The Development of Augmented Reality in the Retail Sector during the Covid-19 Pandemic

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Submitted to Dr. Marion Garaus

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Affidavit

I hereby affirm that this Bachelor'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.

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Abstract

The usage and adoption of Augmented Reality (AR) within the retail industry is currently growing in order to strengthen consumer-brand relationships and satisfy the needs and wants of consumers. The Covid-19 pandemic has been a leading factor for brands to implement “try on” options, when governmental restrictions were imposed, and brick and mortar stores were closed. This thesis explores consumer buying behavior before and after the pandemic and further investigates the impacts of AR for buyers. The empirical part of the study includes an online survey that was conducted to test the researcher’s hypotheses. The survey collected a total of 125 responses, which were later statistically analyzed. The data collected confirmed that the preferred buying behavior before the pandemic was offline shopping, while during the pandemic it shifted to online shopping. The influence of AR on consumer enjoyment was supported by the data. The findings also revealed a positive relationship between enjoyment and purchase intention. The results failed to support the assumption of the researcher that AR impacts perceived risk of buying online. Moreover, there was also insufficient data to prove a relationship between perceived risk of buying online and purchase intention. Based on the findings of this research, managers should implement AR technology in online retail businesses in order to attract and retain more customers. Incorporating virtual fitting rooms raises the interest of buyers and increases their willingness to purchase.

Keywords: Augmented Reality, Retail, Covid-19, Consumer Buying Behavior, Enjoyment, Purchase Intention, Perceived Risk of Buying Online

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1 Introduction

In 2018, 59.5 million people in the United States claimed to have used augmented reality (AR) at least once a month (Vailshery, 2021). It is also projected that the number of users will reach 95 million in 2022 (Vailshery, 2021). Those numbers show an increase in the interest in using AR tools, however, the numbers are very general and cannot give information on how AR impacts different sectors. Research states that nine out of ten companies are using or planning to use AR technology in their marketing campaigns (Bona et al., 2018). However, only 10% claim to have integrated AR well (Bona et al., 2018). The number of mobile AR users amounts to 810 million in 2021 (Alsop, 2021). As a relatively new technology, AR is still being developed and soon it can be incorporated into many day-to-day operations of consumers (e.g., shopping) (Scholz & Duffy, 2018).

One of the industries where AR is used is the retail industry and more specifically, e-commerce. Gappelberg (2020), the CEO of NexTech AR, claims that AR tools engage customers, decrease the number of returns, and provide the option of trying on products virtually, which increases value for them. In fact, AR filters, offered by different online stores, would allow the consumer to "try out" the product before purchasing, which makes their shopping experience smoother. Academic research confirms that virtual fitting rooms influence consumer intention to purchase (Beck & Crie, 2018). Javornik (2016) also researched consumer behavior after the use of AR.

While extant studies provide high amounts of information on the effects of AR, few discuss how the use of AR changed during the Covid-19 pandemic: if it increased or decreased and further, how consumers adapted to it when brick-and-mortar stores were closed. Wiederhold (2021) studied virtual consumerism during the pandemic, she stated that the physical touch of products is the biggest downside that consumers state; she also explains the benefits of AR in the retail sector. However, there is a gap in understanding

how consumers transferred from going to brick-and-mortar stores to using and demanding virtual fitting rooms if the transition was smooth or not. Furthermore, her work also does not discuss if AR tools are good enough to replace physical fitting rooms.

Another area where information is not sufficient is understanding if virtual fitting rooms or any type of AR tool which helps the consumer "try on" a product virtually, actually influence the final buying decision itself (Pantano et al., 2017). Especially during the pandemic, the needs, wants and demands of consumers changed drastically therefore it would be interesting to understand if the AR experience is better than the physical experience and if it influences buyers to take their final decision to purchase.

New technologies are incorporated into the daily activities of individuals constantly, to make their lives easier. However, if the effect of AR on consumers is not studied, there will be a gap in understanding how new technologies can be tailored to the needs of consumers, how to achieve more efficient purchase decisions, or how to create a more environmentally friendly shopping experience by decreasing returns (and increasing the use of virtual fitting rooms) (Scholz & Duffy, 2018; Wiederhold, 2021). Therefore, it is crucial that this research is conducted in order to understand how AR in the retail industry developed during the pandemic and how this new technology affects consumers' final buying decisions.

The present research on AR in the retail sector aims to provide a historical perspective on how AR technology has developed during the pandemic. This thesis proposes that companies started integrating virtual fitting rooms during the pandemic because consumers were demanding to try products before buying them. Furthermore, AR plays an important role in the final buying decision, because the researcher claims that consumers are more likely to purchase a product if they could try it virtually before buying.

Against this background, the current thesis seeks to answer the following research questions:

1. How did AR evolve during the pandemic?

2. How does the presence of an AR tool/virtual fitting room impact the final buying decision of consumers during the time of Covid-19?

3. What is the importance of AR in the life of consumers during the pandemic as compared to pre-Covid-19 times?

2 Literature Review

2.1 Online vs. Offline Buying Behavior Before the Pandemic

Over the last twenty years the use of mobile and wireless communication systems experienced a significant growth (Yang et al., 2021). Hereby such systems give its users the possibility to conduct day-to-day operations no matter their location (Yang et al., 2021). One of these daily operations is shopping online, or mobile commerce (m-commerce): a monetary transaction over a wireless network (Yang et al., 2021). Moreover, m-commerce has experienced a substantial growth recently and research from 2020 shows that 79% of smartphone users conducted an online transaction in the past half a year (Yang et al., 2021).

Businesses were not keen on providing online shopping possibilities to consumers two decades ago. However, the use of m-commerce increased since then and the online world now provides more possibilities for both consumers and retailers (Yang et al., 2021). Hereby many businesses emerged online-only, and many existing ones started providing online shopping options (Melovic et al., 2021). On another note, a benefit to online-only businesses could be lower costs due to retailer not investing in physical space and human capital (Melovic et al., 2021).

One of the downsides of e-commerce for retailers is that consumers are less likely to make spontaneous purchases when shopping because then they are more goal-oriented: In other words, they search for a specific product, they find it, they buy it (van Esch et al., 2019). Impulse buying behavior (IBB) was initially defined as unplanned purchase behavior (Yang et al., 2021). However, many researchers including Yang et al. (2021) did not agree with this definition and added that IBB is not only unplanned purchase behavior, but it also involves a sudden, compelling urge to buy a given product. Yang et al. (2021) claims that IBB is a type of consumer response towards different factors. In a physical store IBB can be influenced by "consumer characteristics, store characteristics, situational stimuli and product characteristics" (Yang et al., 2021, p.3).

Furthermore, according to Yang et al. (2021) IBB is more likely to occur in the e-commerce environment rather than the brick-and-mortar store due to higher efficiency of shopping. However, van Esch et al. (2019) contradicts this claim by discussing that shopping online, being more efficient and organized for consumers rather than the in-store experience, can result in reduction of unplanned purchases. In an e-commerce website, products are divided into different categories (i.e., dresses, tops, denim, etc.) and the consumer cannot be baited with a pack of socks, which is right next to the cashier desk for example. Research also shows that almost half of the purchases made in-store are impulsive, which greatly benefits retailers since their revenue increases (van Esch et al., 2019).

Online shopping can be also beneficial for consumers because it can be done in the comfort of their homes. They also have more time to compare prices between different retailers and spend on a given purchase, while in the shop they are pressured to take a faster decision (Yang et al., 2021). Furthermore, in e-shops more product information is provided; one can check the materials used for the good, find sizes/colors easier (rather than making rounds in the

store to search for them), check other product suggestions to match and create a full outfit, etc. (Yang et al., 2021). Furthermore, the option 'to pair' or 'find similar items' to the ones that the consumer is interested in buying is growing popularity in online retail stores, which enables the customer to find similar items easier and continue their shopping journey (Ratchford et al., 2022).

Another benefit of online-only retail shops for both retailers and consumers is that such shops have less distribution costs (Ratchford et al., 2022). Thereby, this would allow them to have larger selection of items from which consumers can choose from, which would not require a lot more space for retailers as the goods are stored in warehouses and not in physically (appealing) stores (Ratchford et al., 2022). Online shops also allow for more 'niche' products that would be of interest to some consumers, which would not be available in brick-and-mortar stores (Ratchford et al., 2022). Furthermore Raijas (2002) discusses the benefits of online grocery shopping and thereby argues that it is more beneficial for retailers to offer items like books or basic clothing in an e-commerce environment rather than a physical shop because of low value-to-weight ratio and shelf time of perishable items.

Online stores allow retailers to reach a broader audience, thus "overcoming geographical boundaries" (Ratchford et al., 2022). A study in Finland presents data on the market about small local shops vs. big supermarkets in more central areas which confirms that local shops are disappearing, while big ones are gaining popularity (Raijas, 2002). Moreover, online grocery shops are becoming more popular among consumers because of the ease and convenience of online purchasing, which does not involve the distance travelled to the supermarket (Raijas, 2002). Hereby, consumers have a greater variety of goods they can choose from and do not have to limit themselves with the products that the local market provides (Ratchford et al., 2022). This also allows retailers to increase their audience and customer base, with the right help of marketing tools.

Some customers, for example the elder generation, can consider online shopping harder as they are not so familiar with the technology of e-commerce. Others, would not engage due to insecurities like product quality (will it be the same as the product pictures), credit card fraud, delivery problems, etc. (Melovic et al., 2021). Furthermore, Melovic et al. (2021) claims that due to the fact that Millennials believe shopping online involves risks, they tend to buy less expensive goods online, which can be considered an important point when starting an e-commerce business.

Offline shopping involves physically visiting a store to purchase or try on products. In the brick-and-mortar shop, one can physically touch and smell things, interact with employees who can assist them, ask for the availability of products, etc. (Beck & Crié, 2018). All of those operations involve a certain degree of social interaction, with other customers or with employees. Humans are social beings and that is why they are more likely to trust the real-life store experience (face-to-face-interactions), rather than the online store they cannot see (Kim et al., 2019). They rely on interactions, which guide them in their buying decisions (Kim et al., 2019). Social interactions in the store reduce uncertainty (product quality, possible delivery problems) and ensure faster information sharing (asking an employee would be easier than asking an automated virtual assistant) (Kim et al., 2019).

Despite the increasing growth of online retailing in the past years, offline retailing still makes up more than 80% of total US retail sales (Ratchford et al., 2022). This supports the claim that brick-and-mortar stores will always have the advantage of 'physical touch of products', whereby it can be considered the most important factor for consumers when shopping (Ratchford et al., 2022). The sensory advantage of physical stores provides consumers with more information about the product, which they receive by physically interacting with it in the store (Ratchford et al., 2022). The online competition (i.e., About You, Zalando, etc.) of physical stores that depend on the sensory advantage to

interact with the good at the point of purchase, are pressured to offer free shipping and free returns in order to be closer to the physical shop experience, in a way that does not require consumers to pay more for the products (i.e., delivery costs) (Melovic et al., 2021). Another advantage of brick-and-mortar stores includes the option for immediate consumption, whereby the customer should not wait a few days for the products to be delivered (Ratchford et al., 2022; Melovic et al., 2021). Thus, big companies like Amazon are now trying to meet same-day-delivery, in order to be able to compete on this level with physical stores (Ratchford at al., 2022). Ratchford et al. (2022) also claims that consumers are less likely to buy goods that involve high amount of sensory information like beauty products (i.e., make-up, perfumes) or apparel.

However, even though, physical shops are more demanded than online stores, the physical experience also has its downsides. Some products may cost more than one expects, and therefore consumers might feel uncomfortable checking or asking for prices in-store since they might fear judgment if they do not buy the given item (Fiestas & Tuzovic, 2021). Furthermore, research shows that 81% of customers check prices online before going to a store to purchase so that they are prepared to pay the price (Beck & Crié, 2018). In the past, finding product information online was insufficient for consumers, but with the emergence of technology that has changed, and more businesses are modernizing (Aw et al., 2021).

