Degree Project
Master’s degree

Enhancing consumers' purchase intention by augmented reality

The relationship between augmented reality and Swedish millennials’ online purchase intention of shopping goods

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Abstract

Aim
The aim of the study is to test the relationship between augmented reality and the Swedish millennials’ purchase intention of shopping goods.

Methods
A survey was distributed online to Swedish millennials (born between the years of 1982 and 2000). Non-probability sampling was conducted in order to collect primary data by making use of convenience and snowball sampling. A total amount of 408 valid responses were collected which were analysed by correlation, linear regression and moderation regression analyses.

Results
The variables related to augmented reality (product perception, risk perception, augmented reality experience, hedonic experience and utilitarian experience) were found to be significantly related to the consumers’ purchase intention. The relationship between product perception and purchase intention was found to be moderated by the online experience with augmented reality. However, no proof was found that perceived risk when shopping online is moderated by using augmented reality.

Conclusion
Augmented reality can be used as a tool to enhance the consumers’ perception of the offered product and therewith raise the online purchase intention of Swedish millennials for shopping goods. The efficiency and informative aspects that augmented reality can provide are especially appreciated. Therefore, this study can recommend online retailers to introduce an augmented reality strategy in order to raise Swedish millennials’ purchase intention of shopping goods and therewith increase the sales numbers.

Keywords
Augmented reality, purchase intention, online retail, e-commerce, Swedish millennials, shopping goods, consumer perception, online shopping experience

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List of abbreviations

α Cronbach’s Alpha
AR Augmented reality
B2C Business-to-consumer
Max. Maximum
Min. Minimum
SD Standard deviation
Sig. Significance level
SPSS Statistical Package for Social Science
QR code Quick response code
US United States
USD United States Dollar
$x$ Sample mean
1. Introduction

1.1 Background

Technological innovations are constantly influencing the society and the way of living. Augmented reality is a technology that combines the real and virtual world and finds access into the life of today’s consumers (Azuma, Baillot, Behringer, Feiner, Julier, & MacIntyre, 2001; Zhou, Duh, &Billinghurst, 2008). Users of social community apps like Snapchat or Instagram are using this type of technology on a daily basis by applying filters on photos that change a person’s appearance. Besides that, the smartphone game “Pokémon Go” created a real hype worldwide in the year 2016, when the app was downloaded over 500 million times within two months (Gilbert, 2016). Crowds of people were catching virtual Pokémon creatures in their surroundings. By using their smartphone cameras, the players could identify the virtual game figures, which integrated themselves into the real environment.

However, augmented reality is not a new phenomenon as its first and simple forms were developed in the 1950s (Carmigniani, Furth, Anisetti, Ceravolo, Damiani, & Ivkovic, 2011). Only from the 1990s onwards when mobile computers were developed, augmented reality gained more attention in the field of computer science (Azuma et al., 2001) and has advanced since then (Huang & Liao, 2017). With decreasing costs, the ongoing digitalization, improving technology and portable devices, augmented reality finds more application in a growing field of usage. The technology can be found in almost every industry, such as medicine, automotive, gaming, military, art, navigation, education, tourism and architecture (Javornik, 2016a). The market of augmented reality is expected to grow from 2.4 billion United States Dollars (USD) in 2016, to be worth 60 billion USD by 2023 (MarketsandMarkets, 2017).

Along with the development of technology, the business-to-consumer (B2C) e-commerce is constantly growing (Huseynov & Yıldırım, 2016; Yaoyuneyong, Foster, & Flynn, 2014). Research indicates, that its growth is linked to the permanent accessibility that online shopping offers with its availability for consumers at all times (Hilken, de Royter, Chylinski, Mahr, & Keeling, 2017). The transparency and constant possibility to compare products are also coherent with the increase of e-commerce (Huseynov & Yıldırım, 2016). Additionally,
the easy access to the internet through smart devices facilitates the B2C e-commerce (Yaoyuneyong et al., 2014).

Smart devices also enable the average citizen to partake in the world of augmented reality technology (Hilken et al., 2017). For example, by simply downloading retail apps that feature augmented reality on the smartphone, it's possible to use the technology. Furthermore, augmented reality is used as a marketing strategy within several industries. Brands such as L’Oréal, Ray-Ban and IKEA make use of virtual try-on apps. L’Oreal’s app “YouCam Makeup” allows the customers to see themselves in real-time on their smart device and explore, try and purchase different makeup products from the brand (L’Oréal, 2017). Ray-Ban’s app “Ray-Ban virtual try-on” (iTunes Apple, 2014; Ray-Ban, 2018) gives the customer the opportunity to explore and try on various glasses in a real-time setting. With IKEA’s augmented reality app “IKEA Place” users are able to virtually place a furniture of choice within their surrounding which is scanned with a smartphone camera. This allows the customer to see how the product fits into their home (IKEA, 2018a).

The use of augmented reality has become a tool for online retailers to improve the customer’s shopping experience (Hilken et al., 2017; Yaoyuneyong et al., 2014). It is portrayed as a strategy for online retailers to attract, encourage and retain customers (Bilgihan, 2016). The visualization that augmented reality offers, is argued to enhance the service quality of the online retail store (Huang & Liu, 2014; Rese, Baier, Geyer-Schulz, & Schreiber, 2017).

1.2 Problem description

Besides the growth rates of online sales, the e-commerce business has to deal with challenges. A rising number of buying processes are discontinued (Lopez-Nicolas & Molina-Castillo, 2008) and many products are returned after the purchase (Hilken et al., 2017). This is often linked to the consumers’ feeling of uncertainty when buying products online. The perceived risk can either relate to the product which the consumer intends to buy or to the channel, the internet (Lopez-Nicolas & Molina-Castillo, 2008). As the internet is not a physical place to go, the risks which a consumer perceives are argued to be higher compared to the ones in a physical store, which has a significant influence on the purchase intention of the consumers (Forsythe & Shi, 2003). According to Hall and Towers (2017), consumers with more knowledge have a greater feeling of power, which makes the consumer perception of the product vital. Especially in the field of e-commerce it is argued that augmented reality affects
consumer behaviour and attitude towards products and the online buying process (Hilken et al., 2017; Huseynov & Yıldırım, 2016; Lopez-Nicolas & Molina-Castillo, 2008).

The lack of direct experience with the product within e-commerce, leads to a feeling of uncertainty and therefore constitutes a risk for the consumers when buying online. This perceived risk results in a growing number of order returns, uncompleted order processes and consumers without any online purchase intention (Yaoyuneyong et al., 2014). Therefore, it is relevant to research how augmented reality can affect the consumers’ perception of the product and their feeling of risk when buying online as well as the influence on the purchase intention. A lack of research was detected concerning the effect of perceived risk on the online purchase intention within the literature of augmented reality. Furthermore, studies about augmented reality’s influence on the risk perception are recommended (Beck & Crié, 2018). Most of the research about augmented reality focuses on augmented reality itself and the consumers’ acceptance of such new technology (Huang & Liao, 2017; Rese et al., 2017). However, this study intends to also contribute to the lack of research in the field of consumers’ online shopping experience which is enhanced through augmented reality technology, where only a few studies put their focus so far (Hilken et al. 2017; Poushneh & Vasquez-Parraga, 2017).

When it comes to online purchasing, consumer products can be divided into different types. Convenience products are bought on a frequent basis by consumers, without a great effort of searching or comparing before the actual purchase (Poon & Joseph, 2000). Shopping goods on the other hand, are a type of consumer product which is bought less frequently and is therefore associated with more effort of comparing for example suitability, quality, price and look before the purchase (Poon & Joseph, 2000). Products such as furniture and clothing are typical examples of shopping goods (Business Dictionary, 2018). During the initial purchasing process, the consumers are likely to spend more time on the decision making for shopping goods, compared to other product categories, as a shopping good purchase requires more information (Business Dictionary, 2018). Compared to speciality goods, the effect of brand and loyalty is not as strong for shopping goods (Poon & Joseph, 2000). For this study, consumer shopping goods have been identified as the product category of interest, as shopping goods are most likely to be purchased online, compared to other product groups (Statista, 2018). This is due to the easy access to product information online, as the collection
of information is especially important for shopping goods (Zhai, Cao, Mokhtarian, & Zhen, 2016).

Since the B2C online industry is growing, there is a constant need for further contemporary studies concerning consumers’ purchase intention of shopping goods and the factors affecting their decisions (Ha & Stoel, 2009; Huseynov & Yıldırım, 2016). Therefore, additional studies focusing on young and future consumers with high purchasing power are required, such as the millennial generation. According to researchers such as Moore (2012) as well as Reis and Braga (2016), the millennial generation is born between 1982 and 2000, thereby creating a current age range from 17 to 36. Within this wide age range, differences in purchase behaviour, lifestyle and preferences are expected. While older millennials are mostly already working, millennials born in the 1990s may still be studying (DeVaney, 2015). However, the significance of the generation to this study is due to several reasons and similarities between these individuals. Millennials are described as "Digital natives" (Prensky, 2001), as they grew up with the access of internet and technological innovations (Bilgihan, 2016). This generation also played with toys of higher technological standards (for example Gameboy and Tamagotchi) compared to prior generations, which means that millennials are used to technologies from an early age. Therefore, they are likely to be open-minded to experience the latest technologies (Lingelbach, Patino, & Pitta, 2012). Besides the easy internet access, it is also argued that the online technological applications are a big part of the everyday life of millennials (Duffett, 2015; Hall & Towers, 2017). As millennials were born into the “digital age”, they spend a tremendous time online connecting with each other through the technologies (Goldenberg, 2007, as cited in Duffett, 2015). Usually, individuals of this generation in developed countries own a personal computer, laptop or mobile phone, which facilitates the everyday usage of internet (Lingelbach et al., 2012).

According to Duffett (2015), the combined purchasing power of millennials worldwide by the year of 2015 was 2.45 trillion USD. In line with this massive purchasing power, technology plays a major role in the field of marketing and B2C e-commerce. Therefore, this generation is expected to be responsive towards technological innovations like augmented reality within online shopping. The millennial generation will continue to have a rising purchasing power, which is due to the fact that they are better educated than previous generations (DeVaney, 2015). Also, their interest in fashion and other shopping goods
(Fromm & Garton, 2013) makes it vital to understand the perceptions and purchasing behaviour of the millennial generation.

Swedish millennials are of special interest to this study. The Swedish millennials are a powerful generation with a high purchasing power (Parment, 2013), which is of interest for this study. As the millennial generation is argued to have both the resources and the power to change the market situation (Knittel, Beurer, & Berndt, 2015), the Swedish millennials fit the description of a powerful generation. Furthermore, Swedish millennials have easy access to internet which makes them a population of great interest as this generation interacts through social media on a daily basis (Bilgihan, 2016). Also, a lack of studies was detected which investigate the behaviour of consumers that are already familiar with the usage of innovative technology within the marketing context (Hoffman & Novak, 2009). Due to the frequent use of various technologies and the open-mindedness of the Swedish millennials (Huang & Liao, 2015; Schewe et al., 2013), these individuals are a valid population of investigation as they are expected to be familiar with innovative technology. Current studies related to innovative technologies within marketing concerning millennials as a consumer group, do not put emphasis on the Swedish millennials. The attempt of this study is therefore to contribute to this lack of studies. The importance of not generalizing studies about millennials from different countries was presented in the study by Schewe et al. (2013). Thus, studies from other countries cannot be generalized to the Swedish millennials. Thereby, it is vital to gain a deeper understanding of the Swedish generation and its habits and preferences in the online marketing context.

1.3 Research aim and question

Based on the previously reviewed literature, the aim of this study is to investigate how augmented reality relates to the Swedish millennials' purchase intention of online shopping goods. Consequently, the research question which this study intends to answer is as follows:

*What is the relationship between augmented reality and the online purchase intention of shopping goods for Swedish millennials?*
1.4 Outline of the study

After introducing the problem, research aim and question of the study in this chapter, the second chapter will outline theory and previous research about augmented reality in relation to Swedish millennials and shopping goods in detail. Also, the developed hypotheses that derived from the reviewed literature are presented. Chapter three is devoted to the methodology, addressing important research choices, data collection, analysis, quality and limitations, as well as ethical considerations. In the fourth chapter, the survey's results are presented in connection with the analysis of the data. The discussion of the findings of the survey and its analysis follows in chapter five. The last chapter of this thesis closes with the conclusion, which provides the answer to the research question. Furthermore, the contribution of the study, practical implications, limitations as well as recommendations for further research are stated.
2. Theoretical framework

2.1 Augmented reality

The technology of augmented reality visually transforms the physical reality by adding virtual objects into a real-life setting by the simple use of a smartphone, screen or projector (Javornik, 2016b). Therefore, augmented reality can be seen as a way of enhancing the consumer’s reality (Carmigniani et al., 2011; Javornik, 2016b). Within the field of mixed reality, virtual reality and augmented reality are often clustered together. However, even though they have the same purpose of enhancing the consumer’s experience, they differentiate. Virtual reality takes the user into a new world (Ashwini, 2007) whereas augmented reality is a technology that interweaves real-life settings and virtual objects with the purpose of letting these different worlds co-exist and being real-time interactive (Azuma et al., 2001; Javornik, 2016b). The technology of augmented reality can be used on products and in different environments (Carmigniani et al., 2011).

