research. Chapter 5 also presents additional information for the research, including the contribution to the current knowledge of the topic, the study's strengths and limitations, and suggestions for future research.

5.2 Contribution to knowledge

This study enriches the current marketing knowledge about how vital the attributes of the AR smartphone app are and how they affect the customer's attitudes. As mentioned earlier in this research paper, AR technology serves as a marketing opportunity to enable brands to create a new communication channel with customers (Vilkina & Klimovets, 2019). Companies employ AR smartphone apps to engage customers and convince them to buy the products. Prior studies

have noted the importance of AR technology as it enables businesses to digitise and visualise marketing and product content, which allows a potential client to remotely get information about products' shape, colour, and size and virtually interact with these products (Riar, Korbel, Xi, Zarnekow, & Hamari, 2021). Customers using AR can examine a product from any angle and rotate it 360 degrees on their smartphones. Besides, in the case of fashion garments and accessories, customers can virtually try on clothing, shoes, or accessories. Brands improve customers' experience with AR, where the customers' environment enhances with three-dimensional digital models, animations, and sounds (Yassir & Krit, 2019; El Seoud & Taj-Eddin, 2019).

Firstly, this research's multiple regression analysis results support the theory that interactivity and telepresence of AR smartphone apps positively influence the attitude towards using the AR smartphone app. The finding aligns with the previous research papers that interactivity and telepresence are vital factors affecting the customer's attitude and cognitive and behavioural responses (Fuadi, Hidayanto, Inan, & Phusavat, 2021; Javornik, 2016; Kowalczuk, Siepmann, & Adler, 2021; Pantano, Reseb, & Baierc, 2017). Interactivity and telepresence make shopping more convenient for customers as it offers them to virtually assess the three-dimensional products at the convivence of their home.

Secondly, the multiple regression analysis results of this research discovered that the utilitarian value of AR smartphone apps positively influences the attitude towards using the AR app by offering convenience, simplifying the shopping process, and making more informed decisions. This statement links to the previous academic papers that highlight the importance of the influence of utilitarian factors on customers' attitudes (Lavoye, Mero, & Tarkiainen, 2021; Pantano, Reseb, & Baierc, 2017; Viera, 2020). As mentioned in the literature review, utilitarian value meets consumers' need for efficiency, helpfulness, functionality, necessity, practicality, and rationality when choosing products.

Thirdly, the multiple regression analysis results of this research validated the assumption that ease of use of AR smartphone apps positively influences the attitude towards using the AR app. This statement correlates with the theory mentioned in the literature review, where the researchers presented that ease of use of technology is a motivation towards using augmented reality technology (Kim, Hwang, Zo, & Lee, 2016; Pantano, Reseb, & Baierc, 2017; Rese & Baier, 2017). Previous studies state that if the AR technology provides interactivity and hedonic value, but the system is not easy to use, the desired change in customers' attitudes might not be achievable (McLean & Wilson, 2019; Zagorc & Bernik, 2022).

Fourthly, this research's single regression analysis results validate the assumption that attitude towards AR smartphone apps positively influences an individual's behavioural intentions. Thus, improving the attitudes towards AR smartphone applications will improve customers' behavioural intentions to continue using this app. A comparison of these research findings with earlier studies confirms that attitude is an essential part of successful technology functions that could impact customers' behavioural intentions (Jiang, Wang, & Yuen, 2021; Wu & Kim, 2022).

Fifthly, although the existing literature emphasises that a multisensory presentation of a product creates an effect of a game that is playful and engaging, which increases the hedonic value and

positively affects customer's attitudes (Hsu, Tsou, & Chen, 2021; Kowalczuk, Siepmann, & Adler, 2021; Pallant, Romano, & Sands, 2021; Pantano, Reseb, & Baierc, 2017; Park & Yoo, 2020), the findings of this research do not support this theory. The result of this study shows that the hedonic value of AR smartphone apps does not influence the attitude towards using the AR smartphone app. The reasons could include the unavailability of preferred styles of the presented eyewear in the Gucci smartphone app, low interest or personal dislike of the brand, not being able to afford the brand's products, or the negative effect of technology anxiety, as also proposed by previous research on the IKEA AR smartphone app (Zagorc & Bernik, 2022).

To summarise, the thesis provides insight into how AR as a marketing tool can influence customers' behavioural intentions in the European fashion industry. From a practical viewpoint, these research results set up an understating of how businesses can leverage augmented reality apps as a part of their business marketing campaign to influence customers' behavioural intentions. Based on the results of the data analysis, the factors leading to an increase in customers' behavioural intentions include the AR smartphone apps' interactivity and telepresence, utilitarian values, and ease of use of an AR smartphone app. As companies improve the interactivity and utilitarian value of using AR smartphone apps and make them easier to use, customers' behavioural intentions to continue using the apps will also increase.

5.3 Implications for relevant stakeholders

Although AR technology is still a new marketing tool for companies, it has already been adopted by various fashion brands that foresee some benefits of this tool. As discussed earlier in the literature review chapter, there are several benefits for companies employing the technology. For example, AR smartphone apps may help businesses increase customer engagement and interactions. This approach will help companies gain better exposure to retail markets and higher revenues. Introducing the technology also brings excitement that helps companies improve branding awareness and relationships with buyers. It also offers better market exposure and potentially better revenues for the companies. Companies can stand out amongst their competitors using the technology's wow effect, among other AR technology's benefits.

The study has investigated that interactivity and telepresence, utilitarian value, and ease of use significantly affect customers' attitudes towards AR smartphone apps, affecting customers' behavioural intentions. Although the survey was quantitative, the survey had a field for respondents to leave any feedback if they would like to, and several interviewees mentioned that the eyewear "looks too virtual", "unrealistic", and "it could be better" that could have affected the hedonic value of using the app. Therefore, the technology implementation must be well-tested and impeccable for the customers. Another important insight is that only half of the target sample had previously tried AR technology. These findings indicate that marketers need to promote the technology more sufficiently and increase customers' awareness of such options on their smartphones or laptops. One of the implications for the users is a new user experience of products which require technology proficiency. In this scenario, not everyone can use AR technology to try on eyewear or any other product virtually. Furthermore, a privacy issue is present in AR smartphone apps as such technology requires the camera to be on, which records the users and their surroundings.