Due to the emergence of m-commerce, consumers now have the possibility to use different channels when interacting with a brand (Aw et al., 2021). The shopping journey is often completed using multiple channels for information search, product and price comparison and purchasing patterns (Aw et al., 2021). For example, one can look for information about a certain product online, compare prices from different retailers also online, but finish the purchase in-store (Aw et al., 2021).

This consumer behavior pattern has surprised both researchers and retailers and while retailers are starting to adopt different channels only to satisfy the consumer's needs, researchers wonder whether e-commerce would ever abolish offline shopping (Aw et al., 2021). Furthermore, webrooming is having a negative influence on online-only retailers, like Amazon and AliExpress (Aw et al., 2021). Webrooming can be defined as doing research on a product online, while purchasing the same product offline/in-store (Aw et al., 2021).

Cross-channel shopping behavior can also have negative results for firms as it might result in brands losing control over consumers shopping journey, or free-riding (Aw et al., 2021). Free riding can be defined as "consumers' switching of retailers in the process of switching channels during their decision-making process", thus decreasing the customer amount and the revenue for retailers (Aw et al., 2021).

Aw et al. (2021) was interested in getting deeper insights into why consumers prefer to perform some operations online (i.e., product information research), while others strictly offline (the final buying decision). The research results concluded that the need for touch and interaction, as well as the online possibility for price-comparison, have a great influence on webrooming (Aw et al., 2021). Furthermore, consumers are highly influenced by the following factors the most: online search convenience, perceived usefulness of online reviews and perceived risk of buying online (Aw et al., 2021).

In this research the author is testing the preferred buying behavior before the pandemic, thus the following hypothesis aroused:

H1: Offline buying behavior was favored before the pandemic.

2.2 Online vs. Offline Buying Behavior During the Pandemic

Consumer buying behavior is defined as a decision-making process that can be affected by internal and external factors (Goswami & Chouhan, 2021). Before

the pandemic, people had developed the urge to buy new things all the time, led by their impulse buying behavior, even such that they do not need or will not use (Yang et al., 2021). On the other hand, Covid-19 can be considered as an external factor that influenced the buying behavior of consumers (Goswami & Chouhan, 2021). Hereby, when the pandemic began consumers' buying patterns of planned or unplanned purchases changed due to people spending more time at home (Goswami & Chouhan, 2021). Thus, there was no need for new outfits for going out, simply because all restaurants, stores, museums, theaters, etc. were closed. Figure 1 below presents data on offline buying patterns during the Covid-19 pandemic in the United Kingdom (Appinio, 2021). The numbers show that with time majority of respondents tend to buy less offline than before the pandemic: an increase from 28% in March 2020 to 51% in late February 2021 (Appinio, 2021).

Characteristic	Buying more offline than before	Buying less offline than before	Buying as much offline as before
Late Feb 21	13%	51%	36%
Early Feb 21	14%	53%	33%
Jan 21	14%	52%	34%
Aug 20	15%	48%	38%
Jun 20	16%	48%	36%
May 20	15%	46%	40%
Apr 20	19%	43%	39%
Mar 20	21%	28%	52%

Figure 1: Percentage change of offline shopping during the pandemic (Appinio, 2021)

There was also a change in the categories of products that were demanded the most at the beginning of the pandemic (Roggeveen & Sethuraman, 2020). Research conducted in India shows that the most demanded products were in the categories of hygiene, essential food, and home entertainment, while non-essential goods like clothing, mobile devices, jewelry, and footwear were not

that demanded (Goswami & Chouhan, 2021). Furthermore, Goswami & Chouhan (2021) claim that in historical times of economic crises individuals tend to be more pragmatic and focus on their needs, rather than their desires. Due to the pandemic many people lost their jobs and decreased their household income, whereby this was a factor in considering some unessential and unplanned purchases (Goswami & Chouhan, 2021).

Goswami & Chouhan (2021) found that there is a significant relationship between awareness of Covid-19, consumer attitude towards the pandemic, type of products purchased and consumer buying behavior. Hereby, explaining the prioritizing of some goods over the pandemic and the change in behavior patterns of consumers (Goswami & Chouhan, 2021). Figure 2 below presents data on how the pandemic impacted different sectors (McKinsey, 2021). Furthermore, the only positive percentage for “the next two weeks” measured in February 2021 is that of the segment of grocery shopping (McKinsey, 2021). All other segments suffered largely from the consequences of the pandemic (McKinsey, 2021).

Characteristic	Pre-COVID-19 (Sep 2020)	Expected post-COVID-19 growth (Sep 2020)	Next two weeks (Feb 2021)	Expected post-COVID-19 growth (Feb 2021)
Entertainment at home	78%	7%	1%	0%
Consumer electronics	63%	6%	-30%	-5%
Books, magazines, newspapers	62%	9%	-11%	-4%
Apparel	58%	8%	-32%	0%
Fitness & wellness	56%	9%	-12%	8%
Jewelry	51%	15%	-35%	-13%
Accessories	50%	15%	-35%	-7%
Footwear	49%	11%	-31%	-4%
Skincare & makeup	45%	14%	-21%	0%
Non-food child products	43%	11%	-15%	-1%
Food takeout & delivery	40%	10%	-10%	-10%
Groceries	32%	11%	17%	11%
Personal-care products	32%	9%	0%	4%

Figure 2: Projected growth of different product categories in the US during the pandemic (McKinsey, 2021)

The areas of food, groceries, healthcare, and home entertainment benefitted the most by the pandemic due to increased demand, however in the beginning those industries faced some issues with delivery times and inventory management (Roggeveen & Sethuraman, 2020). For instance, some grocery stores faced empty shelves in categories like toilet paper, pasta, or pasta sauces. Other industries like apparel were greatly harmed by the economic outcome of the pandemic and tried adapting by changing their product mix by offering hand sanitizers and face masks (Roggeveen & Sethuraman, 2020).

The emergence of the online platform Amazon, as well as the Covid-19 pandemic, were some of the biggest catalysts, which impacted the change of consumer buying behavior from offline to online (Wiederhold, 2021). During the pandemic, many restrictions were imposed, and people were ordered to stay at home, in order to prevent the spread of the virus. Furthermore, in order to stay compliant with the new governmental rules, online shopping was a great alternative to consumers since it also reduced human interaction, which was specifically important during the pandemic (Wiederhold, 2021). Stores were closed and consumers had no other option than to shop online if they wanted to buy something. Online shopping increased drastically compared to pre-Covid-19 times because there was simply no other option (see Statista, 2021 below).

Figure 3 represents a graph that shows the percentage of the gross annual online retail revenue from the total retail revenue in Austria between the years 2006 and 2020 (Statista, 2021). It can be observed that there was a steady increase in online retail revenue between 2006 and 2014, while between 2014 and 2017 the percentage of online retail revenue was constant at 5% (Statista, 2021). In 2018 and 2019 the share of online retail revenue in Austria declined (Statista, 2021). The pandemic began in the end of 2019 and most restrictions in Europe due to the pandemic began in March 2020. The graph shows a peak in the percentage of online retail revenue in 2020, with a figure of 6% (an increase with 1.4%, which is an increase of 30% compared to 2019) of the total retail revenue (Statista, 2021).

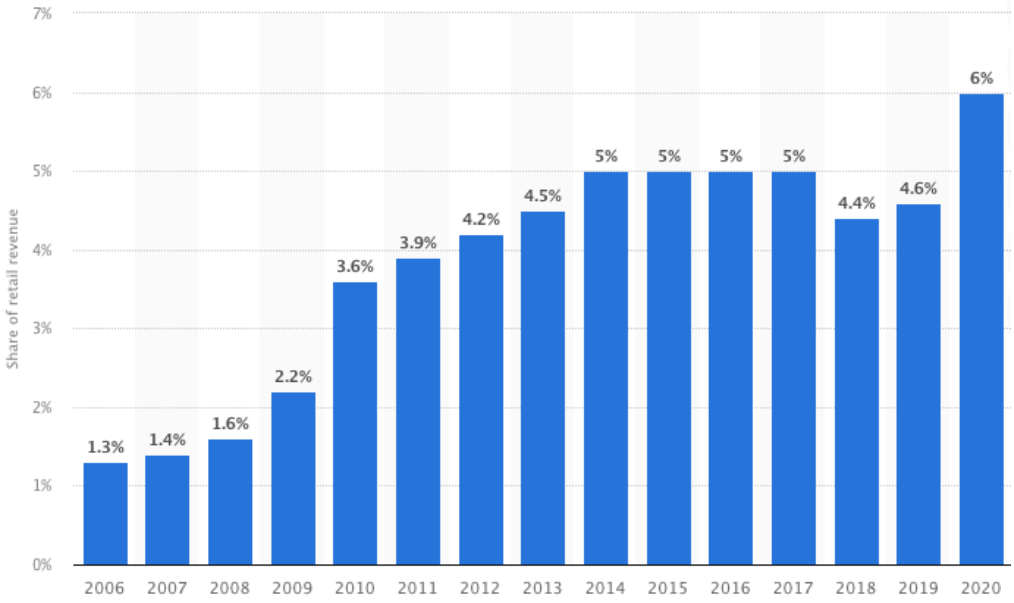

Figure 3: *Share of retail revenue in Austria between 2006 and 2020* (Statista, 2021)

Another example of the growth of online retail sales can be observed by looking at Zalando's quarterly sales (see *Figure 4* below). The rise in Zalando's revenue was steady until the last quarter of 2019, when there was a big increase, followed by an equally bigger decrease (in the first quarter of 2020) (Statista, 2021), which can be explained by Christmas purchases (increase in last quarter of 2019) and afterwards the shock of the upcoming pandemic (decrease in the first quarter of 2020). After this, very high peaks (in Q2 and Q4 of 2020 and Q2 of 2021) and smaller "lows" (in Q3 of 2020 and Q1 in 2021) can be noticed (Statista, 2021), making the curve of online sales growth steeper during the pandemic.

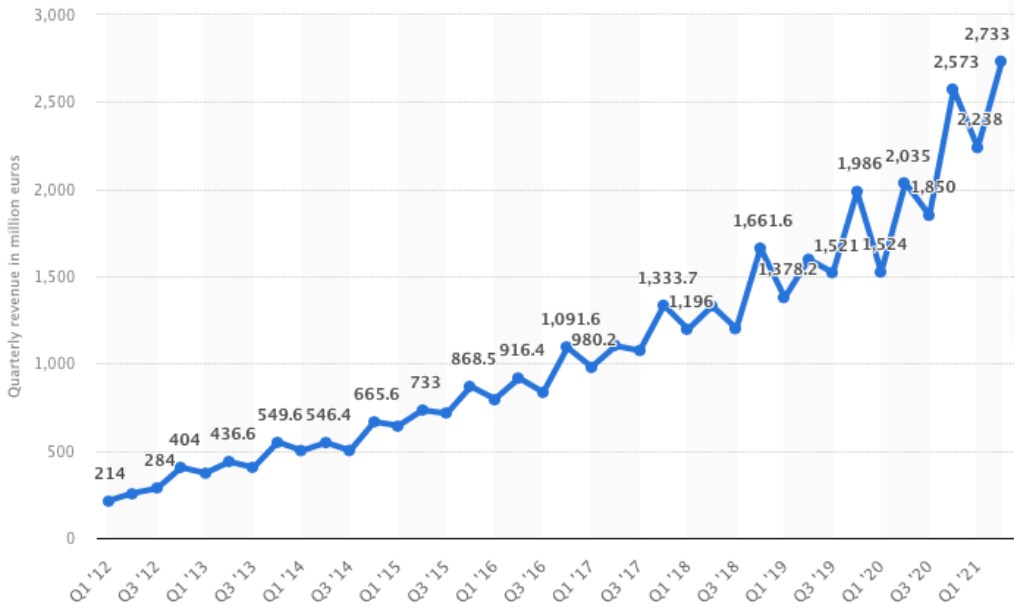

Figure 4: *Zalando's quarterly revenue* (Statista, 2021)

Before the pandemic offline shopping was favored because consumers could go to a store, see the products in real life, touch them, smell them, use their senses to motivate their final decision to buy (Wiederhold, 2021). For this thesis a final buying decision is defined as the action of an individual to finalize the purchase of a good or service. On the other hand, because of the pandemic, consumers realized some of the benefits of e-commerce: online shopping provided more product information (i.e., prices, materials, outfit recommendations), more time to think and compare different products in different stores (Wiederhold, 2021).