The usage of augmented reality within the marketing context has grown rapidly during the last decade and many well-known brands are experimenting with it (Hilken et al., 2017). These brands mostly use the technology for advertising and enhancing the consumers’ purchase intention of products. Top Gear Magazine, Sephora or Pepsi Max for example, make use of augmented reality in order to engage with consumers (Dyakovskaya, 2017). Recent studies show that over 20% of the online purchases are completed by using a smartphone (Escobar-Rodríguez & Bonsón-Fernández, 2017). Therefore, it is vital from the marketing perspective of the B2C e-commerce to keep up with current trends. It is expected that even more brands will engage with augmented reality for marketing purposes to enhance their customers’ experience. According to Digi-Capital (2017), the world of mixed reality is expected to have a total drive of 108 billion USD by 2021. Virtual reality is expected to comprise 23%, whilst augmented reality is expected to comprise 77% of the total drive.

Augmented reality has as presented previously been used with the purpose of influencing the consumers’ purchase intention (Hilken et al., 2017). Despite this, brands such as Google Glass have chosen to withdraw their augmented reality strategy due to high costs and low profit. However, it was reported that Google Glass is now launching their augmented reality strategy for the second time, as yet another attempt to catch the consumers’ attention with an
improved technology (Levy, 2017). Some brands have certainly made a positive impact on the consumers’ purchasing intention (Dyakovskaya, 2017), while others have simultaneously failed to influence the purchase intention per se (Levy, 2017). Thus, researchers are currently not unanimous about how or even if, augmented reality actually influences the consumers’ purchase intention. According to Prahalad and Ramaswamy (2000), augmented reality can possibly have a direct effect on the consumers’ purchase intention, as the technology gives the customer a deeper control of the online purchase. On the other hand, the results of the study by Schwartz (2011) did not show any significant link between the usage of augmented reality and an increased purchase intention of the consumer. Furthermore, the study also indicated that the experience with augmented reality cannot only provide a positive consumer experience but can also result in a negative impact on the purchase intention (Schwartz, 2011).

Within the field of augmented reality and retail business several research studies were conducted, focusing on a variety of products as well as variables which have been investigated. Survey studies were undertaken in order to explain the effect of augmented reality on consumers, especially for fashion products and virtual dressing rooms (Hilken et al., 2017; Yaoyuneyong et al., 2014), glasses or cosmetics (Hilken et al., 2017; Huang & Liao, 2015; Yaoyuneyong et al., 2014). Variables which have been tested in relation to augmented reality and its users are for example brand attitude (Hopp & Gangadharbatla, 2016), behavioral responses (Javornik, 2016a), intention to use and reuse (Rese et al., 2016) and purchase intention (Beck & Crié, 2018; Poushneh & Vasquez-Parraga, 2017). While Beck and Crié (2018) found out that augmented reality increases the purchase intention of the consumer in relation to curiosity and patronage intention, Poushneh and Vasquez-Parraga (2017) came to the result that enhanced user experience of augmented reality influences the consumers’ satisfaction and willingness to buy.

2.2 Purchase intention

In order to predict purchasing behaviour, consumers’ behavioural intentions are frequently measured as indicators for an actual purchase (Armstrong, Morwitz, & Kumar, 2000). Purchase intention is also assumed to be an antecedent of a behaviour that follows (Ajzen, 2002). A behavioural intention is therefore defined as “a person’s subjective probability that he [or she] will perform some behaviour” (Fishbein & Ajzen, 1975, p. 288).
Ajzen and Fishbein's Theory of Reasoned Action from 1967, is a dominant theory within research that explains consumer behaviour. The theory states that behavioural intentions are formed by the consumer through his or her attitude towards a certain behaviour as well as the influence of subjective norms. The attitude towards a certain behaviour can be a strong desire to buy a certain product, therewith positively influencing the consumer’s purchasing intention. Subjective norms on the other hand, influence the consumers’ perception of his or her intended behaviour, for example the opinion of the people in their surrounding such as family, friends or colleagues (Ajzen & Fishbein, 1980). The behavioural intention in the context of the Theory of Reasoned Action can be understood as the willingness or readiness to perform a behaviour under certain considerations (Han & Kim, 2010). In the context of this study, a behavioural intention relates to an intention to buy a product within the category of shopping goods on an online platform.

With the Theory of Planned Behaviour (1985) Ajzen improved the Theory of Reasoned Action by including perceived behavioural control as a variable. Perceived behavioural control describes the perceived easiness or difficulty of undertaking an intended behaviour like a purchase. This factor provides information about any constraints which can be perceived by a consumer and might positively or negatively influence an intended behaviour (Ajzen, 1985). Therewith, it can be argued that perceived behavioural control reflects experiences and expected obstacles towards a purchase intention, such as for example lack of money (Paul, Modi & Patel, 2016).

Although intentions are a precondition for conducting a purchase, it must be considered that a consumer’s behavioural intention is not necessarily followed by the intended behaviour (Moghavvemi, Salleh, Sulaiman, & Abessi, 2015). Intentions are important, however, not sufficient to predict actual behaviours like a purchase (Bhattacherjee & Sanford, 2009). Therefore, this phenomenon is called the intention-behaviour gap and can be described as the inconsistency between behavioural intentions and actual behaviour (Bhattacherjee & Sanford, 2009). Consumers’ varying attitude strengths are seen as an explanation of the differences (Bhattacherjee & Sanford, 2009). As purchase behaviour can only be measured with actual sales numbers, studying consumers’ intentions is seen as an appropriate way to gain an understanding of consumers’ attitudes and feelings towards a possible purchase (Moghavvemi et al., 2015). Therefore, this study will focus on purchase intentions related to augmented reality.
Purchase intentions within an online environment may differ significantly compared to traditional sales channels such as physical stores (Escobar-Rodríguez & Bonsón-Fernández, 2017). Therefore, it is important to understand consumers’ purchase intentions within e-commerce. Several studies investigating online purchase intentions made use of the Theory of Reasoned Action or Theory of Planned Behavior in order to explain future online purchase intentions (Hansen, Jensen, & Solgaard, 2004; Paul et al., 2016; Amaro & Duarte, 2015). This can be explained by the fact that a certain level of knowledge or resources are needed in order to navigate through the internet on a computer or other smart devices (Shim, Eastlick, Lotz, & Warrington, 2001).

Compared to other product categories, shopping goods are products which are related to more information searching and comparison (Poon & Joseph, 2000). Therefore, this category seems to be most suitable to be bought online from the consumer’s perspective. It was predicted by Peterson, Balasubramanian and Rosenberg (1997) that especially products with attributes that can be searched for online and do not need any direct experience during the purchase process (such as books or computer products) are increasingly sold online. These so-called “search goods” are easy to evaluate by the consumer online.

Previous research has found several factors that influence the purchase intention within the online shopping environment and studied a lot of variables extensively. Trust towards the online platform and channel has been found to be one of the strong influences on online purchase intention (Escobar-Rodríguez & Bonsón-Fernández, 2017; Hsu, Chuang, & Hsu, 2014; Pavlou, 2003; Thamizhvanan & Xavier, 2013). Demographic factors such as age, have a significant influence on the online purchase intention as the studies from Law and Ng (2016) show. Older consumers (aged 50+) find it more difficult to purchase online. Also, gender was found to be a significant demographic variable (Law & Ng, 2016). Furthermore, in cases where the consumers already have purchased products online, they are more likely to do re-purchases (Shim et al., 2001). This explains that prior online shopping experience has a significant influence on the online purchase intention (Shim et al., 2001; Thamizhvanan & Xavier, 2013). The consumers’ willingness to transmit personal information is related to a kind of a security feeling or risk perception, having a significant impact on the intention to buy online (Law & Ng, 2016).
2.3 Perception

2.3.1 Product perception

In order to run a successful online business, it is crucial for online retailers to understand the consumers’ product perception (Huseynov & Yıldırım, 2016). Product presentations that make use of for example images, have been proven to lead to a greater perceived value of the product (Hagtvedt & Patrick, 2008, as cited in Modig & Rosengren, 2014). The perception of a product is described as the consumers’ subjective impression of a product’s quality and value which relates to a specific context when investigating the product (Modig & Rosengren, 2014). Therefore, the judgment of a product highly differs between consumers due to their subjective product perceptions (Zeithaml, 1988, as cited in Iranmanesh, Jayaraman, Zailani, & Ghadiri, 2017). Furthermore, product perceptions also differ from the actual technical features of the product itself (Modig & Rosengren, 2014). In order to understand the consumer’s perception of a product, the entire experience of the consumer with the product is of interest (Han, Dieck, & Jung, 2018).

How the product is presented on a website can determine the consumer’s perception of the given product (Dahlén, Rosengren, & Törn, 2008) in terms of perceived quality and value (Modig & Rosengren, 2014). In order to influence the purchase intention of consumers, the product needs to be perceived in such way, that the consumer is left with a positive feeling towards it (Yim, Chu, & Sauer, 2017). A positive feeling can be generated when the product is perceived as valuable, of high quality, reliable, or durable (Dodds et al., 1991, as cited in Modig & Rosengren, 2014). However, in an online environment it requires more effort from the retailer to present the product in a way which can be perceived as valuable compared to an offline context like a physical store (Nelson, 1970, as cited in Wells, Valacich & Hess, 2011). This is mainly described due to the inability to actually touch, feel and try the product before the initial purchase online (Forsythe & Shi, 2003; Yaoyuneyoung et al., 2014).

When the product is perceived as of high quality, value, reliability or durability by the consumer, the purchase intention is likely to be higher (Modig & Rosengren, 2014). When deciding on a product, Swedish millennials differ in their decision making process compared to older consumers. Parment (2013) argues that the decision process of younger consumers is more influenced by emotions compared to older generations, which pay more attention to making rational decisions. How the product is perceived by the consumer is important to
understand, especially by the millennial generation, as this is a critical generation which mostly does not have any specific product nor brand loyalty (Knittel et al., 2016). If younger consumers dislike a product, they are likely to share this negative experience via social media rather than a positive one (Bailey, 2004, as cited in Knittel et al., 2016) and therewith easily influence other consumers’ perceptions. As the Swedish millennials spend a tremendous time online, they are likely to share their product perception with other users (Schewe et al., 2013). Furthermore, augmented reality is argued to provide the consumer with information of the product in such way that it can be perceived more positively than before using the technology (Huang & Liao, 2015). Thus,

H1a: The product perception with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.

2.3.2 Risk perception

Consumers’ actions involve risks as they are always connected with consequences which are related to uncertainty (Bauer, 1960, as cited in Chaudhuri, 2000). Risk can either be associated towards the product of interest or the place where it is sold (Lopez-Nicolas & Molina-Castillo, 2008). Especially related to shopping online, consumers perceive a higher level of risk (Forsythe, Liu, Shannon, & Gardner, 2006).

Concerns about the product can be of technical reasons, which means the fear that the product will not work as expected. Social risks are perceived concerns that people in the consumer’s social environment will dislike or condemn the bought product (Lopez-Nicholas & Molina-Castillo, 2008). Another risk related to the product itself, is of psychological nature: The fear of disappointment or frustration about making a poor product choice relates to psychological risks, which may lead to a feeling of dissatisfaction about purchasing, owning or using the product (Bhukya & Singh, 2015).