5.4 Limitations and future research

The research strategy complies with the goal and objectives of the study, allowing to obtain reliable and objective results. The results of scale reliabilities show the positive relationship between the independent variables (interactivity and telepresence, utilitarian value, ease of use, attitude) and behavioural intentions that answers the research question and supports the idea that AR apps positively influence behavioural intentions in the fashion industry. The first limitation is that the research was done remotely as an online study restricting the assessment of respondents' reactions to the AR smartphone app and overview of their interaction with the AR technology. Secondly, the selected sample had some restrictions in terms of age and location, as well as a mandatory criterion to have an interest in the fashion industry. Thirdly, the results could have been limited and insufficient to describe the problem in depth as the quantitative design does not allow for evaluating participants' views and opinions. Fourthly, the research used the Gucci smartphone app as a stimulus, which makes the results not proven to be applicable to other AR smartphone apps. Fifthly, the study is limited to one type of brand and product, which is Gucci eyewear, and people may or may not favour this brand, the brand's prices, or the eyewear in general. Lastly, the research was focused only on European countries, so it might not apply to other regions. Therefore, there are some suggestions for future studies that could make the research more applicable to a larger sample as well as improve the research validity:

a. The survey setup could be implemented in a workshop to analyse the reactions and emotions of respondents while using an AR smartphone app. A researcher would be able to take notes of the participants' responses and attitudes towards AR smartphone apps to increase the accuracy of the results.

b. A more comprehensive range of products might be tested in the survey to improve the reliability of the results. For example, the items could include sneakers or makeup items.

c. Other brands also could be considered. The brands should not only be simply another company, but the products should also be in different price ranges to cover the interests of people with other incomes. This approach could also benefit companies to discover in which products people are more interested when trying products virtually.

d. Further studies could include a mixed design approach combining quantitative and qualitative designs. This approach will reveal the circumstances and context of reasons the hedonic value of AR smartphone apps does not influence customers' attitudes towards it.

e. The last recommendation for future research is to expand the target sample. As this research employed 100 surveys, more extensive surveys could improve the validity of the results. Another approach is to expand the study to other countries. As cultures vary from country to country, and importance of factors such as interactivity, hedonic and utilitarian values, and ease of use might differ.

This research reached the objectives and provided reliable results. Future studies could provide results applicable to different and more significant populations.

6 BIBLIOGRAPHY

Adam, M., & Pecorelli, M. (2018). Recommendations in augmented reality applications–the effect of customer reviews and seller recommendations on purchase intention and product selection. *European Conference on Information Systems*.

Aggarwal, R., & Singhal, A. (2019). Augmented Reality and its effect on our life. *International Conference on Confluence the Next Generation Information Technology Summit* (510-515). Noida, India

Akdag, F., & Baydogan, M. (2018). Evaluation of Augmented Reality in Architecture Through Sample Applications. *Eurasian Journal of Civil Engineering and Architecture, 1*(1), 42-52.

Al-Bahrani, A., Mahon, D., Mateer, G. D., & Murphy, P. R. (2018). Pokémon GO: Applications for the Economics Classroom. *Journal of Economics Teaching, 3*(2), 218-231.

Alboaneen, D. A., Alateeq, A., Alqahtani, A., Alfahhad, A., Alqahtani, B., Alamri, R., & Alamri, L. (2020). Internet of things based smart mirrors: a literature review. *2020 3rd International Conference on Computer Applications & Information Security* (1-6). Riyadh, Saudi Arabia

Alves, C., & Reis, J. L. (2022). The Intention to Use E-Commerce Using Augmented Reality - The Case of IKEA Place. *Information Technology and Systems. ICITS 2020. Advances in Intelligent Systems and Computing. 1137*, 114–123. Cham: Springer.

Alzayat, A., & Lee, S. H. (2021). Virtual products as an extension of my body: Exploring hedonic and utilitarian shopping value in a virtual reality retail environment. *Journal of Business Research, 130*, 348-363.

AMA. (2020). *Press Release from the Journal of Marketing: How Customers Search for Hedonic versus Utilitarian Purchases*. Retrieved October 30, 2022, from AMA: https://www.ama.org/2020/03/27/press-release-from-the-journal-of-marketing-how-customers-search-for-hedonic-versus-utilitarian-purchases/.

Amazon.com Inc. (2022). *View In Your Room*. Retrieved July 23, 2022, from Amazon: https://www.amazon.com/adlp/arview.

Andrew, H. (2018). *How augmented reality affects the brain*. Retrieved January 31, 2021, from Immersive Learning: https://www.immersivelearning.news/2019/09/06/how-augmented-reality-affects-the-brain/.

Angelica, G. M., Cristina, L. C., & Jesus, A. M. (2020). Museum, School and Augmented Reality, a Way to Preserve the Ethnic Identity of an Ancestral Culture. *Perspectives and Trends in Education and Technology. 256*, 93-108. Singapore: Springer.

Apple Inc. (2019). *Today at Apple*. Retrieved September 5, 2022, from Apple.com: https://www.apple.com/today/

Apple Inc. (2021). *Clips adds immersive new AR Spaces*. Retrieved September 2, 2022, from Apple.com: https://www.apple.com/newsroom/2021/04/clips-adds-immersive-new-arspaces/

Apple Inc. (2022). *Apple Store*. Retrieved July 10, 2022, from Apple: https://www.apple.com/at/store.

Apple Inc. (2022). *Apple Store*. Retrieved July 2, 2022, from App Store products: https://www.apple.com/app-store/.

Apple Inc. (2022). *Augmented Reality*. Retrieved July 6, 2022, from Apple Developer: https://developer.apple.com/augmented-reality/.

Arghashi, V. (2022). Shopping with augmented reality: How wow-effect changes the equations. *Electronic Commerce Research and Applications, 54*, 101166.

Arth, C. G., Gruber, R., Langlotz, L., Mulloni, T., & Wagner, A. D. (2015). *The History of Mobile Augmented Reality.* Graz, Austria: Institut für Computer Graphik und Wissensvisualisierung, Technische Universität Graz.

ASOS Plc. (2022). *ASOS trials 'See My Fit'.* Retrieved October 7, 2022, from ASOS Plc: https://www.asosplc.com/news/asos-trials-see-my-fit-augmented-reality-tool/.

Bajarin, T. (2022). *The Potential Evolution of Apple's AR Glasses*. Retrieved September 1, 2022, from Forbes: https://www.forbes.com/sites/timbajarin/2022/08/23/the-potential-evolution-of-apples-ar-glasses/?sh=5a92538c6369.

Basso, A. (2017). Advantages, Critics and Paradoxes of Virtual Reality Applied to Digital Systems of Architectural Prefiguration, the Phenomenon of Virtual Migration. *International and Interdisciplinary Conference "IMMAGINI?". 1.* Brixen, Italy.

Basu, A. (2019). *A brief chronology of Virtual Reality.* Atlanta, Georgia, United States: Emory University.

Baytar, F., Chung, T., & Shin, E. (2020). Evaluating garments in augmented reality when shopping online. *Journal of Fashion Marketing and Management: An International Journal, 24*(4), 667-683.

Beck, M., & Criea, D. (2018). I virtually try it … I want it! Virtual Fitting Room: A tool to increase on-line and off-line exploratory behaviour, patronage, and purchase intentions. *Journal of Retailing and Consumer Services* (40), 279-286.

Bellalouna, F. (2021). The Augmented Reality Technology as Enabler for the Digitization of Industrial Business Processes: Case Studies. *Procedia CIRP, 98*, 400-405.

Berman, B., & Pollack, D. (2021). Strategies for the successful implementation of augmented reality. *Business Horizons, 64*(5), 621-630.

Bethan, A., & Cano, M. B. (2020). Store of the future: Towards a (re) invention and (re) imagination of physical store space in an omnichannel context. *Journal of Retailing and Consumer Services, 55*, 101913.