It is also important to note the extent of the impact of the pandemic and whether it would be short-term (two to three years, until people get used to the pandemic and return to their old shopping habits) or long-term (constant change in consumer behavior). Roggeveen & Sethuraman (2020) discuss the increase in online grocery shopping pattern, whereby consumers find it more convenient to shop groceries online (i.e., no need to carry big grocery bags from the supermarket). Furthermore, the use of gyms might decline due to people finding it more convenient to work out at home (i.e., online classes or

buying their own fitness equipment) (Roggeveen & Sethuraman, 2020). The streaming platforms also faced an increase in sales during the pandemic, therefore those platforms had to offer the hottest movies in order to keep their audience, thus resulting in a conflict with local cinemas (Roggeveen & Sethuraman, 2020).

The effects of Covid-19 on the retail industry are not fully clear and customer shopping behavior is continuously being studied. An interesting suggestion of Roggeveen & Sethuraman (2020) is that the cleanliness of a store could be a determinant of whether a consumer would buy something from it in the future (or even enter the store itself). Furthermore, the presence of an AR tool could influence the consumer buying decision, whereby the customer would not need to physically try on products that someone else tried before them, as this would be more sanitary.

In addition, during Covid-19, big brands were thinking of how to attract consumers in order to stay profitable and competitive. Thus, many companies like Dior, Nike, Too Faced partnered with Snapchat in order to create AR filters with which they could provide a smoother and more realistic shopping experience for their consumers (Conger, 2020).

The researcher was also interested in identifying the preferred consumer buying behavior during the pandemic, thus the following hypothesis was tested:

H2: Online buying behavior was favored during the pandemic.

2.3 AR in the Retail Sector

Technology is continuously evolving and offering more convenient solutions to daily operations, thus more and more retailers are incorporating systems like mobile apps and self-service touch screen areas (i.e., self-service check out of items) in order to make the shopping experience more convenient for the

customer (Pantano et al., 2017). Retailers benefitted largely from the innovations in this sector, as consumers considered those advancements to be decision support systems, which increased their satisfaction, loyalty and intent to purchase (Pantano et al., 2017). On the other hand, online shopping stores lack the physical interaction with the product at the point of sale (Pantano et al., 2017). Hereby, this prevents the consumer to touch, feel or smell the product before the final purchase (Pantano et al., 2017). Furthermore, Pantano et al. (2017) identifies the greatest concerns of online shopping to be the size and fit of the product. Research in this area suggests that this limitation of e-commerce can be overcome with the help of AR (Scholz & Duffy, 2018).

For this research AR is defined as a technology that changes the real world by using images, objects or information, which are produced by a computer and put on top of it (van Esch et al., 2019). Differently from virtual reality, in which the real world is missing, and one is transferred to a completely virtual environment, AR illustrates the real reality and only augments it (Scholz & Duffy, 2018). The most common use of AR is with the help of mobile devices, which consumers use to change the reality around them (van Esch et al., 2019). Javornik (2016) characterizes AR as an interactive technology because it is immersive and engages consumers.

AR is largely incorporated into the tourism industry, whereby the user can check important information about a historical destination at the point of arrival at the destination (Pantano et al., 2017). For example, *Figure 5* portrays an AR tour in Rome and the visitor can easily access information about the historical site with the help of their mobile device and the AR incorporated in it (Mileva, 2019). *Figure 6* presents an AR tour in the city of Vienna, Austria, whereby one can see Stephansplatz, a historical destination, and with the help of their phone and AR filters, they can see how it looked in the past (ArchäoNOW, 2022).

Figure 5: *AR Tour in Italy* (Mileva, 2019)

Figure 6: *AR Tour of Vienna* (ArchäoNOW, 2022)

Retailers realized soon enough that AR could be beneficial for their industry as well, thus it is now being incorporated into many online retail stores (Pantano et al., 2017). Furthermore, the possibility to overcome the barrier of sensory

perception of a product, pushes online retailers to invest in this technology, with the hope to minimize the difference between the in-store experience and the online shopping one (Scholz & Duffy, 2018). Pantano et al. (2017) also believes that AR and more specifically virtual fitting rooms are the most promising area of research. Looking from the consumer side, Pantano et al. (2017) found that consumers actually have a positive attitude towards virtual fitting rooms and AR tools that provide a 'try on' option.

The most common use of AR in the retail industry is the possibility to try on products, from make-up and accessories to full outfits and furniture. This shopping option happens with the help of virtual fitting rooms or AR face filters (similar to those in Snapchat or Instagram) (see figures below). It provides the consumer with the possibility to try different lipstick colors, clothes, sunglasses, or even to check if a given sofa or a lamp would fit well into their living space. Retailers are continuously adopting AR in their shopping options in order to attract more consumers, hereby many brick-and-mortar store owners installed an in-store virtual fitting room (to prevent consumers from undressing), while others, like online-only retail shop owners, incorporated AR in their websites / mobile applications (to lower the risks for consumers when shopping online) (Scholz & Duffy, 2018). Another use of AR in retail would be to scan different products in stores and immediately receive information and prices about those products, similarly to the AR tours of historical destinations mentioned above (Scholz & Duffy, 2018).

The next paragraphs discuss some examples of virtual fitting rooms and AR tools in the retail sector. Firstly, Figure 7 (see below) illustrates a woman in front of an AR mirror. The mirror has created an avatar of the woman in order for her to see herself trying out different clothes virtually in-store, without having to undress and try them on physically (FXGear Inc.).

Figure 7: *AR mirror* (FXGear Inc.)

The image below depicts a woman, trying out different lipstick shades virtually at Sephora with the help of an AR tool. One can see the different shades at the bottom of the AR tool, whereby the customer can play with them until they reach the perfect shade and buy it. Furthermore, during the pandemic this option to try on beauty products would be considered more sanitary as consumers do not try the products on their face or arm as they usually do (Perch Interactive, 2019).

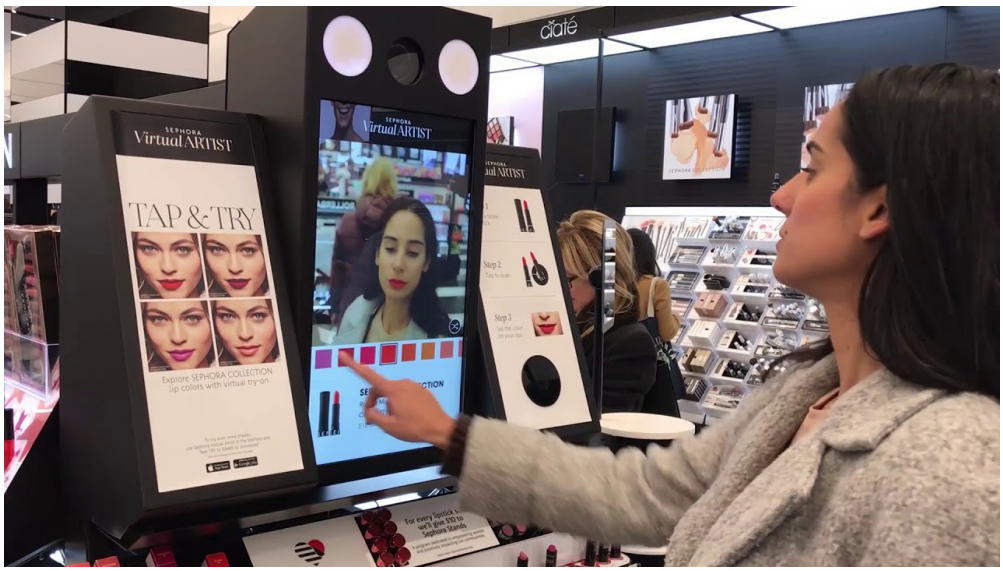

Figure 8: *Sephora AR face-filters for trying on lipstick* shades (Perch Interactive, 2019)

The example below depicts a part of an IKEA app commercial, in which consumers can see how different furniture fits around their house. The only device they need would be their phone or tablet and they can start planning and organizing different furniture around their home (IKEA, 2017).

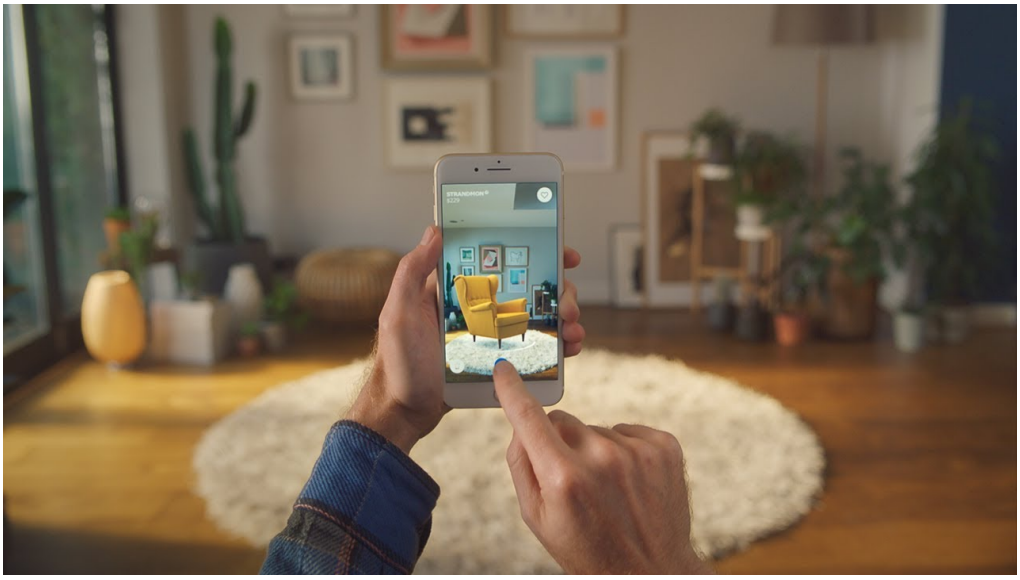

Figure 9: *IKEA AR tool* (IKEA, 2017)

The possibility to 'try before you buy' becomes reality with the help of AR technology (Pantano et al., 2017). Hereby, this option saves consumers' time and efforts because they would not need to undress in the shop, hence making their shopping journey more convenient and more enjoyable for them. Furthermore, in the near future, the usage of AR in the retail industry is expected to take up more than 65% of the whole AR, VR (virtual reality), and MR (mixed reality) market (Scholz & Duffy, 2018).

Literature is scarce on how AR technology actually impacts consumers, therefore van Esch et al. (2019) researched further how anthropomorphism influences individuals' perceptions of AR. In their study, anthropomorphism is defined as attributing human characteristics, rationality, and consciousness to

non-human concepts, like brands, animals, objects, phenomena, etc. (van Esch et al., 2019). Moreover, they take AR technology in the context of providing product information, rather than in its application of being a virtual fitting room. They concluded that anthropomorphism has a significant impact on some constructs related to AR (van Esch et al., 2019). The more detailed results included the confirmation that anthropomorphism influences 'consumer confidence in AR', 'perceptions regarding the convenience of conducting transactions with AR', 'consumer perception of innovativeness of AR', 'perceptions of barriers to the use of AR' and 'of its negative side effects' (van Esch et al., 2019). The data showed the following: the more realistic the image is, the higher the confidence of using AR, thus confirming that if the technology offers more human-like characteristics, consumers would be more willing to use it as it would resemble the in-store experience more (i.e., communicating with an employee, or paying at the cash desk) (van Esch et al., 2019). Furthermore, the level of innovativeness is also impacted by the extent to which the AR technology offers human-like characteristics, the more realistic the technology, the more innovative it would be perceived (van Esch et al., 2019).

Scholz & Duffy (2018) studied the impact of AR on mobile marketing and consumer-brand relationships. They identified three quality attributes that AR technology should fulfill to satisfy the customer: information quality (if the AR technology provides enough and useful information to its users), correspondence quality (the correct layout of virtual items in the physical world pictured on the mobile device) and user empowerment (it is useful to consumers in their goal to complete given tasks) (Scholz & Duffy, 2018).