Furthermore, the internet as the place of the purchase might generate perceived risks which also have to be taken into account (Lopez-Nicholas & Molina-Castillo, 2008). Performance risks are consumers’ concerns that the outcome of an online product purchase might be different than expected. Due to the inability to touch, feel, try and therefore appropriately judge the product online, the product choice may turn out to be different than predicted (Forsythe & Shi, 2003). Therefore, online consumers might fear that they do not get the
product they expected (Forsythe & Shi, 2003; Soopramanien, Fildes, & Robertson, 2007). This perceived risk increases even more if there is a high need to physically inspect the product before the purchase (Soopramanien et al., 2007). Further risks related to the internet are related to the loss of money as well as time and are respectively called finance and time risks (Lopez-Nicholas & Molina-Castillo, 2008). As a purchased product from an online website is often delivered via third parties, also a delivery risk exists which can be perceived by an online shopper (Lopez-Nicholas & Molina-Castillo, 2008). Furthermore, security and privacy issues can present a great concern towards the consumers. Especially the misuse of personal information and spam by the retailer might be expected (Liao, Liu, & Chen, 2011).

Risk perceptions are therewith seen as the most important factor to explain unwillingness to complete online purchases (Forsythe & Shi, 2003). As the perceived risk influences the success of e-commerce (Lopez-Nicolas & Molina-Castillo, 2008) it is necessary to study its impact on consumers. As especially younger consumers are more open-minded towards online shopping compared to older generations (Parment, 2013), risk might not be a strong inhibitor for online purchases for the Swedish millennials. The use of the augmented reality technology is argued to be a risk reliever (Hilken et al., 2017), which can further reduce the perceived risk in the context of online shopping. However, it is still expected that the risk perceived by Swedish millennials is negatively related to the purchase intention. Therefore, this study focuses on investigating the psychological risk as well as the performance risk, as those are expected to influence young consumers’ shopping behaviour most. Thus,

H1b: The risk perception with augmented reality is negatively related to the online purchase intention of shopping goods of the Swedish millennial generation.

2.4 Augmented reality experience

2.4.1 Augmented reality shopping experience

Augmented reality is argued to enhance the consumers’ online shopping experience (Carmigniani et al., 2011; Javornik, 2016b). Consumers have changed their shopping behaviours along with the internet’s ability to easily provide information about for example prices and product quality. This is argued to be one of the main concerns when purchasing online, as customers seek to have the highest possible quality to the lowest price (Lemon & Verhoef, 2016, as cited in Cruz et al., 2018). The consumers’ online shopping experience can
be improved by the visualization and the information that the technology of augmented reality can provide (Cruz et al., 2018). The key to a successful shopping experience is argued to be an experience filled with information about the product of interest (Huang & Liao, 2017). Such product knowledge can be given by the digital use of augmented reality (Cruz et al., 2018).

Compared to virtual reality, where the consumer’s shopping experience is influenced through an avatar, augmented reality enables the consumer to personally experience the product through the technology (Huang & Liao, 2017). The personal shopping experience is argued to be important for consumers, as this gives the consumer knowledge about how the product can be used for oneself in particular (Baek, Byon, Choi, & Park, 2017). This creates a positive feeling of ownership (Huang & Liao, 2017).

For the millennial generation, where also emotional aspects related to the decision making are of importance when shopping online (Parment, 2013), the usage of augmented reality can give the consumer a feeling of satisfaction (Hilken et al., 2017). However, it is also argued that if the augmented reality experience is viewed negatively, this will have a negative impact on how the consumer views the product (Schwartz, 2011). Especially the Swedish millennials per se, are as explained, a generation that spends time online on a daily basis with several purposes, such as for example online purchase, online communication and online inspiration (Schewe et al., 2013).

H2a: The shopping experience with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.

Due to different motivations of online shopping, the experience may differ (Chiu, Wang, Fang, & Huang, 2012). It can be of hedonic or utilitarian value, which are both involved in all shopping experiences and in every consumer behaviour. Both must be understood in order to measure the influence of the shopping experience on consumers' purchase intentions (Blázquez, 2014).

2.4.2 Hedonic augmented reality experience

A hedonic shopping experience relates to an experiential and exciting experience that is fun, pleasant and enjoyable. Hedonic shopping experiences are therefore aiming at creating a unique and fantastic experience for the consumer, which results in an enjoyable entertainment
(Holbrook & Hirschman, 1982). This kind of shopping value especially refers to recreational shoppers and product categories which are linked to shopping due to pleasure reasons instead of needs (Barry, Darden, & Griffin, 1994). Augmented reality enhances the user’s involvement visually as well as physically as it invites the consumer to engage with the product and therefore influences the purchasing process (Fiore, Jin, & Kim, 2005). Therewith, the shopping experience of the online customer can be enhanced (Poushneh & Vasquez-Parraga, 2017). Also, the playfulness of a purchase process is argued to be increased by the use of augmented reality (Huang & Hsu-Liu, 2014). Consequently, it is assumed that the experience with the technology may have a positive influence on the hedonic aspects of online shopping.

As millennials also tend to have a more emotional decision making process (Parment, 2013), it is also likely, that Swedish millennials’ purchase intentions are to a great extent influenced by hedonic values of the shopping experience. The millennials are furthermore argued to be a generation that requires higher stimulation than previous generations (Bilgihan, 2016) which makes the individuals perform more behaviors of exploratory character during the purchasing process (Steenkamp & Baumgartner, 1992, as cited in Fiore et al., 2005). Thus,

H2b: The hedonic shopping experience with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.

2.4.3 Utilitarian augmented reality experience

Utilitarian shopping values however, are linked to the efficiency of the shopping experience. Utilitarian aspects of a purchase process are therefore related to rationality and task-orientation and focus on finding product-related information in an efficient as well as timely manner (Fiore et al., 2005). Consequently, utilitarian shopping experiences facilitate the purchase of a certain product, rather than creating a special shopping enjoyment (Darden & Griffin, 1994). As augmented reality is said to reveal more information about a product, it could be seen as a tool which can also improve the utilitarian aspects of a shopping experience (Huang and Hsu-Liu, 2014). Furthermore, the difficulty of imagining how a certain product may suit the consumer or the environment can possibly be reduced (Hilken et al., 2017).

Although millennials are argued to require more emotional stimulation during the shopping process than other generations (Parment, 2013), consumers have to gather information about
it prior to the purchase depending on the product of interest. As especially shopping products
are related to an extensive information searching process about its functional aspects
(Business Dictionary, 2018), it is assumed that utilitarian value is important for the
millennials' shopping experience. Thus,

H2c: The utilitarian shopping experience with augmented reality is positively related to the
online purchase intention of shopping goods of the Swedish millennial generation.

2.5 The moderating role of augmented reality

Augmented reality is frequently used by brands to enhance the consumer perception, as for
example Pepsi Max with their augmented reality campaign in 2014, which lead to a 30%
increase in their sales of single bottles (Dyakovskaya, 2017).

In order to increase the perception and trust towards a certain product, augmented reality
could be seen as a technology with a persuasive influence on the consumers’ decision making
(Huang & Liu, 2014). Therefore, augmented reality is described as a risk reliever within
online shopping, as this could help the consumer to overcome the problem of trying before
buying. When the products cannot be touched in reality, this technology gives the user the
chance to experience the product virtually in a real-life environment (Yaoyuneyoung et al.,
2014). In case the user has a positive experience, the consumer’s perception of the product
will be enhanced (Yim et al., 2017). Also, the information and visual support which a
consumer gains through using augmented reality could mitigate uncertainties and risks which
are associated with online shopping. Consequently, the shopping experience with augmented
reality is expected to moderate the consumers’ purchase intention. Thus,

H3a: The shopping experience with augmented reality significantly moderates the
relationship between product perception and the online purchase intention of shopping goods
of the Swedish millennial generation.

H3b: The shopping experience with augmented reality significantly moderates the
relationship between risk perception and the online purchase intention of shopping goods of
the Swedish millennial generation.
2.6 Socio-demographic variables

Research has shown, that consumer behaviour in the context of online shopping can differ depending on socio-demographic characteristics (Khare, Khare, & Singh, 2012; Sánchez-Torres, Arroyo-Cañada, Varon-Sandoval, & Sánchez-Alzate, 2017; Smith et al., 2013; Wolin & Korgaonkar, 2003; Wu & Chang, 2016). Therefore, it is assumed, that these variables might also impact the consumers’ attitudes towards the shopping experience with augmented reality. However, as socio-demographic variables are not the main focus of this study, gender, age, nationality, educational level and occupation were used as control variables. Furthermore, also the consumers’ online purchase frequency is used as a control variable, as consumers with more experience in online shopping might differ in their online purchase behaviour compared to consumers with less experience (Hernández, Jiménez, & Martín, 2011). All variables were chosen in order to investigate their influences on the shopping experience with augmented reality and further explain the results of the collected data.

Research states, that the social character of traditional shopping is appreciated more by women (Sim & Koi, 2002) and that men are the ones that are more likely to have positive feelings towards online shopping (Wolin & Korgaonkar, 2003). Therefore, consumer behaviour may differ in the context of online shopping, depending on the gender. Former studies have indicated that compared to women, men are more affected by interactivity (Lin, Featherman, Brooks, & Hajli, 2018) as well as innovativeness and usefulness (Law & Ng, 2016) during the process of online shopping. Women on the other hand, perceive risks when buying online stronger than men (Lin et al., 2018). Also, the fact that women feel more affected by vividness when shopping online (Lin et al., 2018), could be another reason for women to enjoy using augmented reality. However, other previous studies have not shown any significant differences between online purchasing behaviour in relation to gender (Alreck & Settle, 2002; Bhatnagar, Misra, & Rao, 2000; Hernández et al., 2011). Men and women nowadays both work and are therefore similarly used to technology and innovations. This might explain why online purchase behaviour does not have to significantly differ between genders (Law & Ng, 2016).

The control variable age was investigated due to the broad age range of the millennial generation, currently ranging from 17 to 36 years (Moore, 2012; Reis & Braga, 2016). Thus, it is expected that individuals of the millennial generation are within different stages of their
lives (DeVaney, 2015), which can have an impact on their online purchasing intention. In the reviewed literature, age has been explained by some researchers as an influence on the purchase intention (Hsu, Chang, & Lin, 2016; Khare et al., 2012), while others have not found any particular difference between age groups in regard to the purchase intention (Thamizhvanan & Xavier, 2013) and online shopping behaviour in general (Hernández et al., 2011).

Also, nationality can play a role in the context of individuals' online shopping habits. The study results of Thamizhvanan and Xavier (2013) indicate differences between individuals from India and Western countries. Smith et al. (2013) show in their cross-cultural examination that online shopping behaviour differs between Norwegian, German and US-American consumers. Since Sweden is a country that hosts various nationalities (Statistiska Centralbyrån, 2018b), this variable is worth to investigate in the context of online shopping.

For educational level, studies showed different results. Some researchers come to the conclusion that there are no significant relationships between the level of education and online purchase intention (Rippé, Weisfeld-Spolter, Dubinsky, Arndt, & Thakkar, 2016), while others argue that there is a relationship (Sánchez-Torres et al., 2017).

In line with Wu and Chang (2016), the occupation of the individuals was investigated as a control variable, to find possible differences within occupational groups and life-stages of the population. However, some researchers have not found any significant relationships between certain occupations and the online purchase intention (Malik & Guptha, 2013).

Individuals with a higher purchase frequency have more experience within online shopping (Hernández et al., 2011) and therefore are expected to be more open-minded towards new technologies within their shopping experience (Lingelbach et al., 2012). Furthermore, previous research has indicated that the consumers’ prior experience with online shopping is a valuable control variable, as it is supposed to have an even greater influence on consumers’ online purchase behaviour than other socio-demographic variables (Hernández et al., 2011; Escobar-Rodríguez & Bonsón-Fernández, 2017).
Figure 1 visualizes the variables and expected relationships, as well as the hypotheses which were developed in chapter two:

**Figure 1**: Hypothesis modelling
3. Research design

3.1 Research strategy, approach and method

The methodological choice for this study was *quantitative*, which according to Saunders, Lewis, & Thornhill (2016) is closely related to the *deductive research approach*. This approach can in turn be shortly described as “using data to test theory” (Saunders et al., 2016, p. 166). The deductive research approach was also chosen for this study as already enough theory existed to build the hypotheses on (Bryman & Bell, 2013). Furthermore, Saunders et al. (2016) suggest that this is an appropriate approach if the topic of choice is well researched. This method was chosen to test the relationships between perception and the experience with augmented reality towards the purchase intention and the moderating relationship of the experience with augmented reality. The results contribute to the aim of this *explanatory research* as explanations about the relationships between the variables are provided. A *survey strategy* was chosen as an appropriate instrument to capture the participants’ perceptions and purchase intentions and provide a general picture of the results. The strategy was also chosen to enhance the response rate, as it allows the researchers to collect standardized data from many participants at the same time in an efficient and economical way (Saunders et al., 2016). According to Saunders et al. (2016) the survey strategy is frequently linked to the deductive research approach. Furthermore, it is used when exploring potential relationships between variables.