Blanco-Novoa, Oscar, P. F.-L., Vilar-Montesinos, M. A., & Fernandez-Carames, T. M. (2020). Creating the internet of augmented things: An open-source framework to make iot devices and augmented and mixed reality systems talk to each other. *Sensors (Basel), 20*(11), 3328.

Boardman, R., Henninger, C. E., & Zhu, A. (2019). Augmented reality and virtual reality: new drivers for fashion retail. *Technology-driven sustainability*, 155-172.

Bonetti, F., Warnaby, G., & Quinn, L. (2018). Augmented reality and virtual reality in physical and online retailing: A review, synthesis, and research agenda. *Augmented reality and virtual reality. Progress in IS. Springer, Cham*, 119-132.

Bottani, E., & Vignali, G. (2019). Augmented reality technology in the manufacturing industry: A review of the last decade. *ILSE Transactions, 51*(3), 284-310.

Brown, R. (2018). *No-Commitment Manicures: Orly Launches AR Nail Polish Try-On with App Wanna Nails*. Retrieved May 2023, from Beautyindependent: https://www.beautyindependent.com/orly-ar-app-polish-wanna-nails/

Bruno, F., Barbieri, L., Mangeruga, M., Cozza, M., Lagudi, A., Čejka, J., . . . Skarlatos, D. (2019). Underwater augmented reality for improving the diving experience in submerged archaeological sites. *Journal of Ocean Engineering, 190*(106487), 0029-8018.

Burberry Group PLC. (2020). *Burberry Brings Products to Google Search Through Augmented Reality*. Retrieved January 26, 2022, from Burberry: https://www.burberryplc.com/en/news/corporate/2020/burberry-brings-products-to-google-search-through-augmented-real.html.

Caci, B., Scrima, F., Tabacchi, M., & Cardaci, M. (2019). The reciprocal influences among motivation, personality traits, and game habits for playing Pokémon GO. *International Journal of Human–Computer Interaction, 35*(14), 1303-1311.

Chen, Y., & Lin, C. A. (2022). Consumer behaviour in an augmented reality environment: Exploring the effects of flow via augmented realism and technology fluidity. *Telematics and Informatics, 71*, 101833.

Chen, Y., Wang, Q., Chen, H., & Song, X. (2019). An overview of augmented reality technology. *Journal of Physics: Conference Series, 1237*(2), 22082.

Cheung, M. L., Pires, G. D., Rosenberger, P. J., & Oliveira, M. J. (2020). Driving consumer–brand engagement and co-creation by brand interactivity. *Marketing Intelligence & Planning, 38*(4), 523-541.

Chiang, F. K., Shang, X., & Qiao., L. (2022). Augmented reality in vocational training: A systematic review of research and applications. *Computers in Human Behaviour, 129*, 107125.

Chiang, L.-L. L., Huang, T.-L., & Chung, H. F. (2021). Augmented reality interactive technology and interfaces: a construal-level theory perspective. *Journal of Research in Interactive Marketing, 6*, 2040-7122.

Chitra, D. R. (2021). Augmented Reality Changing the Food and Beverage Industries. *Innovating with Augmented Reality*, 53-69.

Chitrakorn, K. (2021). *An augmented reality shopping boutique is here*. Retrieved May 2023, from Voguebusiness.com: https://www.voguebusiness.com/consumers/augmented-reality-store-machine-a-institute-of-fashion-design

Chiu, C.-M., Wang, E. T., Fang, Y.-H., & Huang, H.-Y. (2014). Understanding customers' repeat purchase intentions in B2C e-commerce: the roles of utilitarian value, hedonic value, and perceived risk. *Information Systems Journal, 24*(1), 85-114.

Cho, S. H., & Kim, C. S. (2019). Consumer attitudes, intention to use technology, purchase intention of Korean 20's women on the acceptance of Fashion Augmented Reality (FAR) with the Application of the UTAUT model. *Journal of the Korean Society of Clothing and Textiles, 43*(1), 125-137.

Cho, Y. C., & Sagynov, E. (2015). Exploring Factors That Affect Usefulness, Ease of Use, Trust, And Purchase Intention in the Online Environment. *International Journal of Management & Information Systems, 19*(1), 21-36.

Cohen, R. (2018). How Amazon's delivery logistics redefined retail supply chains. *Journal of Supply Chain Management, Logistics and Procurement, 1*, 75-86.

Cowan, K., & Ketron, S. (2019). A dual model of product involvement for effective virtual reality: The roles of imagination, co-creation, telepresence, and interactivity. *Journal of Business Research, 100*, 483-492.

Creswell. (2017). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* United Kingdom: SAGE Publications.

Creswell, J. W., & Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research.* United Kingdom: SAGE Publications.

Crofton, E. C., Botinestean, C., Fenelon, M., & Gallagher, E. (2019). Potential applications for virtual and augmented reality technologies in sensory science. *Innovative Food Science & Emerging Technologies, 56*, 102178.

Dacko, S. G. (2017). Enabling smart retail settings via mobile augmented reality shopping apps. *Technological forecasting and social change, 124*, 243-256.

Davis, D. (2020, May 27). *6 ways the coronavirus pandemic will impact ecommerce*. Retrieved from digitalcommerce360: https://www.digitalcommerce360.com/2020/05/27/6-ways-the-coronavirus-pandemic-will-impact-ecommerce/

Deloitte. (2021). *Snap Consumer Global AR Report 2021*. Retrieved September 30, 2022, from Deloitte: https://www2.deloitte.com/content/dam/Deloitte/xe/Documents/About-Deloitte/Snap%20Consumer%20AR_Global%20Report_2021.pdf.

Devagiri, J. S., Niyaz, Q., Yang, X., & Smith, S. (2022). Augmented Reality and Artificial Intelligence in industry: Trends, tools, and future challenges. *Expert Systems with Applications*, 118002.

Diamond Hedge. (2022). *Try On Diamond Rings on Your Hand Using Augmented Reality*. Retrieved February 20, 2022, from Diamond Hedge: https://www.diamondhedge.com.

Dinizo, M., & Raman, T. (2022). Augmented Reality in Orthopaedics: History to Current Applications. *Bulletin of the NYU Hospital for Joint Diseases, 80*(1), 75-79.

DressX. (2022). *Our Vision*. Retrieved October 30, 2022, from DressX: https://dressx.com/pages/about

Dunham, J., Xu, J., Papangelis, K., & Schwartz, D. I. (2022). Advertising in Location-Based Games: An Exploration in Pokémon GO. *CHI Conference on Human Factors in Computing Systems Extended Abstracts*, 1-6.

Egaji, O. A., Asghar, I., Warren, W., Griffiths, M., & Evans, S. (2019). An augmented reality application for personalised diamond shopping. *25th International Conference on Automation and Computing (ICAC)*, 1-7, Lancaster, UK.

El Filali, Y., & Krit, S.-d. (2019). Augmented reality types and popular use case. *International Conference of Computer Science and Renewable Energies*, 91-97, Ouarzazate, Morocco.