The two most common uses of AR in the retail sector include displaying information about products and 'trying on' products virtually, without having to undress. Hereby, the latter use will be discussed here and the AR tool that provides this service is the so-called virtual fitting room. Virtual fitting rooms

are defined as a virtual platform, where users can try virtual clothes or products on their bodies (i.e., apparel, footwear) or at their homes (i.e., furniture, home accessories). Pantano et al. (2019) claims that virtual fitting rooms are a very prosperous area of research, thus there is a need to develop this technology further. Van Esch et al. (2019) also saw the need to advance this technology in order to reach a more realistic image, whereby it would be more favored by consumers. Furthermore, a suggestion for this field of research could be how to reach a realistic movement of the product, whilst being worn on the body. Consumers have a positive attitude towards virtual fitting rooms according to Pantano et al. (2017), which could imply that if such a tool is not present consumers would be less willing to buy a given product. Virtual fitting rooms also have positive impact on consumers' intention to visualize the product (not only because they want to buy it, but also because the technology is new and they want to try it out) and retention of store (they are more likely to remember the website because it offered an innovative shopping option) (Beck & Crié, 2018).

Research suggests that how good the technology is and how 'real' the images are impacts consumers' willingness to buy and their general behavior towards AR (Scholz & Duffy, 2018; Beck & Crié, 2018). Furthermore, the presence of an AR tool or a virtual fitting room increases customers' curiosity and develops their exploratory behavior (Beck & Crié, 2018), implying that consumers would spend more time on a given website if there is a virtual fitting room present (Beck & Crié, 2018). Moreover, consumers' desire to check the AR tool motivates their interest, hence they also pay more attention to the product itself, also increasing their intention to buy it (Beck & Crié, 2018). Beck and Crié (2018) also found that the presence of a virtual fitting room does not determine which shopping behavior is more likely to occur, i.e., offline, or online purchase. Hence, this could imply that a virtual fitting room can provide quality (realistic) image of the product or of a person wearing the product, which is similar or equal to the experience in-store (Beck & Crié, 2018).

Furthermore, companies are willing to invest and further develop AR in the retail industry in order to satisfy their customers and provide a more enjoyable and smoother shopping experience (Conger, 2020; Pantano et al., 2017).

2.4 Benefits and Challenges of Using AR from a Consumers' and Retailers' Perspective

This section of the research discusses benefits and challenges of AR for consumers and retailers. Pantano et al. (2017) found that customers have positive feelings regarding AR, thus they are more willing to understand and use this technology. Furthermore, other research confirms that the AR technology has a positive relationship with customers' perception of AR and their intention to use it (Scholz & Duffy, 2018).

Since AR is a type of technology, the Technology Acceptance Model can be applied (Pantano et al., 2017). It consists of four key variables, which are ease of use, usefulness, attitude, and behavioral intention (Pantano et al., 2017). Furthermore, 'ease of use' is defined as the extent to which the consumer believes this technology requires no efforts to be used and no additional or a little learning instruction (Pantano et al., 2017). Secondly, 'usefulness' presents the extent to which a consumer believes the technology would improve their performance (Pantano et al., 2017). 'Attitude' involves how the consumer evaluates the technology and 'behavioral intention' shows the extent to which the consumer intents or is motivated to use the technology (Pantano et al., 2017). The Technology Acceptance Model has been used widely for different new approaches in the retail industry, like calculating online / mobile shopping engagement, assessing recently opened shops which incorporate immersive technology, etc. (Pantano et al., 2017). Thereby, Pantano et al. (2017) also claim that the model is also confirmed for AR tools and virtual fitting rooms, thus they based their research on the model and found significant relationships between all variables of the Technology Acceptance Model related to AR.

According to Scholz & Duffy (2018), who studied the influence of AR on consumer-brand relationships, AR is a perfect tool for deepening and strengthening the bond between retailers and consumers. This is because the AR technology allows people to try out products on their mobile devices in the comfort of their home, which increases value for customers and creates a more intimate consumer-brand relationship because they can interact from their own personal space (Scholz & Duffy, 2018). In other words, they have let the brand into their home, which on its own creates intimacy and builds trust between the two parties (Scholz & Duffy, 2018).

Pantano et al. (2017) also found out that consumers regard AR as useful and enjoyable, which has a direct effect on their willingness to buy a given good. Hereby, this is confirmed by Poushneh & Vasquez-Parraga (2017), as they state that AR has a positive effect on consumer experience, satisfaction, and their willingness to buy. Scholz & Duffy (2018) also confirm it. Furthermore, van Esch et al. (2019) discusses that AR increases transaction convenience, hereby the AR tool increases the confidence in this innovative technology and consumers therefore find their shopping experience much more convenient and enjoyable.

The biggest downside of online shopping is the lack of physical experience, but now AR can provide a solution to the problem and make it possible for consumers to interact with the product virtually before they buy it, thus reducing the number of insecurities regarding how the products would look like, once delivered to the customer's door (Pantano et al., 2017). This is also confirmed by Scholz & Duffy (2018), who claim that AR reduces uncertainty about future purchases (i.e., delivery problems, state of good at the point of arrival, size, and fit problems).

AR decreases returns, which benefits retailers because they avoid return costs (Wiederhold, 2021). As mentioned in the previous section, most online retailers are pressured to offer free shipping and free returns in order to satisfy

the consumer, as they would not consider buying online if it is more expensive (Ratchford et al., 2022). Hereby, AR would prevent this from happening because the consumer will 'get a feeling' about the items they are buying.

Poushneh & Vasquez-Parraga (2017) discussed the influence of AR on user experience, user satisfaction and user willingness to buy. They deducted that the presence of an AR system significantly impacts user experience positively (Poushneh & Vasquez-Parraga, 2017). The product information provided by the AR tool contributed to the consumer shopping journey as it makes it more realistic (Poushneh & Vasquez-Parraga, 2017). Furthermore, the level of information provided by the AR technology also influenced the user experience, as the consumer felt more familiar with the product (Poushneh & Vasquez-Parraga, 2017). The nature of AR, being a relatively new technology, urged users to share their experience on social media, which contributes to WOM for the given brand (Poushneh & Vasquez-Parraga, 2017). Moreover, Poushneh & Vasquez-Parraga (2017) found that AR influences performance of tasks and customers value the characteristics of the product more. Lastly, if there is an AR tool present, consumers are more satisfied and willing to buy the product, hereby they also find themselves more entertained because of the numerous virtual information (Poushneh & Vasquez-Parraga, 2017).

As another benefit, AR increases word of mouth (WOM), which would be extremely crucial for retailers (Heller et al., 2019). Hereby, they depend on this marketing strategy because existing consumers have a great power when it comes to sharing their experiences (good or bad) of a given brand, thus further expanding the consumer category and brand awareness (Heller et al., 2019). On another note, impulse buying behavior is more likely to occur in e-commerce, rather than in a physical store according to Yang et al. (2021). However, van Esch et al. (2019) contradicts this claim and points out that such behavior is more common offline. According to him AR could be the factor that increases spontaneous purchases in the online shopping world, because it

involves a longer shopping path, which increases the time spent by a customer in the online store (van Esch et al., 2019). Furthermore, the curiosity of the customer is increased and not only towards the technology, but also towards the product (Beck & Crié, 2018).

AR is still being developed, which implies there are still many challenges in the process. One of the first issues of virtual fitting rooms that comes to mind is: will it be ever possible to provide the perfect imagery of a product on the body or in a customer's house (Pantano et al., 2017)? Other problems for consumers include the issues of privacy and personal autonomy (van Esch et al., 2019). This is because consumers allow the AR technology to use their mobile device camera, which some consumers are scared of because important information about their surroundings (i.e., people, home area, location) can be exposed (van Esch et al., 2019; Marr, 2021). Furthermore, some consumers still consider online shopping a risk (i.e., credit card fraud, items quality) and decide not to engage with it (Poushneh & Vasquez-Parraga, 2017).

With every new and immersive technology there is the existing problem of incorporating it due to it being very expensive for shop owners. This favors only the companies that can afford to integrate such a shopping option, while small online businesses may be left behind and lose their customer base because of it. Another concern related to AR in general is where the border between the real and the virtual world is. As AR is exactly in the middle, it is not fully virtual (VR), it might be hard in the future to distinguish between what is real and what is not. Lastly, there are no clear rules / laws that guide the AR environment (Marr, 2021).

The main focus of this thesis is the impact of AR on consumer's shopping journey and buying patterns. Thus, the researcher came up with the following hypotheses:

H3: AR makes customers' online shopping journey more enjoyable.

H4: Enjoyment increases purchase intention.

H5: AR decreases perceived risk of buying online.

H6: Perceived risk decreases purchase intention

2.5 Research Model

In this section, the research model that this thesis follows is presented. In Figure 10, one can see the different variables and their according hypothesis. The hypotheses will then be tested and hereby either accepted or rejected, while the impact of the independent variables on the dependent variables will be measured and discussed in later sections.

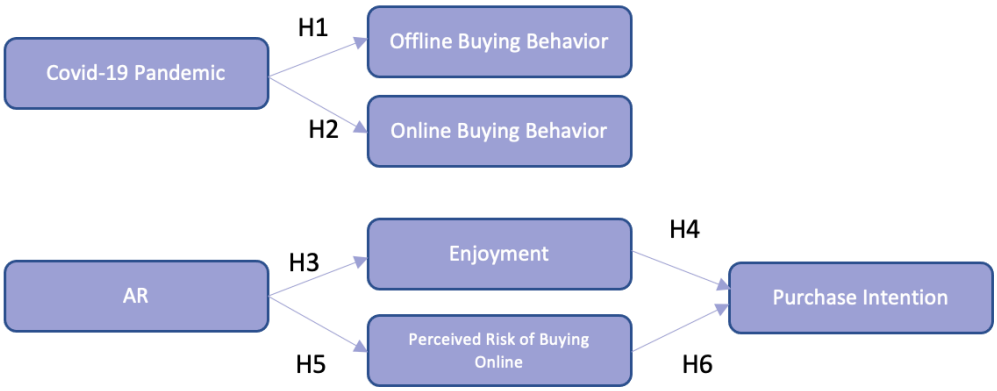

Figure 10: Research Model

3 Methodology

The methodology of this thesis is divided into five sections. First, the researcher describes the three main research approaches and justifies their choice among them for this thesis (see Section 3.1). In the next section, Survey Development (3.2), the questionnaire developed by the researcher will be discussed as well as all other relevant information regarding the survey will be included. Next, the researcher reviews the measurements and different scales used in the survey, as well as from where they were adopted (see Section 3.3).

Section 3.4 examines the data collection and analysis process that will be used for measuring the results of the survey. Finally, in section 3.5, the research ethics will be discussed.

3.1 Research Design

There are three research approaches that aim to gather primary data for a given research: quantitative, qualitative, and mixed method approach (Creswell, 2014). The quantitative approach tests relationships of given variables (Creswell, 2014). It uses the method of deduction to test its theories (Creswell, 2014). The quantitative research design analyses statistical data, which can be collected through experiments or surveys (Creswell, 2014). Furthermore, this approach applies the post positivism philosophical worldview, which is characterized by theory identification, data collection and finally revising if the theory was supported or not (Creswell, 2014). The qualitative research design on the other hand, collects data with the help of open-ended questions and focuses on the behavior and thoughts of individuals (Creswell, 2014). It uses the method of induction and collects data from interviews, observations, case studies, etc. (Creswell, 2014). Moreover, the qualitative approach applies the constructivism and transformative philosophical worldviews (Creswell, 2014). The mixed method approach combines the quantitative and qualitative approaches, which provides a broader and more in-depth understanding of the problem (Creswell, 2014). Research can start with quantitative collection of data and further explain the data with qualitative analysis after that (explanatory design), it can also start with qualitative data collection, which would build up to the quantitative data (exploratory design), or it can collect both at the same time (Creswell, 2014). The mixed method approach follows the pragmatic philosophical worldview, which puts the problem in the center (Creswell, 2014).