3.2 Data collection

To obtain suitable data for this study, *primary data* was collected. This is due to the fact that this data collection method can generate data of the Swedish millennials’ purchase intention related to augmented reality, that secondary data could not provide. As suggested by Saunders et al. (2016), it is valuable to use primary data when aiming to test hypotheses. In order to gather adequate primary data, the opinions of millennial generation consumers were collected via an online survey. Pictures from IKEA’s online catalogue presenting the product of example (a chair) in several pictures (IKEA, 2018b) as well as a short video that presents the product of example by using augmented reality within e-commerce (EFTMO, 2017) were embedded in the questionnaire. By asking the respondents to watch the video about the
example of augmented reality, the participants were able to understand how the technology can change the way the product is presented online. Consequently, they had the required knowledge about the experience with the technology they needed in order to answer the questions related to it. This enabled high response rates and eliminated errors. Thereby, the participants were able to share their product and risk perceptions, shopping experience and future purchase intentions within e-commerce related to augmented reality.

3.2.1 Product of example

In order to capture consumers’ opinions towards augmented reality and resulting purchase intentions, the augmented reality app of the Swedish furniture company IKEA served as an example of the technology. The app IKEA Place allows the consumers to virtually place furniture in their environment simply by scanning the surrounding with a smartphone camera (Hilken et al., 2017; IKEA, 2018a). As furniture is a product of the category of shopping goods, a chair from IKEA’s virtual assortment catalogue was chosen as the survey’s product of example. It was chosen due to the high and appealing quality of the app which was recently launched. Furthermore, the IKEA Place app is also one of the well-developed augmented reality apps within the context of online shopping (Dyakovskaya, 2017). The consumers were able to give their feedback about the product under investigation and their impression of the shopping experience with the technology. In the survey the participants were asked to answer questions concerning their personal perceptions and opinions of the chosen chair, which was presented in an online catalogue both in pictures as well as by using augmented reality. The video that was embedded in the survey presents augmented reality in a straightforward and neutral way. It gave the participant an overview of how the augmented reality app works, by presenting the navigation of the required steps through a smartphone display. The video was chosen as it lets the participant have an experience of how augmented reality blends the virtual reality (the chair) into the real-life setting (the environment).

3.2.2 Population

The study’s population consists of the Swedish millennial generation, which was born between 1982 and 2000. Consequently, people living in Sweden and born between 1982 and 2000 were asked to participate in the survey. To make sure that the survey’s respondents fulfil these preconditions, they were asked to state their age and if they have lived or will live in Sweden for at least one year. This was important due to the fact that individuals that have
the intention of staying in Sweden for minimum one year can be registered in Sweden and therefore be considered a part of the Swedish population (EU medborgare i Sverige, 2018). With these two simple but effective background questions, it was ensured that only valid responses from the target population were comprised in the results.

As there are many technology startups found in Sweden (Turula, 2017), it is expected that the population is accustomed to technological innovations. Therefore, the Swedish millennials are argued to be accustomed to innovative technologies (Lingelbach et al., 2012) such as augmented reality. Furthermore, the population’s income per capita in Sweden is one of the highest within Europe. Therewith, Swedish consumers have a high purchasing power (Global Property Guide, 2017). Currently, the millennial generation of registered Swedes comprises approximately 2.5 million people, which equals 24.4% of the Swedish population (Statistiska Centralbyrån, 2018a).

Since Swedish millennials are the target population, the survey was distributed in Swedish. However, as there are people with different nationalities living in Sweden that might not understand Swedish (well enough) yet (Statistiska Centralbyrån, 2018b), the authors decided to also publish the survey in English. In this way, it was ensured that as many respondents as possible could understand the questions without any further difficulties. In order to make sure that the translated survey was reliable, a back-translation technique was applied. The method is used in order to discover most problems by back-translating the translated version and comparing it with the original version of the questionnaire (Saunders et al., 2016).

3.2.3 Sampling

Since no sampling frame of the Swedish millennials exists and not every individual of the population was accessible, non-probability sampling was used for the survey. The limitations associated with non-probability sampling will be further assessed in chapter 3.5.

In order to gather data from as many respondents as possible, the survey was distributed online. The self-completion online questionnaire also made it possible to reach a geographically dispersed sample size, which can be seen as a way of enlarging the sample’s representativeness (Saunders et al., 2016; Veal, 2006). To reach a great number of participants, convenience sampling, a type of non-probability haphazard sampling process, was used. It is suitable to use this kind of sampling, when researchers need a feasible way to
obtain data on a large scale (Saunders et al., 2016). Furthermore, the method can also be referred to as criterion sampling, as the selected individuals were chosen within a certain age group (Veal, 2006). Therefore, the survey was shared on social media platforms, such as Facebook and LinkedIn. The link to the survey was posted on the authors’ personal profiles as well as in public Facebook groups with a high number of Swedish millennial members. Furthermore, the survey and its link were sent out via email to students of Dalarna University in order to reach individuals of the target population. Additionally, the researchers personally approached by-passing students at the University of Uppsala, asking them to complete the survey. Therefore, a notebook as well as Quick response codes (QR codes) were used in order to lead the voluntary participants on the survey’s website.

Furthermore, snowball sampling, which is a type of volunteer sampling, was used to gather more participants (Bryman & Bell, 2011; Saunders et al., 2016). This method is usually used when it is difficult to identify members of the target population (Saunders et al., 2016). Therefore, the participants were asked to forward the survey to their family, friends and colleagues that fulfill the criterias for the study (for example via sharing it on Facebook).

3.2.4 Measurements

Based on the theoretical framework, the survey’s questions were developed. All questions related to the independent and dependent variables were measured on a 5-point Likert scale range which respectively were related to the following degrees of agreement: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree. Item scales which have been previously tested by acknowledged researchers were adapted to this study. The scale items of the dependent and independent variables which related to previous research showed a high internal consistency with a Cronbach’s alpha between 0.8 and 1. Cronbach’s alpha > 0.7 is regarded as highly internal consistent (Saunders et al., 2016). Product perception, risk perception, consumers’ shopping experience with augmented reality, hedonic experience and utilitarian experience were all measured with a set of questions targeting each of the constructs. In order to make sure that augmented reality can enhance the consumers’ perceptions when online shopping in the sample of this survey, product perception, risk perception and purchase intention were measured before and after augmented reality was presented to the participants.
3.2.4.1 Independent Variables

Product perception was measured by capturing the consumers’ subjective feelings towards the product in terms of value and quality (Modig & Rosengren, 2014). Four items were included in the survey, which ask about the perceived value, quality, durability and reliability of the presented product (Dodds et al., 1991, as cited in Modig & Rosengren, 2014). The participants were asked to answer the items related to a chair which was presented in an online catalogue by six pictures featuring the chair from different angles. Afterwards, the product perception items were asked repeatedly, however, in relation to the chair which was this time presented in a video featured by the use of an augmented reality app.

The construct risk perception was operationalized by measuring performance and psychological risks related to the product. Four items were chosen in order to measure the consumers’ perceived feeling of risk that relates to the product presented online (Lopez-Nicolas & Molina-Castillo, 2008). Two items were included to measure the perceived performance risk (difficulty to judge quality and functional performance), which relate to studies by Forsythe and Shi (2003) and Bhukya and Singh (2015). Two additional items were added, relating to the perceived psychological risk towards the product (inability to try and feeling of stress). These two items were taken from inspiration of the studies of Forsythe et al. (2006) as well as Bhukya and Singh (2015). Like the construct product perception, the risk perception was measured in twice. First, the risk perception towards the chair shown in pictures was investigated. Second, the perceived risk was again enquired after the chair was presented within a video that featured the chair by using an augmented reality app.

To measure the construct of consumers’ experience with augmented reality, five items were used to capture the satisfaction that the experience with augmented reality provides to the consumer. The first item captured the perceived proper visualization of the product through the augmented reality experience by inspiration from studies of Escobar-Rodríguez and Bonsón-Fernández (2017) and Pavlou (2003). Four more items were included, targeting the general feeling towards the consumer’s online shopping experience with augmented reality. These feelings (like, favorable, valuable and interesting experience) were captured with inspiration from previous researchers’ studies within the field of online purchase (Lin, Featherman, Brooks & Hajli, 2018).
The hedonic experience was measured by capturing the consumers’ enjoyment during the shopping experience with augmented reality (Holbrook & Hirschman, 1982, as cited in Fiore et al., 2005). Five items were used to measure the experience, which were adapted from Childers, Carr, Peck and Carson (2001). In order to capture the enjoyment of the experience with augmented reality, the items covered aspects of fun, good feeling, excitement, enjoyment and comfortability.

The utilitarian experience was captured by measuring the consumers’ effectiveness in choosing the right product during the shopping experience (Holbrook & Hirschman, 1982, as cited in Fiore et al., 2005). Therefore, three items related to convenience, time-saving and efficiency were used (Childers et al., 2001). Furthermore, two items capturing the easiness of the shopping process and information given were added (Merle, Senecal, & St-Onge, 2012).

3.2.4.2 Dependent Variables

To measure the construct of purchase intention, the consumers’ intention to buy a product online must be captured (Fiore et al., 2005). During the survey, the purchase intention was measured twice. The consumer’s intention to buy a product online was measured in relation to the product in pictures. Thereafter, the respondents’ purchase intention was captured after seeing the product by using augmented reality by inspiration of Hilken et al. (2017). The purchase intention related to the pictures was measured with three items which were adapted from survey items from the studies of Escobar-Rodríguez and Bonsón-Fernández (2017) and Hsu et al. (2014). For the purchase intention related to the shopping experience with augmented reality, the inspiration for the three items derived from Escobar-Rodríguez and Bonsón-Fernández (2017), Hilken et al. (2017) and Hsu et al. (2014).

3.2.4.3 Control Variables

The control variables were each measured in one question in the beginning of the survey. Gender and nationality were measured on a nominal scale. Educational level, occupation and the consumers’ online purchase frequency were captured on an ordinal scale. Only age was measured on a ratio scale. Nationality and age were formulated in open-end questions, where the respondents typed in their responses. For the remaining items the respondents were given
between two to six options, from which they should choose. All the control variables were added with the main purpose of capturing characteristics of the sample.

3.3 Data analysis

The survey was set up and its data was collected via Google Forms, an online survey tool. After all the data were collected, the responses were converted to a numerical form within the program Microsoft Excel. The coded data was then transferred to the statistics program Statistical Package for Social Science (SPSS) and analysed.

*Cronbach’s alpha* was calculated in order to test the internal consistency and therefore the reliability of the surveys’ questions. This test evaluates each set of questions which relates to measuring a certain construct. The alpha coefficient ranks from 0 to 1, whereas values higher than 0.7 indicate a high internal consistency (Saunders et al., 2016), however, values higher than 0.6 indicate a moderate but yet acceptable reliability (Hinton, Brownlow, McMurray, & Cozens, 2004). This means, that a set of questions measures the same concept.

By means of *descriptive statistics* the results of the questionnaire were described in terms of central tendencies and dispersion. This gives a broader picture of the population’s characteristics and the data (Sirakaya-Turk, 2011). *Inferential statistics* were used to test the developed hypotheses (Babbie, 1986, as cited in Sirakaya-Turk, 2011). Hypothesis testing is a procedure to test the probability of a phenomenon occurring not only in the sample but also in the population. However, inferences to the population can only be carefully argued for due to non-probability sampling in this study’s survey.

In order to test the strength as well as the direction of the relationships between the variables, the hypotheses H1a, H1b, H2a, H2b and H2c were tested by conducting *correlation analyses*. Pearson’s correlation coefficient $r$ was thereby calculated to describe the covariance of the variables (Sirakaya-Turk, 2011). The coefficient varies between -1 and +1, whereas a negative value indicates a negative covariance and a positive value a positive covariance. The closer the value to ±1, the stronger the relationship. The covariance and correlation were also demonstrated visually by scatterplots.

*Hierarchical multiple regression analyses* were used to test H1a, H1b, H2a, H2b and H2c further in detail. The unstandardized B coefficient was calculated for each relationship related
to the hypotheses, indicating the degree, to which the participants’ purchase intention increased or decreased for every scale raise of the calculated independent variable. Furthermore, the influence of the socio-demographic control variables was tested by means of hierarchical multiple regression analyses. In order to test hypothesis H3a and H3b and their moderation of the augmented reality experience, a moderated regression analysis was conducted. This analysis was conducted by making use of hierarchical multiple regression analysis.