El Seoud, A. S., & Taj-Eddin, I. (2019). An android augmented reality application for retail fashion shopping. *International Journal of Interactive Mobile Technologies (iJIM), 13*(1), 4-19.

Elmqaddem, N. (2019). Augmented reality and virtual reality in education. Myth or reality? *International journal of emerging technologies in learning, 14*(3), 234.

Fan, X., Chai, Z., Deng, N., & Dong, X. (2020). Adoption of augmented reality in online retailing and consumers' product attitude: a cognitive perspective. *Journal of Retailing and Consumer Services, 53*, 101986.

Fan, Y., & Fuyuan, S. (2017). Effects of Web Interactivity: A Meta-Analysis. *Communication Research, 45*(5), 635-658.

Farshid, M., Paschen, J., Eriksson, T., & Kietzmann, J. (2018). Go boldly! Explore augmented reality (AR), virtual reality (VR), and mixed reality (MR) for business. *Business Horizons, 61*(5), 657-663.

Federico, M., Pizzigalli, A., & Sanna, A. (2019). A state validation system for augmented reality-based maintenance procedures. *Journal of Applied Sciences, 9*(10), 2115.

Fedorenko, S. (2018, August 2). *82 percent of consumers want to view-and-feel products in-store before purchasing online: study*. Retrieved October 30, 2022, from Internet Retailing: https://internetretailing.net/customer/82-of-consumers-want-to-view-and-feel-products-in-store-before-purchasing-online-study-18165/#:~:text=Home%20%3E%20Themes%20%3E%20Customer-,82%25%20of%20consumers%20want%20to%20view%2Dand%2Dfeel%20products,store%20be.

Feiner, Macintyre, & Seligmann. (1993). Knowledge-based augmented reality. *Communications of the ACM, 36*(7), 53-62.

Feng, Y., & Xie, Q. (2018). Measuring the content characteristics of videos featuring augmented reality advertising campaigns. *Journal of Research in Interactive Marketing, 12*(4), 489-508.

Fida, B., Fabrizio, C., Franco, G. d., Ferrari, M., & Ferrari, V. (2018). Augmented reality in open surgery. *Updates in surgery, 70*(5), 389-400.

Fuadi, D. K., Hidayanto, A. N., Inan, D. I., & Phusavat, K. (2021). The Implementation of Augmented Reality in E-Commerce Customization: A Systematic Literature Review. *13th International Conference on Information & Communication Technology and System (ICTS)*, pp. 12-17. Surabaya, Indonesia.

Garcia-Pereira, I., Vera, L., Aixendri, M. P., Portales, C., & Casas, S. (2020). *Multisensory experiences in virtual reality and augmented reality interaction paradigms* (Vol. 14). Valencia, Spain: Smart Systems Design, Applications, and Challenges.

Ghelani, D. (2022). What is non-fungible token (NFT)? A short discussion about NFT Terms used in NFT. *Authorea Preprints*, 1-7.

Goertzen, M. (2017). Applying Quantitative Methods to E-book Collections. *AKA TechSource, 53*(4), 12-18.

Google LLC. (2022). *AR Core*. Retrieved July 5, 2022, from Google Developers: https://developers.google.com/ar.

Google LLC. (2022). *Helpful products*. Retrieved October 28, 2022, from Google Products: https://about.google/products/.

Google LLC. (2022). *Play Google*. Retrieved October 2, 2022, from Play Google apps: https://play.google.com.

Grzegorczyk, T., Sliwinski, R., & Kaczmarek, J. (2019). Attractiveness of augmented reality to consumers. *Technology Analysis and Strategic Management., 31*(11), 1257-1269.

Gucci. (2022). *Mobile Application*. Retrieved October 31, 2022, from Gucci: https://apps.apple.com/us/app/gucci/id334876990.

Hancock, P., Kaplan, A., Cruit, J., & Endsley, M. (2020). The effects of virtual reality, augmented reality, and mixed reality as training enhancement methods: A meta-analysi. *Human Factors the Journal of the Human Factors and Ergonomics Society, 63*(4), 707-726.

Hawker, K., & Carah, N. (2021). Snapchat's augmented reality brand culture: sponsored filters and lenses as digital piecework. *Continuum 35, 35*(1), 12-29.

HBR. (2020). *How AR Is Redefining Retail in the Pandemic*. Retrieved October 10, 2022, from HBR: https://hbr.org/2020/10/how-ar-is-redefining-retail-in-the-pandemic

Heller, J., Chylinski, M., Ruyter, K. d., Mahr, D., & Keeling, D. I. (2019). Let me imagine that for you: Transforming the retail frontline through augmenting customer mental imagery ability. *Journal of Retailing, 95*(3), 94-114.

Henningsson, S., & Vaidyanathan, N. (2022). Designing augmented reality services for enhanced customer experiences in retail. *Journal of Service Management, 34*(1), 78-99.

Henningsson, S., Vaidyanathan, N., Archibald, P., & Lohse, M. (2020). Augmented Reality and Customer Experiences in Retail: A Case Study. *AMCIS 2020 Proceedings*, *18*, 1-10. Virtual Conference.

Hilken, T., Heller, J., Chylinski, M., Keeling, D. I., Mahr, D., & Ruyter., K. d. (2019). Making omnichannel an augmented reality: the current and future state of the art. *Journal of Research in Interactive Marketing, 12*(4), 509-523.

Hinsch, C., Felix, R., & Rauschnabel, P. A. (2020). Nostalgia beats the wow-effect: Inspiration, awe, and meaningful associations in augmented reality marketing. *Journal of Retailing and Consumer Services, 53*, 101987.

Holbrook, E., & Morris, H. (1982). Hedonic Consumption: Emerging Concepts, Methods, and Propositions. *Journal of Marketing, 46*(3), 92-101.

Hsu, S. H.-Y., Tsou, H.-T., & Chen, J.-S. (2021). "Yes, we do. Why not use augmented reality?" customer responses to experiential presentations of AR-based applications. *Journal of Retailing and Consumer Services, 62*, 102649.

IBM Corporation. (2023). *IBM SPSS Statistics*. Retrieved from IBM Products: https://www.ibm.com/products/spss-statistics.

IKEA Group. (2017). *Say Hej to IKEA Place*. Retrieved June 22, 2022, from YouTube: https://www.youtube.com/watch?v=UudV1VdFtuQ.

IKEA Group. (2022). *IKEA Place App*. Retrieved August 2, 2022, from IKEA: https://www.ikea.com/at/de/customer-service/mobile-apps/.

Ikonen, P., & Uskal, T. (2020). Augmented reality as news. *Immersive Journalism as Storytelling: Ethics, Production, and Design*, 147-160.

Ivanov, V., Pavlenko, I., Liaposhchenko, O., Gusak, O., & Pavlenko, V. (2021). Determination of contact points between workpiece and fixture elements as a tool for augmented reality in fixture design. *Wireless Networks, 27*(3), 1657-1664.

IWC. (2021). *IWC SCHAFFHAUSEN launches mobile app with virtual try on*. Retrieved October 31, 2022, from IWC Press Room: https://press.iwc.com/iwc-schaffhausen-launches-mobile-app-with-virtual-watch-try-on/.