For this research, the selected research approach will be the quantitative research approach. Moreover, the research design will be a survey, which will

be conducted online. The reasoning behind this choice is that the quantitative approach would allow for bigger sample, thus the data would show more adequate results as more people from the population will take part in it. Furthermore, a survey rather than an experiment was chosen as the researcher believes an experiment would be irrelevant for this study.

3.2 Survey Development

The researcher aims to test the relationship between AR and enjoyment, as well as between AR and perceived risk of buying online. Furthermore, the relationship between the latter variables (enjoyment and perceived risk of buying online) and purchase intention will be tested as well. The study also seeks to find an answer to which was the preferred buying behavior (online or offline) before and during the pandemic. An online survey was created by the researcher in order to test the six hypotheses. The chosen platform for the survey creation was SoSci Survey.

The survey consists of 18 closed-ended questions (including demographic ones as well). Most of them follow the Likert scaling, however there are also semantic differential questions, yes-no questions and multiple-choice questions. The Likert scale questions are measured on a scale from one (strongly disagree) to seven (strongly agree). The semantic differential question is measured on a scale from -3 (negative characteristic) to +3 (positive characteristic).

The first part of the survey asks general questions about preferred method of buying before and during the pandemic, which is testing the first and second hypothesis. The second part of the questionnaire includes an IKEA AR app video, which participants need to watch and after, they need to rate the characteristics of the AR app with the help of a semantic differential question. Furthermore, the next sections ask in-depth questions about participants' perception of enjoyment, perceived risk of buying online and purchase intention, which would help the researcher accept or reject hypothesis three

to six. At the end of the survey, the researcher asks general questions about frequency of online shopping and AR usage. The survey ends with demographic questions such as age, gender, nationality, income, education, etc. to ensure the diversity of the sample. In addition, the appendix presents the exact format and wording of the questionnaire.

3.3 Measurements

In this section the different constructs and their consequent measurement items (in the survey) are discussed. Table 1 presents the six constructs of this thesis.

To measure the preferred buying behavior before and during the pandemic, two constructs were measured: offline shopping behavior and online shopping behavior. The first two questions for each construct were taken from Colaco & Silva (2022) and were adapted by the researcher of this thesis to be formulated as open questions, where participants can input any number freely. The second part of the questions were taken from Erjavec & Manfreda (2022) and were thereby adapted to measure online shopping consequently for before and after the pandemic in the first two constructs.

AR was operationalized by the different characteristics of AR. Thus, questions from Poushneh (2018) were taken and a semantic differential scale was used, so that participants can rate the characteristics of AR after watching the video about IKEA's app.

Next, the construct "enjoyment" was measured with three single items asking participants if they find the IKEA AR app to be enjoyable. The questions are Likert scaled and were adapted from Kowalczuk et al. (2021). The construct of "purchase intention" was adapted from Pappas (2016), whereby three Likert scale items are asking participants whether they would purchase, re-purchase or recommend IKEA's AR app. Lastly, Likert scale questions from Hong (2015) were taken to measure the researcher's construct of "perceived risk of online

purchase". The questions are aiming to find answers whether participants are hesitant to order online because of possible size & fit problems or return delays.

Before the demographics, the survey asks participants to state (yes/no) if they have ever made a purchase online and if they have ever used AR before checkout. Those questions act as filter or reliability questions as the researcher requires only people that are familiar with online shopping to take part in the survey.

The final part of the survey includes the demographic questions (see Appendix for exact wording and survey questions). The participants were asked about their age, gender, nationality, education, income range and frequency of shopping online. Some of the questions were multiple choice, others like age and nationality were open – ended in order to give the participants freedom in answering.

Construct Name	**Survey Questions / Items**	**Source**
Online Shopping Behavior Before the Pandemic	**In the following questions we are interested in your attitude towards <u>online</u> shopping BEFORE the pandemic. Kindly indicate the extent you agree/disagree with the following statements:** I find online shopping useful in my daily life. Using online shopping helps me buy things more quickly. Online shopping allows me to buy things more efficiently. I intend to use online shopping in the future. I will always try to use online shopping in my daily life. I plan to continue to use online shopping frequently.	(Erjavec & Manfreda, 2022)

	Open-ended + Likert Scale (1-7)	
Online Shopping Behavior During the Pandemic	**In the following questions we are interested in your attitude towards <u>online</u> shopping DURING the pandemic. Kindly indicate the extent you agree/disagree with the following statements:** I find online shopping useful in my daily life. Using online shopping helps me buy things more quickly Online shopping allows me to buy things more efficiently. I intend to use online shopping in the future. I will always try to use online shopping in my daily life. I plan to continue to use online shopping frequently. Open-ended + Likert Scale (1 – 7)	(Erjavec & Manfreda, 2022)
Frequency of Buying Furniture Online Before the Pandemic	How often did you purchase products **online before** the pandemic within a time span of one month? ____ half a year	(Colaco & Silva, 2022)
Frequency of Buying Furniture Offline Before the Pandemic	How often did you purchase products **offline before** the pandemic within a time span of one month? ____ half a year	(Colaco & Silva, 2022)
Frequency of Buying Furniture Online During the Pandemic	How often did you purchase products **online during** the pandemic within a time span of one month? ____ half a year	(Colaco & Silva, 2022)
Frequency of Buying Furniture Offline During the Pandemic	How often did you purchase products **offline during** the pandemic within a time span of one month? ____ half a year	(Colaco & Silva, 2022)

AR characteristics	**In the following questions we are interested in your perception of AR, having in mind the video you have just watched. How do you rate the AR technology in general?** Slightly informative – Highly informative Irrelevant information – Relevant information Unreliable – Reliable Insecure – Secure Shady output – Trustworthy output Slightly augments one's capabilities – Highly augments one's capabilities Adds virtual information to the places where do NOT belong – Adds virtual information to the places where belong Risky to use – Safe to use Hard to use – Easy to use Not personalized – Personalized Slightly augments one's awareness – Highly augments one's awareness (Semantic differential, -3 to +3)	(Poushneh, 2018)
Enjoyment	**In the following questions we are interested in your perception of how enjoyable AR technology can be. Kindly indicate the extent you agree/disagree with the following statements** I find using the IKEA's AR app to be enjoyable. The actual process of using the IKEA's AR app is pleasant. I have fun using the IKEA's AR app. Likert Scale (1 – 7)	(Kowalczuk et al., 2021)
Purchase Intention	**In the following questions we are interested in your intention to purchase via the IKEA's AR app. Kindly indicate the extent you agree/disagree with the following statements (1 – strongly disagree to 5 – strongly agree):**	(Pappas, 2016)

	I am likely to purchase furniture though IKEA's AR app. I am likely to recommend IKEA's AR app to my friends. I am likely to make another online purchase with IKEA's AR app if the products I buy prove to be useful. Likert Scale (1 – 7)	
Perceived Risk of Online Shopping	**In the following questions we are interested in your perception of risk in online shopping. Kindly indicate the extent you agree/disagree with the following statements (1 – strongly disagree to 5 – strongly agree):** I would be concerned that the product delivered may not perform to my expectations. I would be concerned that the product delivered may not match the descriptions, including the pictures, given on the website. Likert Scale (1 – 7)	(Hong, 2015)

Table 1 – Measurement Item Table

3.4 Data collection and analysis

A total number of 125 respondents was acquired with the online survey. The questions are asked in English. The survey was shared in social media in order to gather more participants, as well as it was sent out to students in Modul University via their email. The target participants need to be familiar with what AR technology involves and also well-aware of how online shopping is conducted, which is why young people are targeted through social media and the university platform. The sampling method is non-probability and more specifically convenience sample, since the survey will be shared in social media and send out to students and anyone who is willing to participate can do so.

The analysis was conducted with the help of the program Jamovi, which analyzed the raw quantitative data and provided the researcher with the results from different statistical tests. The aim of the survey is to gather relevant data for the researcher and to derive conclusions from the sample to the whole population. Then, the collected data from SoSci Survey was extracted and exported as an Excel file. After that, the data was "cleaned" and prepared to be imported to Jamovi. The tests that the researcher ran in the statistical software are the reliability test (Cronbach's alpha), Shapiro-Wilk Test and Linear Regression Analysis. The results from those tests will be shared in a later section.

The reliability test or Cronbach's alpha is used to measure the reliability of variables. Furthermore, all survey items are combined and analyzed together in order to give the researcher a general overview if the single survey items measure the same thing or whether there were some discrepancies that confused participants or were not asked correctly. Shapiro-Wilk test is a statistical test that measures the normality of variables. This test was conducted for each variable in order to establish the normality of the variables. Furthermore, the indicator for normality is usually a p-value. The most common significance level is 95%, thus the p-value for normality is considered significant if it is below 0.05. Linear Regression model is a statistical analysis that measures the correlation of variables and further allows the researcher to make conclusions about how much the independent variable predicts the dependent one. The four indicators for the linear regression model are as follows: R (b), R^2, adjusted R^2 and the p-value.

3.5 Research Ethics

The questionnaire begins with a brief overview of the survey and asks participants for their consent to record their answers and voluntary participation. In addition, the survey is anonymous, and the researcher does

not have the ability to link answers to a certain participant who filled out the survey.

Furthermore, the researcher is taking measures to protect the data collected and the privacy of the participants. The questions in the survey provided answers that are “neutral” in order for the participant to not be pressured to answer something that is not true. Furthermore, in demographic questions that can be considered more personal, participants are given the option to select “prefer not to say” when they feel uncomfortable answering.

The researcher explains the idea and aim of the survey in the beginning, thus ensuring that they are transparent with their purpose for the data collected. The researcher does not aim to harm or attack any of the participants, thus questions were formulated in a very neutral tone.

4 Results

This chapter focuses on data analysis and the results from the statistical tests. The raw data from the survey was drawn to answer the research questions of the thesis. This section is divided into three subsections that discuss the different tests conducted for analyzing the data. The first section investigates the sample descriptive. Secondly, each construct was tested for reliability in order to ensure the reliability of the results and conclusions of this study. Lastly, each hypothesis was tested, whereby the results from the statistical tests show if the researcher should accept or reject the null hypothesis for each one.

4.1 Sample Description

Firstly, the researcher investigated the sample characteristics in order to get a general understanding of the population and the demographics of the participants. The discussed demographics include gender, age, nationality, income, education, usage of online shopping and AR.

Participants' gender is shown in Table 2. It can be observed that more females participated in the survey, which amount to approximately 65.80% of the sample or 79 women in total. On the other side, males make up 32.5% of the sample and their size is 39 individuals. Lastly, two people preferred not to share their gender, which would equal the remaining 1.70% of the sample.

In the table below one can see the breakdown of the sample according to gender, as well as the valid percentages and the cumulative percentages.

	Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	39	32.50%	32.50%	32.50%
	Female	79	65.80%	65.80%	98.30%
	Prefer not to say	2	1.70%	1.70%	100.00%
	Total	120	100.00%	100.00%	100.00%

Table 2: Gender

Respondents' age is between 18 and 66. Hereby individuals were divided into five age groups for better understanding of the results. The age groups are as follows: 18-20, 21-25, 26-35, 36-45 and higher than 45. The majority of participants are in their early twenties (the group 21-25); hence they form 59,20% of the sample and their exact number is 71. This group is followed by respondents aged 18-20, which were 35 and amount to 29.20% of the sample. Those two groups combined form 88.40% of the whole sample, which is important to be noted as mainly young people engage in online shopping and would be interested to try or use AR technology during their shopping experience. Table 3 shows more detailed breakdown of each age group and their corresponding percentage. Seven individuals responded that their age is between 26 and 35, while only two were aged between 36 and 45, lastly five people from the sample are older than 45.