3.4 Data quality

By means of reliability it was ensured that the study was reliable in terms of consistency (Saunders at al., 2016). Various steps were taken in this study to enlarge reliability of the study and its collected data. To enhance the external reliability, each part of the research process was cautiously presented to provide transparency and thereby facilitate the replicability of the study. The internal reliability was enhanced by the fact that two authors conducted the study (Saunders et al., 2016). In the context of the study’s survey, it is important to eliminate the chance of participant error as this is portrayed as a threat to the reliability of a research (Saunders et al., 2016). It is suggested that time is delicate in terms of participant error. As the survey was available online, it was not possible to decide when the participants should respond to the questionnaire. However, this could be interpreted as an advantage in terms of reliability, as it ensures that the participants are able to respond when time is suitable for them. Furthermore, keeping the questionnaire short (answering the questions took approximately 7 minutes) avoided tiredness of the questions which the participants had to answer. A matrix question structure was used to reduce the perceived length of questionnaire. This is argued to lead to more accurate answers as well as a higher response rate (Saunders et al., 2016). Additionally, two reversed coded items were added in order to reduce bias as participants tend to answer questions in the same way in case of similar questions.

Validity refers to appropriate measurements which are used in a study and the accuracy of the analysis and its generalizability of the results from the sample towards the population (Saunders at al., 2016). Clear wording and short questions made sure that the questions were understood in the right way. Therefore, the questionnaire was also provided both in Swedish and English, so the participants could choose the language they were the most comfortable
with. Furthermore, the clear and structured visual presentation gave support to the
participants’ understanding of the questions. Construct validity was also ensured by
calculating the questions’ Cronbach’s alpha. The alpha coefficient shows as mentioned, if
each set of questions measures the same concept (Saunders et al., 2016).

Reliability and validity was also ensured by conducting a pilot test of the online survey before
publishing the actual questionnaire. The pilot test contributed to the study’s reliability by
checking if the questions were understood in the right way. The use of pre-tested
measurement scales with a Cronbach’s alpha ($\alpha$) higher than 0.7 was used to measure the
variables in a reliable manner and to create internal consistency of the questions (Saunders
et al., 2016). The validity of the questionnaire was also assessed by pilot testing it with a
small number of participants. This enabled further changes and corrections in the
questionnaire to make it more comprehensible for the participants and therefore valid
(Saunders et al., 2016). With the feedback from experts such as teachers and experienced
research students on the questions and structure, the content validity of the questionnaire was
ensured. Further participants, such as ordinary consumers, provided feedback on the
understanding of the questions. This ensured face validity and that consumers without
background knowledge about augmented reality would understand the questions in the right
way (Saunders et al., 2016). In total 14 individuals were asked to give feedback during pilot
testing as 10 individuals are suggested to be the minimum number for small scale studies
(Fink, 2013, as cited in Saunders et al., 2016).

3.5 Data limitations

As the data used for this study was collected by non-probability sampling, limitations need
to be considered before interpreting the results of the research (Saunders et al., 2016). As the
probability for each case being selected from the population is unknown, statistical inferences
cannot be made with confidence from the sample about the characteristics of the population.
Thus, the results are not likely to be completely representative (Saunders et al., 2016).

Furthermore, data limitations result from the data collection techniques of convenience and
snowball sampling. These techniques are often used to efficiently obtain data to a low cost
but entail bias in terms of representativeness (Saunders et al., 2016). The data collection
techniques are also associated with a low control of distribution. Thus, the findings’
representativeness for the population is limited. Another limitation in regard to snowball
sampling is a possible bias that results from the respondents’ forwarding of the online questionnaire to their own contacts. Thus, the results can be biased as a relatively homogenous group might be reached (Saunders et al., 2016).

3.6 Ethical considerations

According to Bryman and Bell (2011), there are several ethical considerations that have to be taken into account during research. As a foundation of research, it is important for the researchers to reflect and consider how the study will affect the participants (Saunders et al., 2016). To ensure that the participants did not feel pressured to complete the survey, a comprehensible letter of information was provided prior to the participation. The letter of information highlighted that the participation was voluntary and ensured that the participants fully comprehended what the study concerned (Dalarna University, 2009). Despite the fact that Swedish millennials were the main focus of the study, the survey was provided in both Swedish and English. The English survey was used in order to include people that have moved to Sweden but might not have learned Swedish yet. The survey was both anonymous and voluntary, which is yet another ethical consideration. In line with the suggestion of Bryman and Bell (2011), the material collected was solely used for the purpose of this study.

Furthermore, the choice of the product of example which was used in the survey was influenced by considerations of gender-neutrality. This means that the product of choice can appeal to every participant and be equally relatable to everyone. The decision to use a neutral product was also based on the fact that the product should not be offensive to any respondent (Saunders et al., 2016).

APA referencing style was used throughout the thesis in order to give credit to the background literature and inspirational sources. Also, by using the APA referencing style, the authors made sure to never copy given literature and avoid any concerns and accusations of plagiarism.
4. Results

4.1 Descriptive Statistics

A total number of 444 responses were collected with the survey tool Google Forms during a time period of seven days. All answers from respondents which did not have the age of interest (between 17 and 36), would not stay in Sweden for at least one year (thereby not fulfilling the precondition of being registered in Sweden) or did not answer to all of the questions were removed from the data set. Consequently, 408 valid responses were included in the statistical calculations. Due to the non-probability sampling method, the generalizability of the results towards the population is limited. However, a high level of confidence was reached, as for a population size of 2.5 million, a minimum sample number of 385 are required (Saunders et al., 2016). Due to the high number of collected responses, the researchers were able to carefully generalize the results to the population of Swedish millennials with a level of confidence of 95% and a 5% error margin.

4.1.1 Socio-demographic variables

The data which was collected by means of the distributed online survey represents all ages of the Swedish millennial generation except the age of 17. The mean ($\bar{x}$) age of the respondents is 26.26 years with a standard deviation (SD) of 3.44, which is only slightly younger than the average of the Swedish millennials which is 26.8 years (Statistiska Centralbyrå, 2018a).

Table 1: Mean, standard deviation, minimum and maximum of age

<table>
<thead>
<tr>
<th>Age</th>
<th>$\bar{x}$</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.26</td>
<td>3.44</td>
<td>18</td>
<td>36</td>
</tr>
</tbody>
</table>

In terms of gender, male and female participants are relatively evenly represented in the sample with 57.4% females and 42.4% males. The remaining 0.2% of the respondents chose the category other. The gender distribution of the Swedish millennial population is also quite even with 51.7% males and 48.3% females (Statistiska Centralbyrå, 2018a). Therewith, it can be stated that females are slightly overrepresented within the sample.
With regard to nationality, 82.4% of the survey’s participants are Swedish, whereas 17.6% have a different nationality but can be registered in Sweden (as they live in Sweden for at least one year or longer). Therefore, this sample represents a slightly higher but similar percentage of foreign participants compared to the Swedish millennials (13.7%) (Statistiska Centralbyrån, 2018a). In total, 42 different nationalities are included in the result as valid responses.

Concerning education, the biggest represented educational group is the one with a bachelor degree with 43.9% of the sample, closely followed by participants with a high school degree 41.4%. Also, respondents with a master degree are represented with 6.9%, as well as Swedish millennials which completed an apprenticeship with 5.4%. The smallest groups are doctoral degree and primary school education, which are both represented with 1.2%. The results are in line with Bilgihan (2016) and DeVaney (2015), who state that the millennial generation is well educated. However, in comparison to the overall population of the Swedish millennials, the sample’s data shows an overrepresentation of highly educated participants. Whereas 52% of the sample have a University degree, approximately only 20% of the Swedish millennial population have a bachelor, master or doctoral degree (Statistiska Centralbyrån, 2018a). The number of high school graduates in the sample represents the number of those in the population well (42.1%). However, millennials with primary school education and apprenticeship are underrepresented compared to the population of Swedish millennials (17.9% and 15.0%).

In terms of occupation, the results show two main groups: 51% of the sample are employed and 42.4% are students. Also, unemployed Swedish millennials are represented with 3.7% and 2.9% of the respondents could not identify themselves with the given options and therefore chose others. The results are according to DeVaney (2015), who states that one part of the millennials may still attend university and others already work. However, compared to the Swedish millennial population, students are again overrepresented in terms of occupation in this sample compared to the population (4.4%) (DAAD, 2017).

For the online purchase frequency, the results show that the majority of the Swedish millennials (55.6%) purchases online on a monthly basis. Respondents that purchase online minimum once a year are represented with 33.1% in the sample, followed by 10.8% that purchase online every week. Only a small amount of 0.5% never does any purchases online.
This is in line with the study of Lingelbach et al. (2012) that states that the millennial generation is in general open-minded towards the usage of the internet.

Table 2: Frequency and percentage of socio-demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>173</td>
<td>42.4</td>
</tr>
<tr>
<td>Female</td>
<td>234</td>
<td>57.4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Nationality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish</td>
<td>336</td>
<td>82.4</td>
</tr>
<tr>
<td>Other</td>
<td>72</td>
<td>17.6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>5</td>
<td>1.2</td>
</tr>
<tr>
<td>High school degree</td>
<td>169</td>
<td>41.4</td>
</tr>
<tr>
<td>Apprenticeship</td>
<td>22</td>
<td>5.4</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>179</td>
<td>43.9</td>
</tr>
<tr>
<td>Master degree</td>
<td>28</td>
<td>6.9</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td>5</td>
<td>1.2</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>173</td>
<td>42.4</td>
</tr>
<tr>
<td>Unemployed</td>
<td>15</td>
<td>3.7</td>
</tr>
<tr>
<td>Employed</td>
<td>208</td>
<td>51.0</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>2.9</td>
</tr>
<tr>
<td>Online purchase frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td>44</td>
<td>10.8</td>
</tr>
<tr>
<td>Monthly</td>
<td>227</td>
<td>55.6</td>
</tr>
<tr>
<td>Minimum once a year</td>
<td>135</td>
<td>33.1</td>
</tr>
<tr>
<td>Never</td>
<td>2</td>
<td>0.5</td>
</tr>
</tbody>
</table>

4.1.2 Multi-item constructs

All multi-item constructs were tested for their internal consistency. As table 3 below shows, all calculated Cronbach’s alphas except for one construct consist of values higher than 0.7, which is regarded as a high internal consistency (Saunders et al., 2016). The only result with a lower Cronbach’s alpha was the construct of risk perception. This construct showed a Cronbach’s alpha higher than 0.6, which indicates a moderate but yet acceptable reliability (Hinton et al., 2004).
Table 3: Mean, standard deviation and Cronbach’s alpha of multi-item constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>( \bar{x} )</th>
<th>SD</th>
<th>( \alpha )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product perception (picture)</td>
<td>Value</td>
<td>3.35</td>
<td>0.803</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality</td>
<td>3.33</td>
<td>0.793</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>3.44</td>
<td>0.830</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-lasting</td>
<td>3.45</td>
<td>0.801</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.39</td>
<td>0.673</td>
<td>0.855</td>
</tr>
<tr>
<td>Risk perception (picture)</td>
<td>Quality</td>
<td>3.88</td>
<td>0.925</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performance</td>
<td>3.48</td>
<td>0.996</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fitting</td>
<td>3.90</td>
<td>1.164</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stress</td>
<td>2.60</td>
<td>1.262</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.47</td>
<td>0.756</td>
<td>0.634</td>
</tr>
<tr>
<td>Purchase intention (picture)</td>
<td>Furniture online</td>
<td>3.37</td>
<td>1.199</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Several pictures</td>
<td>3.75</td>
<td>1.022</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Different angles</td>
<td>3.95</td>
<td>1.013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.69</td>
<td>0.952</td>
<td>0.855</td>
</tr>
<tr>
<td>Product perception AR</td>
<td>Value</td>
<td>3.56</td>
<td>0.882</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality</td>
<td>3.39</td>
<td>0.855</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>3.73</td>
<td>0.903</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-lasting</td>
<td>3.59</td>
<td>0.912</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.57</td>
<td>0.801</td>
<td>0.923</td>
</tr>
<tr>
<td>Risk perception AR</td>
<td>Quality</td>
<td>3.30</td>
<td>1.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performance</td>
<td>2.93</td>
<td>1.053</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fitting</td>
<td>1.89</td>
<td>1.073</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stress</td>
<td>1.98</td>
<td>1.064</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2.53</td>
<td>0.772</td>
<td>0.714</td>
</tr>
<tr>
<td>AR experience general</td>
<td>Visualization</td>
<td>4.04</td>
<td>0.931</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Like</td>
<td>4.08</td>
<td>0.933</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Favorable</td>
<td>3.97</td>
<td>0.949</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Valuable</td>
<td>3.86</td>
<td>0.984</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interesting</td>
<td>4.08</td>
<td>0.880</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.00</td>
<td>0.825</td>
<td>0.928</td>
</tr>
<tr>
<td>Construct</td>
<td>Item</td>
<td>( \bar{x} )</td>
<td>SD</td>
<td>( \alpha )</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------</td>
<td>----------------</td>
<td>-----</td>
<td>--------------</td>
</tr>
<tr>
<td>AR hedonic experience</td>
<td>Fun</td>
<td>4.16</td>
<td>0.836</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feel good</td>
<td>3.94</td>
<td>0.945</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excitement</td>
<td>3.69</td>
<td>1.056</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enjoyment</td>
<td>4.04</td>
<td>0.882</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Comfortability</td>
<td>4.15</td>
<td>1.035</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.00</td>
<td>0.715</td>
<td>0.805</td>
</tr>
<tr>
<td>AR utilitarian experience</td>
<td>Convenience</td>
<td>3.85</td>
<td>0.908</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Save time</td>
<td>3.58</td>
<td>1.049</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficiency</td>
<td>3.61</td>
<td>1.013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Easiness</td>
<td>3.93</td>
<td>1.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>3.90</td>
<td>1.116</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.77</td>
<td>0.850</td>
<td>0.890</td>
</tr>
<tr>
<td>Purchase intention AR</td>
<td>Online</td>
<td>3.93</td>
<td>1.040</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Future</td>
<td>3.97</td>
<td>0.977</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First choice</td>
<td>3.43</td>
<td>1.097</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.78</td>
<td>0.917</td>
<td>0.857</td>
</tr>
</tbody>
</table>