Javornik. (2016). Augmented reality research agenda for studying the impact of its media characteristics on consumer. *Journal of Retailing and Consumer Services, 30*, 252-261.

Javornik, A., Duffy, K., Rokka, J., Scholz, J., Nobbs, K., Motala, A., & Goldenberg, A. (2021). Strategic approaches to augmented reality deployment by luxury brands. *Journal of Business Research, 136*, 284-292.

Jiang, Y., Wang, X., & Yuen, K. F. (2021). Augmented reality shopping application usage: The influence of attitude, value, and characteristics of innovation. *Journal of Retailing and Consumer Services, 63*, 102720.

Jingen, L. L., & Elliot, S. (2021). A systematic review of augmented reality tourism research: What is now and what is next? *Tourism and Hospitality Research, 21*(1), 15-30.

Jomsri, P. (2018). Implementing virtual 3D model and augmented reality navigation for library in university. *International Journal of Modelling and Optimization, 8*(6), 315-317.

Jung, T., & Dieck, M. C. (2018). *Augmented reality and virtual reality.* Manchester, UK: Springer International Publishing AG.

Kallberg, J. B., Mitsuoka, V., Pittman, V., Boyce, J., & Todd, M. A. (2022). Tactical Considerations of Augmented and Mixed Reality Implementation. *Military Review, 105*(113), 105-113.

Karnes, K. (2018). *What is Augmented Reality? How AR is Changing Mobile*. Retrieved 2023 May, from Clevertap: https://clevertap.com/blog/what-is-augmented-reality/

Kato, H., Billinghurst, M., Blanding, R., & May, R. (1999). Marker tracking and HMD calibration for a video-based augmented reality conferencing system. *The 2nd International Workshop on Augmented Reality (IWAR 99)* (85-94). San Francisco, CA, USA.

Kim, J., & Lee, K. H. (2019). Influence of integration on interactivity in social media luxury brand communities. *Journal of Business Research, 99*, 422-429.

Kim, K., Hwang, J., Zo, H., & Lee, H. (2016). Understanding users' continuance intention toward smartphone augmented reality applications. *Information Development, 32*(2), 161-174.

King, Keohane, & Verba. (1996). *Designing Social Inquiry.* Princeton: Princeton University Pres.

Klimovets, O. V., & Vilkina, M. V. (2019). *Augmented reality as marketing strategy in the global competition. The 21st Century from the Positions of Modern Science: Intellectual, Digital and Innovative Aspects.* Cham, Switzerland: Springer.

Kotler, P., & Keller, K. L. (2009). *Marketing Management* (Vol. 13). London, UK: Pearson Prentice Hall.

Kowalczuk, P., Siepmann, C., & Adler, J. (2021). Cognitive, affective, and behavioural consumer responses to augmented reality in e-commerce: A comparative study. *Journal of Business Research, 124*, 357-373.

Kudina, O., & Verbeek, P. P. (2019). Ethics from within: Google Glass, the Colling ridge dilemma, and the mediated value of privacy. *Science, Technology, & Human Values, 44*(2), 291-314.

Kumar, H., Gupta, P., & Chauhan, S. (2022). Meta-analysis of augmented reality marketing. *Marketing Intelligence and Planning, 41*(1), 110-123.

Kumari, S., & Polke, N. (2018). Implementation Issues of Augmented Reality and Virtual Reality: A Survey. *International Conference on Intelligent Data Communication Technologies and Internet of Things* (853-861). Pune: Springer, Cham.

Kusumawati, A., Nimran, U., & Yulistyawati, E. T. (2020). The influence of utilitarian value, hedonic value, social value, and perceived risk on customer satisfaction: survey of e-commerce customers in Indonesia. *Business: Theory and Practice, 21*(2), 613-622.

Lavoye, V., Mero, J., & Tarkiainen, A. (2021). Consumer behaviour with augmented reality in retail: a review and research agenda. *The International Review of Retail, Distribution and Consumer Research, 31*(3), 299-329.

Lee, H. (2019). Classification of virtual fitting room technologies in the fashion industry: from the perspective of consumer experience. *International Journal of Fashion Design Technology and Education, 13*(2), 1-10.

Leeb, E. J., & Overby, J. W. (2022). The effects of utilitarian and hedonic online shopping value on consumer preference and intentions. *Journal of Business Research, 59*(10), 1160-1166.

Lego Group. (2022). *Lego Catalogue*. Retrieved September 7, 2022, from Lego: https://www.lego.com/en-at/themes/brand-catalogue.

Lemon&Orange. (2014). *Timberland Augmented Reality Campaign [Video]*. Retrieved May 2023, from YouTube: https://www.youtube.com/watch?v=5TZmQPdhpak.

Lerache, J., Mangiarua, N. A., Becerra, M. E., & Igarza, S. (2018). Framework for the development of augmented reality applications applied to education games. *International Conference on Augmented Reality, Virtual Reality and Computer Graphics* (340-350). Cham, Switzerland: Springer.

Li, H., Gupta, A., Zhang, J., & Flor, N. (2020). Who will use augmented reality? An integrated approach based on text analytics and field survey. *European Journal of Operational Research, 281*(3), 502-516.

Lin, P.-Y., Wu, W.-C., & Yang, J.-H. (2021). A QR Code-Based Approach to Differentiating the Display of Augmented Reality Content. *Applied Sciences, 11*(24), 11801.

Lin, Y., Fu, M., & Lin, P. (2020). Differences between Traditional and Augmented-Reality Experiential Marketing Campaigns. *International Journal of Humanities and Social Science, 10*(3), 11937-11941.

L'Oréal S.A. (2017). *How augmented reality is revolutionising the beauty experience*. Retrieved June 2022, from L'Oréal: https://www.loreal-finance.com/en/annual-report-2017/digital/augmented-reality-beauty-experience.

L'Oréal S.A. (2023). *Makeup Virtual Try-on Maybelline*. Retrieved May 2023, from L'Oréal: https://www.loreal.com/en/articles/science-and-technology/makeup-virtual-try-on-maybelline/.

Ma, Q. R., Abdullah, R., Haslizam, M., & Idris, M. S. (2019). Design an inexpensive augmented reality platform for the customized application. *Journal of Modern Manufacturing Systems and Technology, 3*, 39-49.

Machine-A Company. (2022). *About us*. Retrieved October 29, 2022, from Machine-A: https://www.machine-a.com.

Mainsbridge, M. (2016). Body as instrument: an exploration of gestural interface design. *Macquarie University*.

Malik, O. (2016). *Pokémon Go Will Make You Crave Augmented Reality*. Retrieved May 2023, from Newyorker: https://www.newyorker.com/tech/annals-of-technology/pokemon-go-will-make-you-crave-augmented-reality

Mana, F., Paschena, J., Eriksson, T., & Kietzmannc, J. (2018). Go boldly! Explore augmented reality (AR), virtual reality (VR), and mixed reality (MR) for business. *Business Horizons, 61*(5), 657-663.