	Age	Frequency	Percent	Valid Percent	Cumulative Percent
Age	18-20	35	29.20%	29.20%	29.20%
	21-25	71	59.20%	59.20%	88.40%
	26-35	7	5.80%	5.80%	94.20%
	36-45	2	1.60%	1.60%	95.80%
	>45	5	4.20%	4.20%	100.00%
	Total	120	100.00%	100.00%	100.00%

Table 3: Age

Participants' nationality is presented in Table 4. Furthermore, only the top 4 locations are shown and divided. The rest of the participants are combined in a group named "Other". 24.20% of the sample comes from Austria, which is followed by Bulgaria, amounting to 20.80% of the whole sample, hence those two countries make up almost half of the sample. Serbia is the third most common nationality with a valid percentage of 5.80%, followed by Germany, China, and Hong Kong, hence each of them represents 5.00% of the population. Participants from countries different from the ones already listed make up 34.20% of the sample.

One can observe a more detailed information on each nationality group in the table below.

	Nationality	Frequency	Percent	Valid Percent	Cumulative Percent
Nationality	Austria	29	24.20%	24.20%	24.20%
	Bulgaria	25	20.80%	20.80%	45.00%
	Serbia	7	5.80%	5.80%	50.80%
	Germany	6	5.00%	5.00%	55.80%
	China	6	5.00%	5.00%	60.80%
	Hong Kong	6	5.00%	5.00%	65.80%

	Other	41	34.20%	34.20%	100.00%
	Total	120	100.00%	100.00%	100.00%

Table 4: Nationality

Income is a relatively sensitive question, which can explain the high number of participants that answered, "prefer not to say". Furthermore, those 45 respondents amount to 37.50% of the sample. Next, they are followed by people that earn between 0€ and 499€, which sum up 25.80% of the sample. The next group has a monthly income of between 1000€ and 1499€, which make up 15.00% of the sample.

The Table below represents a more detailed view of income groups.

	Income	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Income	0 € - 499 €	31	25.80%	25.80%	25.80%
	500 € - 999 €	10	8.30%	8.30%	34.20%
	1,000 € – 1,499 €	18	15.00%	15.00%	49.20%
	1,500 € – 1,999 €	11	9.20%	9.20%	58.30%
	2,000 € - 2,499	0	0.00%	0.00%	58.30%
	2,500 € +	5	4.20%	4.20%	62.50%
	Prefer not to say	45	37.50%	37.50%	100.00%
	Total	120	100.00%	100.00%	100.00%

Table 5: Income

Majority of respondents (55.80% - 67 of the respondents) have a high school degree, while 43.30% (52 – of questionnaire takers) have a university degree. Those two groups make up 99.20% of the whole sample, which can be explained by the fact that the researcher shared the survey with university

students mainly. One participant selected vocational school, which would amount to 0.80% of the whole sample. No one responded that their highest level of education is apprenticeship or compulsory schooling. In Table 6, one can see the visual representations of the education of the respondents.

	Education	Frequency	Percent	Valid Percent	Cumulative Percent
Education	University	52	43.30%	43.30%	43.30%
	High School	67	55.80%	55.80%	99.20%
	Vocational School	1	0.80%	0.80%	100.00%
	Apprenticeship	0	0.00%	0.00%	100.00%
	Compulsory Schooling	0	0.00%	0.00%	100.00%
	Total	120	100.00 %	100.00 %	100.00%

Table 6: Education

Table 7 shows a frequency table for usage of online shopping and usage of AR during shopping of respondents. 36 of respondents answered that they have both purchased items online and used AR during their shopping journey, which make up 30% of the sample. In total 119 of the survey participants have shopped online, which leaves one respondent that has not ever engaged in online shopping. Furthermore, this participant has also never used AR. 83 respondents (69.20% of the sample) have used online shopping, but they never used AR before checkout. The results of this survey question are in line with the researcher's aim to only include participants that are familiar with online shopping behavior.

	Use of AR for Shopping		
Use of Online Shopping	**Yes**	**No**	**Total**

Yes	36	83	119
No	0	1	1
Total	36	84	120

Table 7: Frequency Table for Use of Online Shopping and Use of AR

In order to use a product as stimulus which appeals equally to males and females, the researcher chose to ask questions about furniture products rather than apparel or any other retail segment. The survey incorporated an IKEA AR video commercial illustrating their new app and how to use it. Participants were asked to watch it and then rate the app according to certain AR characteristics. To get further insights of the sample, the researcher included a question regarding whether respondents have moved to another apartment during the time of the pandemic. The answers to this question were very balanced: 48.30% (58 individuals) of participants changed their apartment, while the rest 51.70% (62 individuals) stayed at the same place they were living before the pandemic. The researcher did not expect such a high number of people to have changed their living space during the pandemic, however this contributed to the reliability of the responses to all other questions as people that change apartments usually require new furniture. Furthermore, the detailed results are portrait below in Table 8.

	Move	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Move	Yes	58	48.30%	48.30%	48.30%
	No	62	51.70%	51.70%	100.00%
	Total	120	100.00%	100.00%	100.00%

Table 8: Moved to a new Apartment during the Pandemic

Table 9 below represents the different constructs and their type of measure. Furthermore, depending on each measure (nominal, ordinal, interval, or ratio) the researcher analyzed the constructs' central tendency, dispersion, and normality. For constructs 1-6 (online shopping before the pandemic, online

shopping during the pandemic, AR characteristics, enjoyment, purchase intention and perceived risk of buying online) the researcher used Likert scale questions to collect data, however they are all considered interval. The best measure of central tendency for interval scaled variables is the mean. The mean is higher than 4 (which would be the middle point between 1 – 7, which is the scale used for those questions), which means that all Likert scale variables are a bit skewed to the left and would show negative skewness. The highest mean is of the construct "Online Shopping During the Pandemic", while the lowest mean is of the variable "Purchase Intention". The standard deviation is a measure of the average dispersion of the values about the mean. The standard deviation of the first 6 constructs is relatively low (below 1.70), which implies that data results are clustered around the mean. The next statistics is the normality test, for which a Shapiro-Wilk test was conducted for all variables before proceeding to the statistical tests. The Shapiro-Wilk p-value for Constructs 2-5 is <0.001, which implies that data is not normally distributed, while for the first construct (Online Shopping Before the Pandemic) the normality p-value equals 0.062. While that is very close to the cut off value for significance, it should still be considered normally distributed. Constructs 7-10 (Frequency of Buying Furniture Online Before the Pandemic, Frequency of Buying Furniture Offline Before the Pandemic, Frequency of Buying Furniture Online During the Pandemic, Frequency of Buying Furniture Offline During the Pandemic) are all ratio scaled as the questions for those variables were open ended and participants could answer with any number that relates to their frequency of shopping. Furthermore, for ratio scaled variables mean and standard deviation are also the best ways to discuss central tendency and dispersion. "Frequency of Buying Furniture Online Before the Pandemic" has the lowest mean of 0.725, while the highest one is "Frequency of Buying Furniture Offline Before the Pandemic" with a mean of 1.75. Standard deviation is low for constructs "Frequency of Buying Furniture Online Before the Pandemic" and "Frequency of Buying Furniture Offline During the Pandemic", which means the data is spread around the mean, while for

constructs “Frequency of Buying Furniture Offline Before the Pandemic” and “Frequency of Buying Furniture Online During the Pandemic”, the standard deviation is above 3, therefore the data is more spread out. Furthermore, all of the constructs 7-10 failed their normality test (Shapiro-Wilk Test) and their p-value showed to be <0.001, which implies a not normal distribution.

	Type	Mean	Standard deviation	Shapiro-Wilk p-value
Online Shopping Before Covid-19	Interval	4.70	1.36	0.062
Online Shopping During Covid-19	Interval	5.26	1.32	<0.001
AR Characteristics	Interval	5.09	1.08	<0.001
Enjoyment	Interval	4.92	1.52	<0.001
Purchase Intention	Interval	4.33	1.70	<0.001
Perceived Risk of Buying Online	Interval	4.72	1.43	<0.001
Frequency of Buying Furniture Online Before the Pandemic	Ratio	0.725	1.74	<0.001
Frequency of Buying Furniture Offline Before the Pandemic	Ratio	1.75	3.18	<0.001
Frequency of Buying Furniture	Ratio	1.56	4.33	<0.001

Online During the Pandemic				
Frequency of Buying Furniture Offline During the Pandemic	Ratio	0.886	1.63	<0.001

Table 9: Central tendency, Dispersion and Normality

4.2 Scale Reliability

Before testing each hypothesis, a reliability test was conducted to see if each construct (measured with Likert scale questions) is reliable and if it measures what it is supposed to measure. Thus, the Cronbach's Alpha was measured for each construct. The acceptance level is 0.6, whereby between 0.6 and 0.8 is acceptable and above 0.8 is good. In Table 10 the reliability results are illustrated. One can see that all constructs meet the minimum level, and they also show a high reliability score. Furthermore, as all constructs are reliable and measured with Likert Scale, the researcher was able to compute a composite variable using the average of all items for those latent variables.

Variable	Cronbach's Alpha
Online Shopping Before the Pandemic	0.889
Online Shopping During the Pandemic	0.892
AR characteristics	0.928
Enjoyment	0.941
Purchase Intention	0.927
Perceived Risk	0.843

Table 10 – Reliability Test Results

4.3 Hypotheses testing

The researcher computed composite variables in Jamovi for all constructs measured on a Likert scale. Then, the author had to establish which test would

fit best for which hypothesis. For Hypothesis 1 and 2 the researcher measures the constructs with two types of questions: Likert scale and open-answer question. The Likert scale questions measured respondents' attitude towards online shopping before and during the pandemic, while the open question measures the frequency of shopping online vs offline before and during the pandemic. The researcher wants to compare the means of the variables before and during Covid-19, thus a Paired samples T-test needs to be conducted. All variables except "Online Shopping Before Covid-19" are not normally distributed, however this variable will be compared to a non-normally distributed variable, thus a test for not normally distributed variables should be computed, namely a Wilcoxon sign-rank test.

The computed variables are all interval scaled as a mean value of all question items that used Likert scale was computed to measure the different constructs. For hypothesis 3-6 all dependent and independent variables are interval scaled, thus as the hypothesis are also directional, a Linear regression test should be conducted to evaluate the relationship between the variables. This is also because the researcher is interested in predicting the dependent variable thus comparing their means would be irrelevant. Furthermore, constructs 3-6 (AR characteristics, enjoyment, purchase intention and perceived risk) all failed their normality check (Shapiro-Wilk test – discussed in previous sections), thus they are not normally distributed.

H1: Offline buying behavior was favored before the pandemic.

H0: No difference exists regarding offline buying behavior before and after the pandemic.

For hypothesis 1 the independent variable is the Covid 19 pandemic, and the dependent variable would be offline buying behavior. Hypothesis 1 assumes that consumers preferred to shop offline before the pandemic.

Both variables “Frequency of Buying Furniture Online Before the Pandemic” and “Frequency of Buying Furniture Offline Before the Pandemic” are not normally distributed. As the researcher is trying to compare the means of the two groups either a Paired Samples T-Test or a Wilcoxon sign-rank test should be conducted. The average frequency of buying online before the pandemic was 0.725 (*SD* = 1.74), while the frequency of buying offline was higher (*M* = 1.75, *SD* = 3.18). There was a significant effect for shopping before the pandemic, *t*(119) = -3.14, *p* < 0.001, with offline purchasing being more favored. Thus, there is enough evidence to reject the null hypothesis and accept the alternative one that offline buying was favored before the pandemic.

	Statistic	**df**	**Significance**
*Frequency of Buying Furniture **Online Before** the Pandemic - Frequency of Buying Furniture **Offline Before** the Pandemic*	**Student’s t** = -3.16 **Wilcoxon** W = 503a	119	0.002 <0.001

Table 11: Wilcoxon Test Frequencies Before the Pandemic

H2: Online buying behavior was favored during the pandemic.

H0: No buying behavior was favored during the pandemic.

The independent variable for hypothesis 2 is Covid-19, while the dependent variable is online buying behavior. The researcher wants to test the preferred buying behavior during the pandemic as well. Thus, hypothesis 2 assumed that online buying behavior was favored during the pandemic. Furthermore, people started to use online shopping more often in their lives. For this hypothesis open-ended questions asking for the frequency of buying furniture online and offline during the pandemic were used, as well as Likert scaled questions asking

for the attitude towards online shopping before and during the pandemic were asked.