When presenting the results of the multi-item constructs, it gets clear that the overall perception of the respondents towards the chair presented in pictures is rather positive with an overall mean of 3.39, which is slightly above the neutral average of 3. The standard deviation (SD) of 0.673 indicates, that opinions correspond well and are not strongly divided. Although the product’s perception is rather positive, the risk perception towards the product is rather strong with a mean of 3.47 (SD=0.756). The buying intention which is related to the product presented in pictures shows a generally high purchase intention with a mean of 3.69. The SD=0.952 indicates that opinions about the purchase intention vary slightly more compared to perceptions about the product and risk.

After presenting the video within the survey, the following results can be reported related to online shopping with augmented reality: The perception of the product under the influence of augmented reality is positive with a mean of 3.57 (SD=0.801). Compared to the product perception related to the pictures, the overall perception slightly increased. However, opinions vary slightly stronger. The risk perception in relation to the experience with augmented reality is rather low with a mean of 2.53 (SD=0.772). Compared to the risk related to the product presented in pictures the perceived risk decreased to a large extent. The general
shopping experience under the influence of augmented reality was rated very positive with a mean of 4.00 (SD=0.825), as well as the hedonic aspects of the shopping experience with a mean of 4.00 (SD=0.715). The aspects of the utilitarian shopping experience were rated slightly lower compared to the hedonic aspects with a mean of 3.77 (SD=0.850). Lastly, the overall buying intention after using an augmented reality app is generally high with a mean value of 3.78 and more varying opinions (SD=0.917). However, the purchase intention is only slightly higher compared to the purchase intention related to the pictures.

4.2 Inferential Statistics

By means of inferential statistics, the previously developed hypotheses (H1a, H1b, H2a, H2b and H2c) were tested. In case a relationship can be found, the hypothesis will be confirmed (Saunders et al., 2016).

4.2.1 Correlation analysis

For the correlation analysis, a significance level (p) of 0.01 was chosen, which means that the chance that a significant correlation was found although it is not true, is 1% or lower. Pearson correlation coefficients (r) were calculated in order to examine the relationships and therewith the hypotheses (H1a, H1b, H2a, H2b and H2c). The Pearson correlation coefficient expresses in a numerical form to which extent the two variables move together, hence how strongly the values correlate (Saunders et. al, 2016). The results indicate a positive moderate relationship between the dependent variable purchase intention and the independent variables product perception (r=0.514, n=408, p=0.000). For the independent variables general augmented reality experience (r=0.659, n=408, p=0.000), hedonic augmented reality experience (r=0.624, n=408, p=0.000) and utilitarian augmented reality experience the relationships with the purchase intention indicate a strong positive relationship (r=0.717, n=408, p=0.000). Therefore, increases in product perceptions, the general experience with augmented reality, as well as the hedonic and utilitarian experience were correlated with increases in the purchase intention.

However, the relationship between the purchase intention and the risk perception indicates a moderate negative relationship (r=-0.452, n=408, p=0.000). Therefore, increases in the risk perception were correlated with a decrease in the purchase intention. All correlations are highly significant with p<0.01.
Table 4: Correlation with purchase intention (Augmented reality)

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Hypothesis testing</th>
<th>Pearson Correlation (with purchase intention)</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product perception AR</td>
<td>H1a</td>
<td>0.514**</td>
<td>0.000</td>
</tr>
<tr>
<td>Risk perception AR</td>
<td>H1b</td>
<td>-0.452**</td>
<td>0.000</td>
</tr>
<tr>
<td>General AR experience</td>
<td>H2a</td>
<td>0.659**</td>
<td>0.000</td>
</tr>
<tr>
<td>Hedonic AR experience</td>
<td>H2b</td>
<td>0.624**</td>
<td>0.000</td>
</tr>
<tr>
<td>Utilitarian AR experience</td>
<td>H2c</td>
<td>0.717**</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Scatterplots were created for each predicted relationship (H1a, H1b, H2a, H2b and H2c), showing the multivariate distribution correlation within graphs (Appendix 5). Each scatterplot indicates the linear relationships of the variables. The different strengths of the variance of the data are visible. It is clearly shown that all relationships are positive, except the relationship between the risk perception and the purchase intention, which is negative.

4.2.2 Hierarchical multiple regression analysis

In order to explore the relationships which were confirmed in the correlation analysis more in detail, hierarchical multiple regression analysis was conducted. The regression analysis provided information about the change that the independent variables cause in the dependent variable purchase intention. For the regression analysis, a significance level (p) of 0.05 was chosen, which means that the chance that a significant correlation was found although the correlation is not significant for the population, is 5% or lower. In the first model of the hierarchical multiple regression analysis, the socio-demographic variables age, gender, nationality, education, occupation and online purchase frequency were used as control variables. The calculated R Square (R=0.055) indicated that 5.5% of the variance in the purchase intention variable could be explained by the control variables (see appendix 6). However, the regression equation was found to be not significant (p=0.096). Furthermore, none of the controlled socio-demographic variables showed a significant relationship towards the purchase intention.

In the second model, the independent variables product perception, risk perception, augmented reality experience, hedonic experience and utilitarian experience were added. A significant regression equation was found (p<0.000). The model’s R Square (R=0.603)
indicated that 60.3% of the variation within the purchase intention could be explained by the model which included the control variables, as well as the independent variables. Therewith, the five independent variables explained 54.8% of the variation within the purchase intention variable, after controlling the demographic variables (R Square change = 0.548, p<0.000) (see appendix 6). Again, none of the control variables showed a significant relationship and therewith influence on the purchase intention variable.

Table 5: Hierarchical multiple regression analysis, Model 2

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Unstandardized beta coefficient</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product perception AR</td>
<td>0.098</td>
<td>0.043</td>
</tr>
<tr>
<td>Risk perception AR</td>
<td>-0.132</td>
<td>0.004</td>
</tr>
<tr>
<td>General AR experience</td>
<td>0.206</td>
<td>0.001</td>
</tr>
<tr>
<td>Hedonic AR experience</td>
<td>0.148</td>
<td>0.021</td>
</tr>
<tr>
<td>Utilitarian AR experience</td>
<td>0.460</td>
<td>0.000</td>
</tr>
</tbody>
</table>

In order to test the hypotheses H1a, H1b, H2a, H2b and H2c, each hypothesis along with the calculation results will be presented separately in the following chapters.

4.2.2.1 Product perception

*H1a: The product perception with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.*

The independent variable product perception showed a significant relationship towards the purchase intention within the regression model (p<0.05) (see table 5) and an unstandardized B coefficient=0.098. Therefore, the participants’ purchase intention increased 0.098 points on the Likert scale for each scale raise in product perception. In line with the correlation analysis, the positive relationship between the product perception with augmented reality and purchase intention can be confirmed and H1a is thereby accepted.

By means of a new hierarchical regression analysis, the influence of the control variables was tested on the relationship between product perception and purchase intention on a more detailed level. The regression analysis showed that none of them had a significant influence on the hypothesis H1a (all p>0.05, see appendix 6). This means that the influence of product perception to the purchase intention does not change much between people with different
characteristics. However, the Beta coefficients showed that for example students and employed participants had a stronger influence on the relationship between product perception and purchase intention compared to unemployed (Beta=-0.004) and “other” (Beta=-0.053).

4.2.2.2 Risk perception

H1b: The risk perception with augmented reality is negatively related to the online purchase intention of shopping goods of the Swedish millennial generation.

In the regression model above (see table 5), the negative unstandardized B coefficient (-0.132) indicated a negative relationship between risk perception with augmented reality and purchase intention, which is highly significant (p<0.05). The participants’ purchase intention therewith decreased 0.132 points on the Likert scale for each scale raise in risk perception. This was also previously confirmed by the correlation analysis. Therefore, H1b is accepted.

A new hierarchical regression analysis tested the influence of the control variables on this relationship between risk perception and purchase intention. The analysis showed also in this case no significant influence of the socio-demographic variables on the hypothesis with all p>0.05 (see appendix 6). Therewith, the influence of risk perception to the purchase intention does not change much between people with different characteristics. However, the Beta coefficients showed that participants that never purchase online had a stronger influence on the relationship between risk perception and purchase intention compared with those that purchase online yearly (Beta=-0.067), weekly (Beta=0.00) and monthly (Beta=0.016) (all p>0.05).

4.2.2.3 Augmented reality shopping experience

H2a: The shopping experience with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.

In terms of the experience with augmented reality, the analysis above showed a highly significant relationship (p<0.05) towards the purchase intention and a moderate unstandardized B coefficient of 0.206 (see table 5), which is significantly stronger compared to the product perception. The participants’ purchase intention consequently increased 0.206
points on the Likert scale for each scale raise in experience with augmented reality. Therefore, hypothesis H2a was confirmed, as the correlation analysis already indicated.

Another hierarchical regression analysis tested the influence of the control variables on the hypothesis H2a. The results showed that none of the control variables significantly influenced the relationship augmented reality experience - purchase intention with all p>0.05 (see appendix 6). The influence of the augmented reality experience to the purchase intention does not change a lot between people. However, the Beta coefficient showed that for men the influence on the relationship between the experience with augmented reality and purchase intention was weaker compared to women (Beta=0.039), however, stronger compared to “others” (Beta=−0.027).

4.2.2.4 Hedonic augmented reality experience

H2b: The hedonic shopping experience with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.

Also, the hedonic experience with augmented reality indicated a significant relationship towards the purchase intention (p<0.05) by means of the multiple regression analysis with a moderate unstandardized B coefficient 0.148 (see table 5). The participants’ purchase intention increased 0.148 points on the Likert scale for each scale raise in hedonic experience with augmented reality. The relationship was therewith weaker compared to the general experience with augmented reality, but stronger compared to the product perception. H2b was accepted, due to the confirmed and significant relationship between the hedonic experience with augmented reality and the purchase intention in line with the correlation results.

Also for this relationship, the influence of the control variables showed no significant influence on this hypothesis with all p>0.05 (see appendix 6). This means that the influence of the hedonic augmented reality experience on the purchase intention does not change much between different participants. However, the Beta coefficients showed that participants with a bachelor degree have a stronger influence on the relationship between the hedonic experience and purchase intention compared with those with primary school education (Beta=0.000), doctoral degree (Beta=0.015), master degree (Beta=0.029), high school degree (Beta=0.076) and apprenticeship (Beta=0.101).
4.2.2.5 Utilitarian augmented reality experience

H2c: The utilitarian shopping experience with augmented reality is positively related to the online purchase intention of shopping goods of the Swedish millennial generation.