Massimo Dutti. (2022). *SHOES EXPERIENCE - NEW SERVICE*. Retrieved Jan 16, 2022, from massimodutti.com: https://social.massimodutti.com/paper/en/new-service-shoes-experience/

McKinsey & Company. (2020). *How COVID-19 has pushed companies over the technology tipping point—and transformed business forever*. Retrieved from McKinsey: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever.

McLean, G., & Wilson, A. (2019). Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Computers in Human Behaviour, 101*, 210-224.

McQuarrie, L. (2019). *Douglas' Interactive Beauty Mirror Lets Customers Virtually Try Products*. Retrieved May 2023, from Trend hunter: https://www.trendhunter.com/trends/interactive-beauty-mirror.

Mendoza, B. A. (2022). Face Filters and Their Effects on Users. *San Diego State University ProQuest Dissertations Publishing*, (1-20). San Diego, USA.

Microsoft Corporation. (2022). *Mesh*. Retrieved October 22, 2022, from Microsoft: https://www.microsoft.com/en-us/mesh.

Microsoft Corporation. (2022). *What is augmented reality or AR?* Retrieved July 7, 2022, from Microsoft: https://dynamics.microsoft.com/en-us/mixed-reality/guides/what-is-augmented-reality-ar/.

Minjung, P., & Yoo, J. (2020). Effects of perceived interactivity of augmented reality on consumer responses: A mental imagery perspective. *Journal of Retailing and Consumer Services, 52*, 101912.

Muhanna, M. (2015). Virtual reality and the CAVE: Taxonomy, interaction challenges and research direction. *Journal of King Saud University - Computer and Information Sciences, 34*(3), 1319-1578.

Naeem, M. (2020). Understanding the customer psychology of impulse buying during COVID-19 pandemic: implications for retailers. *International Journal of Retail & Distribution Management, 49*(3), 377-393.

Naji, M., & Shafiq, L. (2021). The Effect of Programmatic Advertising, Interactive Content and Promotion Strategy towards Brand Management in the Jordanian Context. *Turkish Journal of Computer and Mathematics Education, 12*(14), 2340-2357.

Niantic. (2022). *Pokémon Go*. Retrieved August 1, 2022, from Pokémon Go: PokemonGo.com

Nikhashemi, S. R., Knight, H. H., Nusaira, K., & Liat, C. B. (2021). Augmented reality in smart retailing: Symmetric Approach to continuous intention to use retail brands' mobile AR apps. *Journal of Retailing and Consumer Services, 60*, 102464.

Nimri, R., Patiar, A., & Jin, X. (2020). The determinants of consumers' intention of purchasing green hotel accommodation: Extending the theory of planned behaviour. *Journal of Hospitality and Tourism Management, 45*, 535-543.

Noghabaei, M., Heydarian, A., Balali, V., & Han, K. (2020). Trend analysis on adoption of virtual and augmented reality in the architecture, engineering, and construction industry. *MDPI AG, 5*(26), 1-19.

Osama, E. (2021). The effect of commercial companies' use of marketing augmented reality applications on consumer brand experience. *The Egyptian Journal of Media Research 2021, 77*, 405-448.

Osatuyi, B., Qin, H., & Xu, L. (2021). How mobile augmented reality applications affect continuous use and purchase intentions: A cognition-affect-conation perspective. *Journal of Retailing and Consumer Services, 63*, 102680.

Oyman, M., Bal, D., & Ozer, S. (2022). Extending the technology acceptance model to explain how perceived augmented reality affects consumers' perceptions. *Computers in Human Behavior, 128*, 107127.

Ozturkcan, S. (2021). Service innovation: Using augmented reality in the IKEA Place app. *Journal of Information Technology Teaching Cases, 11*(1), 8-13.

Pallant, J., Romano, B., & Sands, S. (2021). Augmented reality and the customer journey: An exploratory study. *Australasian Marketing Journal, 29*(4), 354-363.

Pantano, E., Reseb, A., & Baierc, D. (2017). Enhancing the online decision-making process by using augmented reality: A two country comparison of youth markets. *Journal of Retailing and Consumer Services, 38*, 81-95.

Park, M., & Yoo, J. (2020). Effects of perceived interactivity of augmented reality on consumer responses: A mental imagery perspective. *Journal of Retailing and Consumer Services, 52*, 101912.

Park, S., Bokijonov, S., & Choi, Y. (2021). Review of microsoft hololens applications over the past five years. *Applied Sciences, 11*(16), 7259.

Parka, M., & Yoob, J. (2020). Effects of perceived interactivity of augmented reality on consumer responses: A mental imagery perspective. *Journal of Retailing and Consumer Services, 52*, 101912.

Peak, D. A., Prybutok, V., & Qin, H. (2021). A virtual market in your pocket: How does mobile augmented reality (MAR) influence consumer decision making? *Journal of Retailing and Consumer Services, 58*, 0969-6989.

Pena-Garcia, N., Gil-Saura, I., Rodriguez-Orejuela, A., & Siqueira-Junior, J. R. (2020). Purchase intention and purchase behaviour online: A cross-cultural approach. *Heliyon, 6*(6), 04284.

Perry, P., Kent, A., & Bonetti, F. (2019). The use of mobile technologies in physical stores: The case of fashion retailing. *Exploring omnichannel retailing*, 169-195.

Petrovych, O. B., Vinnichuk, A. P., Krupka, V. P., Zelenenka, I. A., & Voznyak, A. V. (2021). The usage of augmented reality technologies in professional training of future teachers of Ukrainian language and literature. *2898*, 315-333. New York, USA: CEUR Workshop Proceedings.

Piekarski, W., & Thomas, B. (2002). ARQuake: The Outdoor Augmented Reality Gaming System. *Communications of the ACM, 45*(1), 36-38.

Plotkina, D., Dinsmore, J., & Racat, M. (2021). Improving service brand personality with augmented reality marketing. *Journal of Services Marketing, 36*(6), 781-799.

Pope, H. (2018). Introduction to virtual and augmented reality. *Library Technology Reports, 54*(6), 5-7.

Poretski, L., Arazy, O., Lanir, J., Shahar, S., & Nov, O. (2019). Virtual objects in the physical world: Relatedness and psychological ownership in augmented reality. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (1-13). New York: Association for Computing Machinery.

Poretski, L., Lanir, O. A., & Nov, O. (2021). Who owns what? Psychological ownership in shared augmented reality. *International Journal of Human-Computer Studies, 150*, 102611.

Prakash, D., Ghosh, S., Deborah, S. A., & Chandran, K. S. (2020). Virtual Fashion Mirror. *4th International Conference on Computer, Communication and Signal Processing (ICCCSP)* (1-4). Chennai, India: IEEE.

Prophet, J., & Ayoung, S. (2018). The state of immersive technology research: A literature analysis. *Computers in Human Behaviour, 86*, 77-90.

Pull&Bear. (2022). *Pull Bear New Virtual Fitting Room*. Retrieved October 6, 2022, from Instagram: https://www.instagram.com/p/CakaMErDZVB/?hl=en.