In Table 12 and Table 13, the results of both scales were presented. The average frequency of buying online during the pandemic was 1.56 (*SD* = 4.33), while the frequency of buying offline was lower (*M* = 0.886, *SD* = 1.63). There was a significant effect for shopping during the pandemic, *t*(119) = 1.62, *p* = 0.014, with online purchasing being more favored, which confirms the researcher's assumptions (Table 12). Furthermore the Likert scale questions tastings also confirmed that there was a significant effect for shopping during the pandemic, *t*(119) = -5.68, *p* < 0.001, with online purchasing being more favored (Table 13). Moreover, the researcher should reject the null hypothesis and accept the alternative one, namely that online buying behavior was favored during the pandemic.

	Statistic	**df**	**Significance**
*Frequency of Buying Furniture **Online During** the Pandemic - Frequency of Buying Furniture **Offline During** the Pandemic*	**Student's t** = 1.62 **Wilcoxon** W = 1790a	119	0.109 0.014

Table 12: Wilcoxon Test Frequencies During the Pandemic

	Statistic	**df**	**Significance**
Online Shopping Before Covid-19 - Online Shopping During Covid-19	**Student's t** = -5.68 **Wilcoxon** W = 899a	119	<0.001 <0.001

Table 13: Wilcoxon Test – Online Shopping Before vs. During the Pandemic

H3: AR makes customers' online shopping journey more enjoyable.

H0: AR has no impact on customers' online shopping enjoyment.

In hypothesis 3 the dependent variable is enjoyment, while the independent variable is AR. The researcher aims to prove that AR impacts enjoyment of consumers throughout their shopping journey. The researcher assumes a positive relationship between the two variables, whereby if AR is present before checkout, consumers would enjoy their shopping journey more. For this hypothesis a Linear Regression analysis was conducted to test the relationship between the two variables.

Table 14 and Table 15 present simultaneously the Model Fit Measures and the Model Coefficients. The R value (presented also by the Standard Estimate) presents the correlation between the two variables, a value of 0.685 shows a strong positive correlation. The R^2 value presents the percentage of variation or prediction of one variable by the other one that the model explains. The adjusted R^2 is the adjusted value and is more commonly used, hence is this case a value of 0.464 is considered a weak effect size. AR significantly predicted enjoyment, b = 0.685, $t(119) = 10.2029$, p <0.001 and also explained a significant proportion of variance in enjoyment, $R^2 = 0.469$, $F(1, 118) = 104$, p <0.001, which makes the model significant, thus it follows that the null hypothesis should be rejected and the alternative one accepted. Therefore, AR makes customers' online shopping journey more enjoyable.

Model Fit Measures

				Overall Model Test	
Model	R	R^2	Adjusted R^2	F	p-value
1	0.685	0.469	0.464	104	<0.001

Table 14: Linear Regression – AR and enjoyment

Predictor	**p-value**	**t**	**Standard Estimate**
Intercept	0.932	0.0852	

AR	<0.001	10.2029	0.685

Table 15: Model Coefficients – AR and Enjoyment

Figure 11 below illustrates a scatterplot of the linear relationship between AR and enjoyment. The figure confirms that there is a visual linear relationship between the two variables.

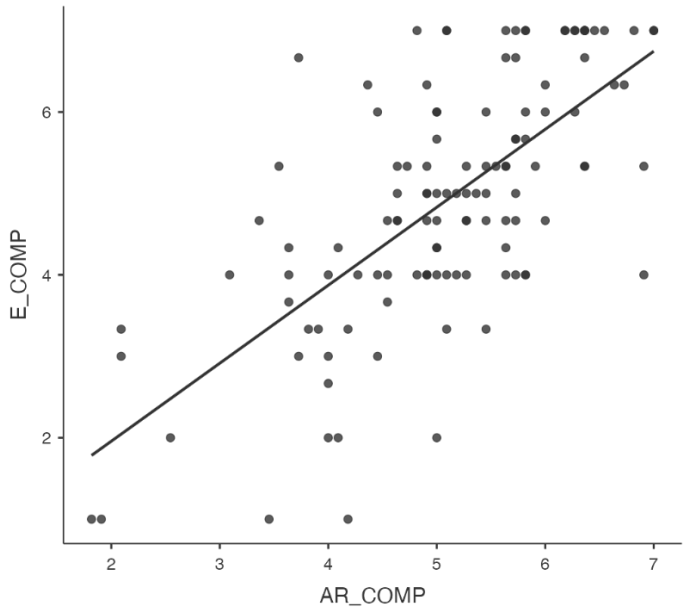

Figure 11: Scatterplot – AR (independent variable on the x-axis) and Enjoyment (dependent variable on the y-axis)

H4: Enjoyment increases purchase intention.

H0: Enjoyment has no impact on purchase intention.

Enjoyment is the independent variable for hypothesis 4, while the dependent variable is purchase intention. The researcher chose a directional hypothesis meaning that a positive relationship between the dependent and independent variables is assumed. Furthermore, the higher the enjoyment during shopping for consumers the higher their purchase intention. In order to test this relationship a Linear regression analysis was needed to test this assumption.

Table 16 and Table 17 below present the numeric results of the regression conducted. The R value is 0.742, which again shows a strong positive correlation between the variables, while the adjusted R^2 has a value of 0.547 implying a moderate effect size. Enjoyment significantly predicted purchase intention, b = 0.742, $t(119) = 12.041$, $p < 0.001$ and also explained a significant proportion of variance in purchase intention, $R^2 = 0.551$, $F(1, 118) = 145$, $p < 0.001$, thus this again confirms the researcher's hypothesis. Hereby, the null hypothesis should be rejected and the alternative one accepted, namely that enjoyment increases purchase intention.

Model Fit Measures

				Overall Model Test	
Model	R	R^2	Adjusted R^2	F	p-value
1	0.742	0.551	0.547	145	<0.001

Table 16: Linear Regression – Enjoyment and Purchase Intention

Predictor	**p-value**	**t**	**Standard Estimate**
Intercept	0.527	0.634	
AR	<0.001	12.041	0.742

Table 17: Model Coefficients – Enjoyment and Purchase Intention

The Figure below (Figure 12) shows the visual representation of the relationship between enjoyment and purchase intention.

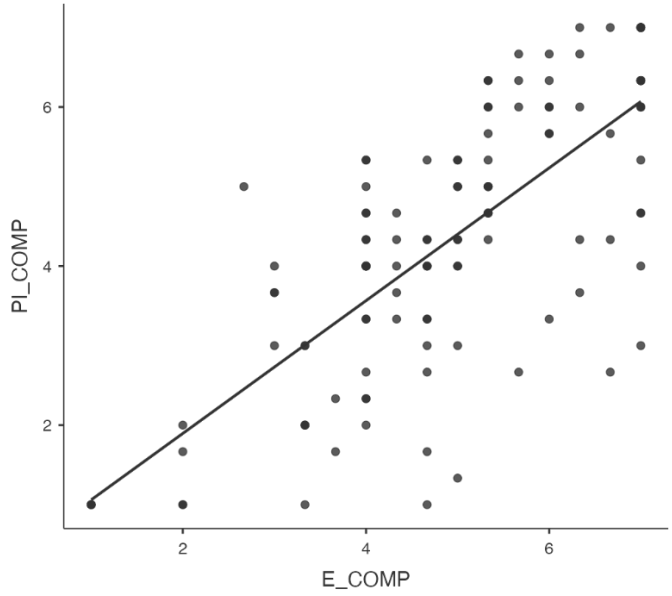

Figure 12: Scatterplot – Enjoyment (independent variable on the x-axis) and Purchase Intention (dependent variable on the y-axis)

H5: AR decreases perceived risk of buying online.

H0: AR has no impact on perceived risk of buying online.

For hypothesis 5, the independent variable is once again AR, while the dependent variable is perceived risk of buying online. Hypothesis 5 assumes a negative relationship between AR and perceived risk of buying online, therefore if AR present at checkout, consumers will feel more secure buying online. A linear regression test was conducted to test this hypothesis.

Table 18 and Table 19 present the Linear regression results conducted with the statistical program Jamovi. The R value of the model equals 0.0873, which shows a very weak (almost non-existent) negative relationship. The adjusted R^2 shows a very low value, which implies that the relationship between those variables cannot be explained with this model. AR did not significantly predict perceived risk of buying online, b = -0.0873, $t(119) = -0.952$, $p = 0.343$ and also failed to explain a significant proportion of variance in perceived risk, $R^2 = 0.00763$, $F(1, 118) = 0.907$, $p = 0.343$, implying that the null hypothesis needs

to be accepted and the researcher's hypothesis should be rejected. Furthermore, it was found that AR has no impact on perceived risk of buying online.

Model Fit Measures

				Overall Model Test	
Model	R	R^2	Adjusted R^2	F	P-value
1	-0.0873	0.00763	-7.82e-4	0.907	0.343

Table 18: Linear Regression – AR and Perceived Risk of Buying Online

Predictor	**p-value**	**t**	**Standard Estimate**
Intercept	<0.001	8.413	
AR	0.343	-0.952	-0.0873

Table 19: Model Coefficients – AR and Perceived Risk of Buying Online

A scatterplot (Figure 13 below) has been created to visualize the relationship between the two variables. One can see that the line is almost horizontal, confirming the non-existent relationship between the variables.

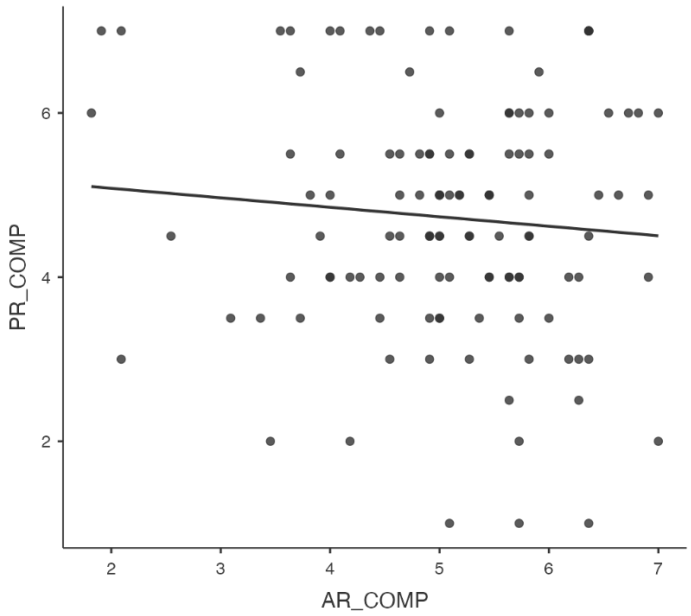

Figure 13: Scatterplot – AR (independent variable on the x-axis) and Perceived Risk of Buying Online (dependent variable on the y-axis)

H0: Perceived risk decreases purchase intention.

H6: Perceived risk has no relationship with purchase intention.

Finally, in hypothesis 6 the independent variable is perceived risk of buying online, while the dependent variable is purchase intention. This hypothesis aims to test a relationship between perceived risk and purchase intention. The researcher chose a directional hypothesis and assumed a negative relationship between the variables: the higher the perceived risk, the lower the purchase intention. Furthermore, a linear regression test was used to test the relationship between perceived risk and purchase intention.

Tables 20 and 21 present the Model Fit Measures and the Model Coefficients of this linear regression test. The R value and the standard estimate amount to 0.0295, which shows a very week (almost non-existent) positive relationship between the two variables. The adjusted R^2 is also very low and close to the zero, which again implies that the variance between the variables cannot be predicted with this model. Perceived risk of buying online did not significantly predict purchase intention, b = 0.0295, $t(119) = 0.320$, $p = 0.749$ and also failed to explain a significant proportion of variance in purchase intention, $R^2 = 8.68e\text{-}4$, $F(1, 118) = 0.103$, $p = 0.749$, which implies the researcher should accept the null hypothesis and reject the alternative hypothesis, claiming that perceived risk has no relationship with purchase intention.