Lastly, a highly significant relationship (p<0.05) was shown between the utilitarian experience with augmented reality and purchase intention with a high unstandardized beta coefficient of 0.460 (see table 5). This indicated that a positive utilitarian experience with augmented reality has an even stronger effect on the purchase intention compared to every other independent variable. The participants’ purchase intention increased 0.460 points on the Likert scale for each scale raise in utilitarian experience with augmented reality. Consequently, also H2c was accepted.

A separate hierarchical regression analysis confirmed also in this case that no influence of the control variables was significant p>0.05 (see appendix 6). The influence of the utilitarian augmented reality experience to the purchase intention does therefore not change significantly between participants with different characteristics. However, the Beta coefficients showed that students have a stronger influence on the relationship between utilitarian experience and purchase intention compared with “other” (Beta=−0.055), employed (Beta=−0.019) and unemployed (Beta=−0.005).

4.2.3 Moderating regression analysis

In order to test the moderating relationship of the experience with augmented reality and therewith hypothesis H3a and H3b, two hierarchical linear regression analyses were conducted. The first analysis tested the moderation of the augmented reality experience towards the relationship between product perception and purchase intention, whereas the second analysis tested the moderation towards the relationship between risk perception and purchase intention.

4.2.3.1 Moderation product perception - purchase intention

H3a: The shopping experience with augmented reality significantly moderates the relationship between product perception and the online purchase intention of shopping goods of the Swedish millennial generation.
In the first moderation analysis, purchase intention was included as the dependent variable. The first model tested the independent variable product perception. A significant regression equation was found for the dependent variable purchase intention and the independent variable product perception ($p<0.000$) with an R Square of 0.265 (see appendix 7). After including the moderator of experience with augmented reality in the second model ($p<0.000$) the R Square changed to 0.312. Consequently, the R Square change of 0.048 indicated, that 4.8% of the variation in the relationship between product perception and purchase intention are moderated by the experience with augmented reality with an unstandardized B coefficient of 0.150. Consequently, it was shown that the experience with augmented reality moderates the relationship in a slightly positive way. Therewith, H3a was accepted.

4.2.3.2 Moderation risk perception - purchase intention

H3b: The shopping experience with augmented reality significantly moderates the relationship between risk perception and the online purchase intention of shopping goods of the Swedish millennial generation.

Also, in the second moderation analysis, purchase intention was included as the dependent variable. In the first model of the analysis, the independent variable risk perception was included. A significant regression equation was found for the dependent variable purchase intention and the independent variable risk perception ($p<0.000$) with an R Square of 0.204 (see appendix 6). The second model of the analysis included the moderator of experience with augmented reality ($p<0.000$). However, the R Square change of 0.000 indicated, that 0% of the variation in the relationship between risk perception and purchase intention are moderated by the experience with augmented reality with an unstandardized B coefficient of 0.004. As the moderator showed a highly insignificant relationship ($p=0.905$), the relationship between risk perception and purchase intention is not moderated by the experience with augmented reality. Consequently, H3b was rejected.
5. Discussion

5.1 Socio-demographic characteristics and purchase intention

Throughout this study, the Swedish millennials were regarded as a general cohort. However, it was expected that in line with the results from the study of DeVaney (2015) differences would be found in their opinions related to augmented reality due to their different characteristics and life-stages. Surprisingly, none of the socio-demographic variables investigated showed a significant influence on the purchase intention. In general, the Swedish millennials perceive products and the shopping experience under the influence of augmented reality online as very positive. This represents that independent of gender, age, nationality, educational level, occupation and online purchase frequency, the results do not change a lot for the generation of Swedish millennials. This is also in line with Jiménez and Martín (2011) as well as Thamizhvanan and Xavier (2013) that present no differences for the investigated control variables to such a population. Also, the previous findings of Wolin and Korgaonkar (2003) concerning men being more likely to purchase online were not in line with the results of this study. This might be the case as women and men are nowadays equally exposed to working with computers and technology due to equal job and working possibilities (Law & Ng, 2016). Furthermore, it was expected that age would have an effect on the online purchase intention (DeVaney, 2015). Surprisingly, this was not the case. This can possibly be explained by the fact that the Swedish millennials have all been exposed to technological innovations from an early stage of life (Schewe et al., 2013).

5.2 Enhancing perception and purchase intention with augmented reality

To ensure, that augmented reality has an effect on this population’s product perception, risk perception and purchase intention, the results of measuring the variables related to pictures and related to the influence of augmented reality were compared. The results indicate, that the product was perceived slightly more positive after presenting the product through an augmented reality app. Surprisingly, the effect of augmented reality on the product perception was rather small. This could be explained by the fact, that augmented reality has a limited possibility of enhancing the product’s characteristics related to quality. Another reason could
possibly be a bias related to the chosen product of example due to varying preferences for furniture. However, the risk perception towards the product was significantly reduced when the consumers were introduced to augmented reality. This is in line with Hilken et al. (2017), suggesting that augmented reality is a risk reliever in the context of online shopping. The participants’ purchase intention related to simple product pictures was slightly lower compared to the purchase intention related to the presentation through augmented reality. Interestingly, also the purchase intention related to the pictures was already relatively high. As Swedish millennials tend to be very open-minded towards technology (Lingelbach et al., 2012) and online shopping (as the results of online purchase frequency in this study show), it can be stated that the survey’s participants were already open-minded towards buying furniture online, also without the use of augmented reality. This might be an explanation for the rather small difference in purchase intention before and after the use of augmented reality. However, by comparing the results before and after the use of augmented reality, it is clearly confirmed that augmented reality had an enhancing effect on the sample and therewith also on the population of this study.

5.3 Perception

5.3.1 Product perception

A positive relationship was found between product perception under the influence of augmented reality and the purchase intention of shopping goods for the Swedish millennial generation. Therefore, it can be interpreted that the more positive the consumers’ perception of the product with augmented reality, the higher the purchase intention. Consequently, the relating hypothesis was confirmed (H1a). This finding is in line with previous research from Yim et al. (2017) that suggested that a product has to be perceived in a positive way in order to raise the consumers’ purchase intention. In line with Hagtvedt and Patrick (2008, as cited in Modig & Rosengren, 2014), it was expected that as an ordinary picture of a product increases the purchase intention, the product presented by augmented reality would further increase the purchase intention. Thereby, the authors’ conclusion was also valid for this study, due to the positive relationship towards the purchase intention.

Since the respondents’ perceptions of the product corresponded well, it was concluded that the product of example which was used in the survey was relatable for the Swedish millennial
participants. Furthermore, this assumption is also supported by the socio-demographic variables which do not have a significant influence on the results.

5.3.2 Risk perception

Risk perception was found to be negatively related to the online purchase intention of shopping goods under the influence of augmented reality, which confirmed hypothesis H1b. Thereby, it can be stated that the more risk which is perceived by this generation when shopping online while using augmented reality, the less intention they have to buy shopping goods. Compared to all other relationships found, the risk relation was the only negative relation towards the purchase intention that was found. This finding was supported by previous studies stating that risk has an intense impact on the purchase intention (Forsythe & Shi, 2003; Lopez-Nicolas & Molina-Castillo, 2008; Parment, 2013). In general, it can be stated that by making use of augmented reality within online shopping Swedish millennials perceive less risk.

However, the findings indicated that perceived risk has only a relatively weak effect of reducing the purchase intention. Indeed, perceived risk reduced the purchase intention of the Swedish millennials, even though to a smaller extent than the authors expected. A possible explanation for the relatively weak effect could be that Swedish millennials are already used to the internet and technology in their everyday life, that they tend to accept risks more often (Forsythe & Shi, 2003). Consequently, risk is not inhibiting the purchase intention to such a strong extent, as previously expected.

5.4 Augmented reality experience

5.4.1 Augmented reality shopping experience

A positive relationship was found between the augmented reality experience and the online purchase intention of shopping goods. Therefore, hypothesis H2a was accepted. In general, the Swedish millennials perceived the experience with augmented reality as highly positive. The popularity of the shopping with augmented reality can be explained by the openness of the Swedish millennial generation to technology and innovation (Schewe et al., 2013). Also, their likeliness of trying new things and products is high (Knittel et al., 2016; Schewe et al., 2013), as this generation is highly adaptable and well-educated (Bilgihan, 2016). Especially,
the fact that this generation already grew up with innovative tech-toys of higher standards contributes to this openness and popularity of the technology (Lingelbach et al., 2012).

The positive perceived experience is in line with the results of the study by Hilken et al. (2017) which showed that the online experience is enhanced when the augmented reality is perceived authentically by the user. An authentic experience could be ensured by choosing a product example for the study’s survey, which featured an augmented reality app of high quality in connection with a product which every participant could relate to. In case the augmented reality experience was not presented authentically, the results might differ. In line with Cruz et al. (2018), the result shows that the consumers were satisfied by the shopping experience with valid information related to the product and the purchase, which were provided by augmented reality.

Even though the control variables did not have any significant influence on the relationship towards the purchase intention, a small difference was indicated in relation to gender. Here, women seemed to be slightly more influenced by augmented reality in relation to their purchase intention than men and other. This could possibly be explained by the fact that women feel more affected by vividness when shopping online (Lin et al., 2018).

### 5.4.2 Hedonic augmented reality experience

The results showed that the augmented hedonic shopping experience was positively related to the purchase intention of shopping goods for the Swedish millennial generation. This means, the more fun and enjoyment the Swedish millennials experience during their online shopping with augmented reality, the stronger their purchase intention is. In fact, the results showed, that the excitement and joy during the shopping experience with augmented reality was perceived highly positive. This finding is in line with Parment (2013), who state that younger individuals’ decision making is more based on emotions and fun compared to others. However, compared to the general augmented reality experience, the augmented hedonic shopping experience showed a slightly weaker relationship. This showed, that fun and emotions are important to the Swedish millennials during online shopping. However, its impact on the purchase intention is not as crucial as a positive shopping experience in general.
5.4.3 Utilitarian augmented reality experience

As presented within the results, the augmented utilitarian shopping experience was positively related to the online purchase intention of shopping goods for the Swedish millennial generation. Consequently, the purchase intention increased to a high extent, in case the Swedish millennials perceived that the shopping experience with augmented reality was able to provide the correct information about the product and the purchase. This finding is in line with other researchers, stating that augmented reality can improve utilitarian aspects and therewith facilitate the efficiency of the shopping process (Hilken et al., 2017; Huang and Hsu-Liu, 2014). As it was suggested by former researchers, the hedonic and the utilitarian shopping experience together create the foundation of the general shopping experience (Blázquez, 2014).

Surprisingly, the relationship between the utilitarian shopping experience and purchase intention was the strongest relationship that was found, compared to the general and the hedonic experience with augmented reality. Therefore, it can be stated that the Swedish millennials consider the information given as a key factor in purchasing shopping goods online. This result is in line with the generally high need for information search before purchasing shopping goods (Business Dictionary, 2018). Due to the relatively high value of furniture and other shopping goods, consumers spend more effort in information collection about the products’ features (Poon & Joseph, 2000). Interestingly, the utilitarian aspect of the shopping experience is stronger related towards the purchase intention compared to the hedonic aspects of the experience. Therefore, it could be argued that informative, utilitarian aspects of a shopping experience with augmented reality are even more important to be gathered before the actual purchase than hedonic aspects, means that the enjoyment of the experience is slightly less important in the context of online shopping intention.

5.5 Moderating effect of augmented reality

The moderation regression analysis indicated a significant positive moderating relationship of the augmented shopping experience towards the relationship between product perception and purchase intention of shopping goods. Therewith, hypothesis H3a was accepted. Interestingly, the moderating effect was rather weak. Only 4.8% of the variation in the relationship between product perception and purchase intention are moderated by the augmented shopping experience. Consequently, it is confirmed that a shopping experience,
which was enhanced with augmented reality does moderate the relationship of the product perception and the purchase intention for Swedish millennials to a small extent.

That the augmented reality shopping experience significantly moderates the relationship between risk perception and the purchase intention of shopping goods of the Swedish millennials within e-commerce, was not confirmed. Therefore, hypothesis H3b was rejected. Surprisingly, this study cannot confirm that augmented reality interacts in the relationship of risk perception and purchase intention. There could be several reasons and possible influences that were not acknowledged in this study. As the comparison of the risk perception before and after the use of augmented reality in chapter 5.2 showed a significant decrease, this result was surprising. However, due to the relatively low impact on the purchase intention related to rising risk in general, measurement difficulties could be expected. Another possible problem when measuring a moderation of the experience with augmented reality on the relationship between risk perception and purchase intention could be the borrowed measurement scales from other researchers. Two of the items that measured the participants’ risk perception were borrowed from a study that related to an offline shopping environment (Bhukya & Singh, 2015). Furthermore, it could be anticipated that the questionnaire did not fully cover all aspects related to risk, as the questions’ focus was put on psychological and performance risk. Thus, this could have an impact on the rejected hypothesis H3b.
6. Conclusion

6.1 Answer to the research question

This research aimed to test the relationship between augmented reality and the online purchase intention of the Swedish millennial generation for shopping goods. To fulfill this aim, the relationships and their strengths between product perception, risk perception, the experience with augmented reality, the hedonic experience as well as the utilitarian experience towards purchase intention were tested. Also, the moderating effects of the general experience with augmented reality were under investigation. By means of an online survey, convenience and snowball sampling, primary data of 408 valid participants were collected and the following conclusions were drawn.