Rahman, M. A., Aminul, I. M., Humyra, E. B., Nahida, S., & Sujan, C. (2018). Consumer buying behavior towards online shopping: An empirical study on Dhaka city, Bangladesh. *Cogent Business & Management, 5*(1), 1514940.

Rauschnabel, P. A., Babin, B. J., Dieck, M. C., Krey, N., & Jung, T. (2022). What is augmented reality marketing? Its definition, complexity, and future. *Journal of Business Research, 142*, 1140-1150.

Regt, A. d., Plangger, K., & Barnes, S. J. (2021). Virtual reality marketing and customer advocacy: Transforming experiences from storytelling to story-doing. *Journal of Business Research, 136*, 513-522.

Rejeb, A. K. (2021). How augmented reality impacts retail marketing: A state-of-the-art review from a consumer perspective. *Journal of Strategic Marketing*, 1-31.

Rese, A., & Baier, D. (2017). How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting and Social Change, 124*, 306-319.

Riar, M., Korbel, J. J., Xi, N., Zarnekow, R., & Hamari, J. (2021). The use of augmented reality in retail: A review of literature. *Proceedings of the 54th Hawaii International Conference on System Sciences* (p. 638). Kauai, Hawaii: ScholarSpace.

Riethorst, M. M., Smink, A. R., & Ketelaar, P. E. (2020). Augmenting reality: An exploration of the intention to use commercial augmented reality comparing older and younger adults differing in technology innovativeness. *Journal of Euromarketing, 29*, 5-28.

Rives, K. (2018). *Augmented Reality: A Comprehensive History (Part 1)*. Retrieved May 2023, from Vertebrae: https://www.vertebrae.com/blog/history-augmented-reality-1/.

Robertson, T. S., Hamilton, R., & Jap, S. D. (2020). Many (un) happy returns? The changing nature of retail product returns and future research directions. *Journal of Retailing, 96*(1), 172.

Rogers, S. (2019). *How Technology Is Augmenting Traditional Theatre*. Retrieved May 2023, from Forbes: https://www.forbes.com/sites/solrogers/2019/12/06/how-technology-is-augmenting-traditional-theatre/?sh=1540a1b550c0.

Rosenberg. (2021). Augmented Reality: Reflections at Thirty Years. *Proceedings of the Future Technologies Conference. 1*, 1-11. Cham, Switzerland: Springer.

Rosenberg, L. B. (2021). Augmented Reality: Reflections at Thirty Years. *Proceedings of the Future Technologies Conference* (1-11). Cham, Switzerland: Springer.

Ruel, E., Wagner, W. E., & Gillespie, B. J. (2020). *The Practice of Survey Research* (Vol. 6). Los Angeles, US: Sage.

Ruiz, G. R. (2022). Augmented Reality as an Efficient Marketing Strategy in a New Consumption Model During the COVID-19 Pandemic. *Handbook of Research on Digital Innovation and Networking in Post-COVID-19 Organizations* (271-300). Pennsylvania, USA: IGI Global.

Samet, A. (2020). *Business Insider*. Retrieved December 1, 2022, from Global ecommerce market report: ecommerce sales trends and growth statistics: https://www.businessinsider.com/global-ecommerce-2020-report?r=US&IR=T.

Sanden, V. D., Willems, S. K., Poncin, I., & Brengman, M. (2020). Digital signage in the store atmosphere: balancing gains and pains. *Retail Futures*, 53-69.

Sharma, A., & Jhamb, D. (2020). Changing consumer behaviours towards online shopping-an impact of Covid 19. *Academy of Marketing Studies Journal, 24*(3), 1-10.

Shopify. (2018). *Start selling with Shopify today*. Retrieved October 20, 2022, from Shopify: https://www.shopify.com/blog/shopify-ar.

Silvestri, B. (2022). How Virtual and Augmented Reality Are Reshaping the Fashion Industry During the Covid-19 Pandemic. *Extended Reality Usage During COVID 19 Pandemic* (39-54). Cham, Switzerland: Springer.

Simran, G., Sinha, P., & Singh, A. (2022). Overview of Augmented Reality and Its Trends in Agriculture Industry. *IOT with Smart Systems. Smart Innovation, Systems and Technologies. 251*, 627-636. Singapore, Singapore: Springer.

Smink, A. R., Reijmersdal, E. A., & Noort, G. v. (2022). Consumers' Use of Augmented Reality Apps: Prevalence, User Characteristics, and Gratifications. *Journal of Advertising, 51*(1), 85–94.

Smink, A. R., Reijmersdal, E. A., Noort, G. V., & Neijens, P. C. (2020). Shopping in augmented reality: The effects of spatial presence, personalization and intrusiveness on app and brand responses. *Journal of Business Research, 118*, 474-485.

Smith, R. E., & Swinyard, W. R. (1988). Cognitive response to advertising and trial: Belief strength, belief confidence and product curiosity. *Journal of Advertising, 17*(3), 3-14.

Snake, L. (2017). *Snapchat filter major update! Bitmoji AR 3D can be realized*. Retrieved May 2023, from Techbang: https://www.techbang.com/posts/53885-snapchat-major-update-bimoji-ar-3d-can-be-realized

Snapchat. (2020). *Estée Lauder Successfully Drives Uplift with a Multi-Product Strategy, led by a Shoppable AR Try-On Lens*. Retrieved October 21, 2022, from Snapchat: https://forbusiness.snapchat.com/inspiration/estee-lauder-foundation.

Snapchat. (2020). *Gucci successfully engages Snapchatters and drives sales with first ever virtual shoe try-on activation on Snap*. Retrieved October 15, 2022, from Snapchat: https://forbusiness.snapchat.com/inspiration/gucci-ar-tryon.

Snapchat. (2020). *Off-White AR Try-On Lens*. Retrieved October 15, 2022, from Snapchat: https://lens.snapchat.com/d4b06ac9f35546d9808fb1ac65b6e93e.

Snapchat. (2020). *Prada Galleria Bag Lens*. Retrieved October 15, 2022, from Snapchat: https://lens.snapchat.com/179e5c7dd3b243eebacb38baa2a0d541.

Snapchat. (2022). *How do I create a custom Filter for Snapchat?* Retrieved October 15, 2022, from Snapchat: https://support.snapchat.com/en-GB/a/odg-howto.

Sung. (2021). The effects of augmented reality mobile app advertising: Viral marketing via shared social experience. *Journal of Business Research, 122*, 75-87.

Sung, E., Han, D.-I. D., & Choi, Y. K. (2022). Augmented reality advertising via a mobile app. *Psychology and Marketing, 39*(2), 543-558.

Sung, H. C., Kim, M., & Lee, J. Y. (2019). Situation-dependent remote AR collaborations: Image-based collaboration using a 3D perspective map and live video-based collaboration with a synchronized VR mode. *Journal of Computers in Industry, 101*(1), 51-66.

Sunger, I., & Serkan, C. (2019). Augmented reality: historical development and area of usage. *Journal of Educational Technology and Online Learning, 2*(3), 118-133.