Model Fit Measures

				Overall Model Test	
Model	R	R^2	Adjusted R^2	F	P-value
1	0.0295	8.68e-4	-0.00760	0.103	0.749

Table 20: Linear Regression – Perceived Risk of Buying Online and Purchase Intention

Predictor	p-value	t	Standard Estimate
Intercept	<0.001	7.716	
AR	0.749	0.320	0.0295

Table 21: Model Coefficients – Perceived Risk of Buying Online and Purchase Intention

To visualize the relationship between the Perceived Risk of Buying online and Purchase Intention, a scatterplot was created (Figure 14). One can see that the points are spread out everywhere on the graph and the line is close to being horizontal, thus implying no relationship exists between the variables.

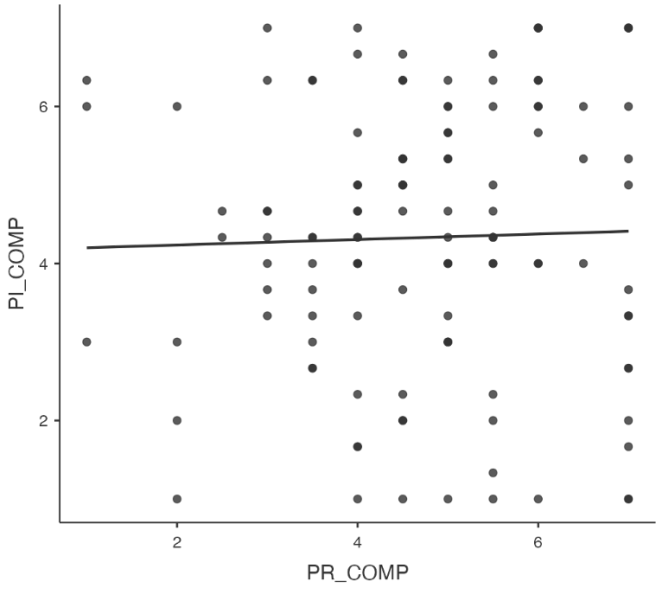

Figure 14: Scatterplot – Perceived Risk of Buying Online (independent variable on the x-axis) and Purchase Intention (dependent variable on the y-axis)

Table 22 illustrates the overview of the hypothesis testing, including the significance p-value and whether the given hypothesis was rejected or accepted.

Hypothesis	**Sign.**	**Accepted / Not**
H1: *Offline buying behavior was favored before the pandemic.*	<0.001	Accepted
H2: *Online buying behavior was favored during the pandemic.*	<0.001	Accepted
H3: *AR makes customers' online shopping journey more enjoyable.*	<0.001	Accepted
H4: *Enjoyment increases purchase intention.*	<0.001	Accepted
H5: *AR decreases perceived risk of buying online.*	0.343	Not Accepted
H6: *Perceived risk decreases purchase intention.*	0.749	Not Accepted

Table 22: Hypothesis Accepted / Rejected Summary

5 Discussion and Conclusion of Findings

The purpose of this section is to discuss the results derived from the survey of this study and relate them to already existing literature. Firstly, an overview of the findings of the study is given, as well as the significance of each relationship is interpreted. The author then provides detailed comparison between those findings and secondary sources.

Hypothesis 1 assumed that offline buying behavior was favored before the pandemic. The researcher found a significant relationship, using a Wilcoxon test. Hence, this proved that offline shopping was preferred before the pandemic. This can be explained by the need of consumers for touch and feel of the products and thus reluctance to buy online. However, due to many

restrictions imposed once the pandemic began, the researcher was also interested to find the most common buying behavior during the pandemic. Thereby, hypothesis 2 measured the preferred shopping pattern during Covid-19. The researcher found a significant relationship for this hypothesis, which confirmed their assumption that online buying behavior was favored during the pandemic. The logic behind this can be that consumers were ordered to stay at home, and they did not have the possibility to visit physical brick-and-mortar stores, thus they explored and familiarized themselves with shopping online. Furthermore, online shopping allowed them to lower physical interactions with people outside of their household, which gave them the only possibility to purchase retail products.

Hypothesis 3 explored the relationship between AR and enjoyment. Furthermore, the researcher assumed a positive correlation between the two variables. A Linear Regression Model was built to find the significance of the model and confirm the positive relationship between the constructs. Moreover, those findings can be explained by the immersive and playful technology of the IKEA AR tool, which allowed participants to witness and enter the world of AR. The next hypothesis looked into the relationship between enjoyment and purchase intention. A regression analysis was conducted to test the relationship between the variables. The p-value was significant, which confirms a positive correlation between enjoyment and purchase intention. The reasoning behind this can be that consumers tend to raise their interest in a given thing if it proves to be enjoyable for them, thus the level of enjoyment plays a role in their willingness to purchase.

Hypothesis 5 investigates the relationship between AR and perceived risk of shopping online and the researcher assumed a negative correlation between the two. The regression model showed to be insignificant, which rejected the alternative hypothesis and accepted the null hypothesis. Furthermore, the researcher was surprised by the results because AR allows for virtual fitting

rooms to exist, which could imply that consumers have the possibility to try products before they buy them, thus lowering the risks of size and fit problems for them. Therefore, further research is needed in this area. In hypothesis 6, perceived risk and purchase intention are evaluated, and a negative relationship is assumed. The Linear Regression Model was not significant, forcing the researcher to reject the alternative and accept the null hypothesis. This finding is interesting, because the author assumed that the higher the risk of online shopping the lower the purchase intention, however there was not enough data to support this claim.

The findings related to Hypothesis 1 were supported by Wiederhold (2021), who also claimed that before the pandemic offline buying behavior was favored because of the sensory benefits that physical experience in brick-and-mortar stores brings. Moreover, Ratchford et al. (2022) also identified physical touch as the most important factor in decision making for shopping. Another important characteristic of offline shopping is the possibility for immediate consumption. On another note, Kim et al. (2019) and Beck & Crié (2018) argued that consumers rely on their social skills to guide them through the shopping experience and decrease their uncertainty regarding products, which further explains the findings of this study.

Wiederhold (2021) argued that Covid-19 has been one of the factors leading the change in buying behavior in favor of online shopping, which contribute to the results following Hypothesis 2. Research in Statista (2021) also showed the increase in online shopping in the year 2020. During the pandemic consumers started shopping more groceries online, which made it more convenient for them and their daily routines (Roggeveen & Sethuraman, 2020).

The finding of this research regarding Hypothesis 3 offer additional empirical evidence on the relationship between AR and enjoyment, which has been already demonstrated in previous studies by Pantano et al. (2017), van Esch et al. (2019), Rogers et al. (2017) and Smink et al. (2019). Furthermore, Rogers et

al. (2017) claims that AR does not impact enjoyment directly but rather indirectly via feelings of competence and autonomy. This research proves a direct relationship between enjoyment and AR. Scholz & Duffy (2018) additionally discuss that AR increases value and intimacy for consumers, which can additionally contribute to enjoyment.

Hypothesis 4 offers empirical evidence which supports the research conducted by Wang et al. (2013), who also argued that a relationship between enjoyment and purchase intention exists. In the Research Model (Figure 10), Hypothesis 3 and 4 and indirectly connected, thus an indirect relationship between AR and purchase intention via enjoyment is assumed. While both the findings from both hypotheses proved to be significant, it can be suggested that an indirect relationship between AR and purchase intention exists. Furthermore, this is supported by Scholz & Duffy (2018), Beck & Crié (2018), Pantano et al. (2017) and Poushneh & Vasquez-Parraga (2017). Furthermore, Poushneh & Vasquez-Parraga (2017) also claim that consumers' levels of entertainment are higher when using AR.

The results of Hypothesis 5 are not significant. However, this finding highly contradicts Pachoulakis & Kapetanakis (2012), who claim that virtual fitting rooms increase sales and decrease risk of returns. Wiederhold (2021) also supports this claim. Furthermore, van Esch et al. (2019) confirms that AR increases transactional convenience and decreases transaction issues which can be considered as one of the perceived risks of online shopping. Van Esch et al. (2019) and Marr (2021) provide the only logical explanation for the findings regarding this hypothesis: consumers let AR use their camera and collect information about the consumers and their surroundings, which can increase the perceived risks for privacy during shopping. The researcher advises that more research is conducted in order to provide a more suitable conclusion.

Hypothesis 6 also showed insignificant results, which contradicts the author's assumptions, as well as the research of Ariffin et al. (2018), Kim et al. (2008) and Samadi & Yaghoob-Nejadi (2009). Furthermore, in their research Samadi & Yaghoob-Nejadi (2009) claimed that consumers perceive the Internet as a riskier environment for shopping and thus more risk is associated when purchasing online for them. Therefore, as this study did not provide sufficient data on the subject, more research is needed on the topic in order to show relevant results.

6 Implications and Limitations

This section discussed potential implications and limitations of the study. The first part focuses on managerial implications, whereby the author discusses some potential issues for managers that appeared after the pandemic. The second section focuses on limitations of the study based on the descriptive statistics evaluated at the end. Furthermore, the last paragraph discusses recommendations for future research and the fields where information is lacking.

6.1 Managerial Implications

While the pandemic caused for a lot of restrictions to be imposed and many physical retail stores to be closed, managers should understand how to tackle and overcome this problem using new and immersive technology to engage and retain their customers. AR is a tool that can provide buyers with the option to try before they buy, which makes the shopper closer to the physical experience. Young individuals tend to look for new products all the time due to the fast-paced retail industry, hence they might be interested in trying out new technologies that enhance their shopping journey.

High-quality imagery in a virtual fitting room using an AR tool could have an influence on buyers: increase their interest in the product, increase their

interest in the technology itself, increase their willingness to buy, etc. which on its own would increase the chances to retain the customer (van Esch et al., 2019). Furthermore, the better the quality and the more human-like it is the more innovative it would be perceived by consumers (van Esch et al., 2019).

The findings of this study confirm the benefits of incorporating AR in online shopping platforms and businesses in order to engage and retain consumers. A high-quality virtual fitting room can grow the interest of consumers, increase WOM and thus increase awareness of the brand. Managers should aim to incorporate such a tool in their operation to meet consumer's expectations, keep them happy and satisfied.

6.2 Limitations and future research

There are some limitations to this study that need to be identified. The first one was the relatively small sample size with a total of 125 respondents, five of which were outliers. This allows for a Type II error to happen as the sample was not big enough to reject the null hypothesis. The sample was represented mainly by females (65.80%), which might have an impact on the results. Furthermore, 88.30% of the sample was aged below 25 years, which in fact was the aim of the researcher as the respondents needed to be aware of online shopping and the technology of AR. Around half of the population had a high school diploma as their highest level of education and the other half had a university degree, which shows balanced results. Furthermore, the nationality of almost half of the sample was either Austrian or Bulgarian, which shows limited results in the diversity of the sample. Approximately a half of the respondents moved their apartment during the pandemic, which shows balanced results. However due to the Age, Gender and Nationality statistics, the sample cannot be generalized to the population. This is also due to the fact that young Europeans (Bulgaria, Austria, Serbia, Germany - the most common nationalities of the sample) (and mainly female), would not represent all

individuals around the world and there will be some slight or drastic differences in beliefs, views, opinions, etc.

The survey was distributed online, which prevented participants who do not have access to mobile device to participate in the survey. Some recommendations for the future of this study include an offline version of the questionnaire that can be conducted. Furthermore, this way responses from the older generation can be collected and thus analyzed. This can provide insights on how older people feel about this new technology and if they would be willing to understand and use it in the future. The survey is a quantitative measure of collecting data, and while the researcher was aiming to gain general insights and statistics on the topic from a larger sample, an in-depth analysis in the form of interviews might be beneficial in order to further gain more insights on consumer buying behavior and attitudes towards AR (in a more open environment, rather than replying to close-ended questions). The researcher used non-probability convenience sampling, which did not allow them to make general conclusions on the subject.

For future research, the author suggests further studies focusing on the relationship between AR and perceived risk of buying online and perceived risk of buying online and purchase intention, as this research failed to find a significant relationship between those variables. This might be due to the novelty of the AR technology, hence not many consumers would be willing to trust it. Furthermore, it would be interesting to see if brands started incorporating this technology more after the pandemic, thus this is another field of research where data is missing.

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