Tan, Y. C., Chandukala, S. R., & Reddy, S. K. (2022). Augmented Reality in Retail and Its Impact on Sales. *Journal of Marketing, 86*(1), 48–66.

Terzopoulos, G., Kazanidis, I., Satratzemi, M., & Tsinakos, A. (2020). A Comparative Study of Augmented Reality Platforms for Building Educational Mobile Applications. *Internet of Things, Infrastructures and Mobile Applications: Proceedings of the 13th IMCL Conference, Springer Nature, 1192*, 307.

The Fabricant. (2022). *Igniting A Fashion Revolution Through Co-Creation. Rip The Status Quo.* Retrieved October 30, 2022, from The Fabricant: https://www.thefabricant.com.

Tropp, J., & Baetzgen, A. (2019). Users' definition of snapchat usage. Implications for marketing on snapchat. *International Journal on Media Management, 21*(2), 130-56.

Vieira, V. A., Rafael, D. N., & Agnihotri, R. (2022). Augmented reality generalizations: A meta-analytical review on consumer-related outcomes and the mediating role of hedonic and utilitarian values. *Journal of Business Research, 151*, 170-184.

Viera, A. (2020). *How AR is creating highly personal brand experiences*. Retrieved from Thinkwithgoogle: https://www.thinkwithgoogle.com/consumer-insights/consumer-trends/trending-visual-stories/augmented-reality-shopping-data

Vilkina, M. V., & Klimovets, O. V. (2019). Augmented reality as marketing strategy in the global competition. *Institute of Scientific Communications Conference* (54-60). Cham, Switzerland: Springer.

Voinea, G.-D., Girbacia, F., Postelnicu, C. C., & Marto, A. (2018). Exploring cultural heritage using augmented reality through Google's Project Tango and ARCore. *International Conference on VR Technologies in Cultural Heritage* (93-106). Cham, Switzerland: Springer.

Wang, C. L., Wang, Y., Wei, J., & Chung, H. (2020). Understanding experiential consumption: theoretical advancement and practical implication. *Asia Pacific Journal of Marketing and Logistics, 32*(6), 1173-1176.

Wang, D., Ren, Q., Li, X., Qi, Y., & Zhou, Q. (2022). Defining Consumers' Interest and Future of Nft Fashion. *2022 International Conference on Social Sciences and Humanities and Arts (SSHA 2022)*, 584-594.

Wang, K., Shawl, R. Q., Neware, R., & Dylik, J. (2021). Research on immersive interactive experience of content e-commerce live users in the era of computer digital marketing. *International Journal of System Assurance Engineering and Management, 14*(3), 1-11.

Wang, R., & Chan-Olmsted, S. (2020). Content marketing strategy of branded YouTube channels. *Journal of Media Business Studies, 17*(3-4), 294-316.

WannaBy Inc. (2022). *Revolutionize customer experience with WannaBy AR solutions*. Retrieved June 28, 2022, from WannaBy: https://wanna.fashion

Watson, A., Alexander, B., & Salavati, L. (2018). The impact of experiential augmented reality applications on fashion purchase intention. *`international Journal of Retail and Distribution Management*.

Watson, A., Alexander, B., & Salavati, L. (2018). The impact of experiential augmented reality applications on fashion purchase intention. *International Journal of Retail & Distribution Management, 48*(5), 433-451.

Werdayani, D., & Widiaty., I. (2021). Virtual fitting room technology in fashion design. *IOP Conference Series: Materials Science and Engineering. 2*, p. 022110. Bristol, UK: IOP Publishing.

West, P. (2017). *Sephora's AR App Update Lets You Try Virtual Makeup At Home*. Retrieved May 2023, from www.vrscout.com: https://vrscout.com/news/sephoras-ar-app-update-virtual-makeup-on/

White, M. (2022). Sample size in quantitative instrument validation studies: A systematic review of articles published in Scopus, 2021. *Heliyon, 8*(12), 12223.

Wiebach, N., & Send, H. (2019). Augmented reality shopping services: Key factors affecting customer evaluation and acceptance. *European Conference on Innovation and Entrepreneurship* (1111-1118). Kalamata, Greece: Academic Conferences International Limited.

Williams, R. (2020, June 30). *Gucci unveils 1st global shoe try-on in Snapchat*. Retrieved September 21, 2022, from Marketing Dive: https://www.marketingdive.com/news/gucci-unveils-1st-global-shoe-try-on-in-snapchat/580766/?referrer_site=www.mobilemarketer.com.

Wilson, R. T., & Till, B. D. (2019). *Managing advertising in non-traditional environments: A message processing framework. Advertising Theory.* New York, USA: Routledge, Taylor & Francis Group.

Wu, Y. F., & Kim, E. Y. (2022). Users' Perceptions of Technological Features in Augmented Reality (AR) and Virtual Reality (VR) in Fashion Retailing: A Qualitative Content Analysis. *Mobile Information Centre*, 13.

Yang, X. (2021). Augmented Reality in Experiential Marketing: The Effects on Consumer Utilitarian and Hedonic Perceptions and Behavioural Responses. *Information Technology in Organisations and Societies: Multidisciplinary Perspectives from AI to Technostress* (147-174). Bingley, UK: Emerald Publishing Limited.

Yao, Y., Zheng, X., Wang, Z., & Jiang, J. (2021). Development overview of augmented reality navigation. *Academic Journal of Computing & Information Science, 4*(2), 83-90.

Yashvi, D., Shah, N., Shah, V., Bhavathankar, P., & Katchi, K. (2021). Markerless Augmented Reality based application for E-Commerce to Visualise 3D Content. *Third International*

Conference on Inventive Research in Computing Applications (ICIRCA), (756-760). Coimbatore, India.

Yassir, E. F., & Krit, S. (2019). Augmented reality types and popular use cases. *International Journals of Engineering, Science & Mathematics, 8*, 91-97.

Yavuz, M., Çorbacıoğlu, E., Başoğlu, A. N., Daim, T. U., & Shaygan, A. (2021). Augmented reality technology adoption: Case of a mobile application in Turkey. *Technology in Society, 66*, 101598.

Yoo, J., & Brownlee, E. A. (2020). *The past, present, and future of virtual reality in higher education.* Gannon: IGI Global.

YouGov Reports. (2016, August 12). *Pokémon Go: 6 million downloads, 5 million players and 1 million paying users since UK launch*. Retrieved October 3, 2022, from YouGov: https://yougov.co.uk/topics/politics/articles-reports/2016/08/12/pokemon-go-six-million-downloads-five-million-curr.

Yussof, F. M., Salleh, S. M., & Ahmad, A. L. (2019). Augmented reality: a systematic literature review and prospects for future research in marketing and advertising communication. *Intelligent and Interactive Computing, 67*, 459-473.

Zagorc, A., & Bernik, A. (2022). Influence of Augmented Reality on Purchase Intention. *Intelligent Computing, 1*, 345-357.

Zuraikat, L. (2020). Google Glass: A Case Study. *Performance Improvement, 59*(6), 14-20.

APPENDICES

Appendix 1: Questionnaire