In this study the Swedish millennials showed no significant differences in relation to their socio-demographic characteristics towards the investigated relationships and their online purchase intention. These results enable the conclusion of a relatively homogeneous young generation, which shows similarities in their reactions towards online shopping with augmented reality.

The product perception and the shopping experience with augmented reality, as well as the hedonic and utilitarian experience with augmented reality are all positively related to the Swedish millennials’ purchase intention. The risk perception showed a negative relationship towards the purchase intention. This reflects a generation, which is open-minded towards the experience with the augmented reality technology and therewith indicates possible future purchases. As the relationship of the utilitarian shopping experience and the purchase intention showed the strongest relationship, this indicates that the Swedish millennial generation appreciates the efficiency and informative aspects about augmented reality in relation to shopping goods. In such cases, augmented reality can be seen as an informative technology and thereby enhancing the purchase intention.

The moderation of the augmented reality experience towards the relationship between product perception and purchase intention was confirmed and therewith indicated a slight interaction of the augmented shopping experience. This means, that shopping goods are perceived more positively through the shopping experience with augmented reality, which in
turn enhances the Swedish millennials’ purchase intention. In regards to risk perception, no significant moderation of the experience with augmented reality was found. Consequently, this study does not prove an enhancing effect of the augmented shopping experience towards the risk and the purchase intention.

6.2 Contribution of the study

This study contributes to existing literature, by examining several aspects of augmented reality that in this combination have not been researched before. Furthermore, in the context of consumer behaviour research about Swedish millennials, the study reveals new findings about augmented reality and shopping goods. This study contributes to research gaps within these fields where current literature was lacking.

The moderating effect of the augmented shopping experience has not been researched in this context before. Therefore, the findings about the significant moderation between the product perception and purchase intention provide a new result. However, the moderation was not confirmed in relation to risk perception.

The contemporary augmented reality technology is constantly improving and its field of application expands (MarketsandMarkets, 2017). Therefore, this study contributes to research and practice in terms of understanding Swedish millennials’ perceptions towards the experience with this technology in online retail. Consequently, the results of this study can be used as a foundation for further research.

Additionally, this study provides practical implications that can be used especially for online retailers to improve their strategy for enhancing consumers’ purchase intention. This will be further assessed in the consecutive chapter.

6.3 Practical implications

As mentioned, this study gives implications for online retailers. It can be stated that in order to provide consumers with a positive product experience, augmented reality can be helpful for online retailers. Due to its positive impact on the consumers’ perception, shopping experience and purchase intention, the introduction of an augmented reality strategy can be recommended in relation to a Swedish Millennial target market and shopping goods.
The study furthermore gives practical implications about the Swedish millennials’ purchase intention of shopping goods. The Swedish millennials’ online shopping habits are carefully described, which can be used as a basis for enhancing the strategy when entering the Swedish market and targeting a young generation.

As the findings present important factors for increasing the purchase intention, the study can give implications for retailers that operate within the category of shopping goods. Here it can be stated that augmented reality can be used to enhance the product perception and therewith the online purchase intention. However, it is important to consider that the technology needs to be well-developed.

Lastly, this study gives practical implications to companies that develop innovative marketing strategies for themselves as well as for others, by revealing that augmented reality is positively perceived by Swedish millennials in the online shopping context.

6.4 Limitations of research

Even though each step of the research process was carefully considered prior to the conduction of this study, the following limitations should be taken into account when interpreting the results.

Firstly, as mentioned in chapter 3.5, the method of convenience and snowball sampling leads to a sample that does not represent the population to the same extent as probability sampling does (Saunders et al., 2016). Due to this bias, the representativeness of the sample is limited since it does not fully represent the population’s characteristics as the presentation of the survey’s results in chapter 4.1.1 show. Furthermore, the survey only included the responses from individuals that felt like answering the poll. Consequently, also the generalizability of the results towards the population is limited. However, this is considered by the authors to be a limitation of an acceptable extent for this particular study, as the high number of valid responses which were collected provide a high confidence level of 95% and a low error margin of 5% (Saunders et al., 2016).

Secondly, the participants’ answers depend on the degree to which they can relate to the product to that the survey’s questions refer to. This means that the generalizability of the study for other shopping products than the example product of the IKEA chair might be
limited. However, it was expected that most individuals could relate to the chosen example product for their personal living situation.

Thirdly, the study is limited to individuals born between 1980 and 2000, as the study focuses on the millennial generation. Due to the fact that currently no consensus exists about the exact age range of the millennials, the chosen age group needs to be considered when interpreting the results.

Lastly, it should be noted, that the results of the Swedish millennials for shopping goods only represent their intention to purchase. It is not possible to make generalizations about the population’s actual purchase behaviour due to the behaviour-intention gap (Bhattacherjee & Sanford, 2009).

6.5 Recommendation for further research

For future research it is suggested to further develop the work of this thesis. This could be done by conducting a large-scale study with the purpose of collecting data from several different geographical parts of Sweden. This would enlarge reliability and generalizability of the results. Another suggestion for future research is to investigate other product categories, in order to explain differences between product categories in relation to augmented reality and online retail. Such studies could give implications for online retailers about the type of businesses and products that are suitable for the usage of augmented reality. However, such study will also require a lot of time effort. Additionally, this research could be used as a basis for an even deeper investigation about the effect of augmented reality on the online purchase intention related to consumers from different countries.

Finally, as presented this study could not prove the moderation of augmented reality towards risk perception and purchase intention. Therefore, it is suggested to further develop and improve the measurement of the risk construct which was used in this survey. Consequently, measurement inaccuracies could be eliminated.
References


Schewe, C., Debevec, K., Madden, T., Diamond, W., Parment, A., & Murphy, A (2013). If You've Seen One, You've Seen Them All! Are Young Millennials the Same Worldwide?, Journal of International Consumer Marketing, 25(1), pp. 3-15


# Appendix

## Appendix 1: Measurement Scales

<table>
<thead>
<tr>
<th>Measurement Scale</th>
<th>Survey Question(s)</th>
<th>Response Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal scale</td>
<td>Gender (Q1)</td>
<td>Female/ Male/ Other</td>
</tr>
<tr>
<td></td>
<td>Nationality (Q3)</td>
<td>Open-end question</td>
</tr>
<tr>
<td></td>
<td>Living in Sweden for at least one year (Q4)</td>
<td>Yes/ No</td>
</tr>
<tr>
<td>Ordinal scale</td>
<td>Educational level (Q5)</td>
<td>Primary school/ High school/ Apprenticeship/ Bachelor degree/ Master degree/ Doctoral degree</td>
</tr>
<tr>
<td></td>
<td>Occupation (Q6)</td>
<td>Student/ Unemployed/ Employed/ Other</td>
</tr>
<tr>
<td></td>
<td>Online purchase frequency (Q7)</td>
<td>Weekly/ Monthly/ Minimum once a year/ Never</td>
</tr>
<tr>
<td>Interval scale</td>
<td>Perception of product (Q8-Q11)</td>
<td>5-point Likert scale</td>
</tr>
<tr>
<td></td>
<td>Perception of risk (Q12-Q15)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purchase intention with pictures (Q16-Q18)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perception of product after augmented reality (Q19-Q22)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perception of risk after augmented reality (Q23-Q26)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consumers’ experience with augmented reality (Q27-Q31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hedonic experience (Q32-Q36)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Utilitarian experience (Q37-Q41)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purchase intention with Augmented Reality (Q42-Q44)</td>
<td></td>
</tr>
<tr>
<td>Ratio Scale</td>
<td>Age (Q2)</td>
<td>Open-end question</td>
</tr>
</tbody>
</table>
### Appendix 2: Conceptual modelling of the questionnaire

<table>
<thead>
<tr>
<th>Construct</th>
<th>Conceptual Definition</th>
<th>Survey Item</th>
<th>Content</th>
<th>Source of inspiration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product perception (picture)</strong></td>
<td>The consumers’ subjective perceptions towards product quality and value (Modig &amp; Rosengren, 2014)</td>
<td>I consider the chair to be of good value.</td>
<td>Product value</td>
<td>Dodds et al. 1991, as cited in Modig &amp; Rosengren, 2014 α0.949</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I consider the chair to be of high quality.</td>
<td>Product quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I consider this product as reliable.</td>
<td>Product reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This product seems to be long lasting.</td>
<td>Product durability</td>
<td></td>
</tr>
<tr>
<td><strong>Risk perception (picture)</strong></td>
<td>Risks which are perceived by consumers related to the product (Lopez-Nicolas &amp; Molina-Castillo, 2008)</td>
<td>It is difficult to judge the quality</td>
<td>Performance risk</td>
<td>Forsythe &amp; Shi, 2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The inability to try the product in my environment makes it hard to judge how it fits</td>
<td></td>
<td>Forsythe et al., 2006 α0.844</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I would have doubts about its functional performance</td>
<td>Psychological risk</td>
<td>Bhukya &amp; Singh, 2015 α 0.746</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I would feel stressed when buying online</td>
<td></td>
<td>Bhukya &amp; Singh, 2015 α 0.885</td>
</tr>
<tr>
<td><strong>Purchase intention (picture)</strong></td>
<td>The consumers’ intention of purchasing the product (Fiore et al., 2005)</td>
<td>I would seriously consider buying furniture online</td>
<td>Purchase intention</td>
<td>Escobar-Rodríguez &amp; Bonsón-Fernández, 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I would seriously consider buying the chair after seeing it in several pictures</td>
<td></td>
<td>Hsu et al., 2014</td>
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<tr>
<td></td>
<td></td>
<td>I would seriously consider buying the product if I see it from different angles</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Product perception (AR)</strong></td>
<td>The consumers’ subjective perceptions towards product quality and value (Modig &amp; Rosengren, 2014)</td>
<td>I consider the chair to be of good value</td>
<td>Product value</td>
<td>Dodds et al. 1991, as cited in Modig &amp; Rosengren, 2014 α0.949</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I consider the chair to be of high quality</td>
<td>Product quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I consider the chair to be reliable</td>
<td>Product reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>I consider the chair to be long lasting</td>
<td>Product durability</td>
<td></td>
</tr>
<tr>
<td>Construct</td>
<td>Conceptual Definition</td>
<td>Survey Item</td>
<td>Content</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tbody>
</table>
| Risk perception (AR)                           | Risks which are perceived by consumers related to the product (Lopez-Nicolas & Molina-Castillo, 2008) | It is difficult to judge the quality  
The inability to try the product in my environment makes it hard to judge how it fits  
I would have doubts about its functional performance  
I would feel stressed when buying online | Performance risk       | Forsythe & Shi, 2003  
Forsythe et al., 2006  
α 0.844                                                                 |
|                                                |                                                                                       |                                                                                                                                             | Psychological risk     | Bhukya & Singh, 2015  
α 0.746                                                                 |
|                                                |                                                                                       |                                                                                                                                             |                         | Bhukya & Singh, 2015  
α 0.885                                                                 |
| Consumer's shopping experience with augmented reality | The consumer's online shopping experience with augmented reality (Hilken et al., 2017) | If I would use augmented reality I would feel that it gives me proper visualization of the product  
If I would use augmented reality I would feel that I like the shopping experience  
If I would use augmented reality I would feel that I find the shopping experience very favorable  
If I would use augmented reality I would feel that I find the shopping experience very valuable  
If I would use augmented reality I would feel that I find the shopping experience very good | Product visualization  | Escobar-Rodríguez & Bonsón-Fernández, 2017; Pavlou, 2003 |
|                                                |                                                                                       |                                                                                                                                             | Satisfaction of shopping experience | Lin et al., 2018  
α 0.96                                                                 |
| Hedonic shopping experience with augmented reality | The consumers' enjoyment of the shopping experience (Holbrook & Hirschman, 1982 as cited in Fiore et al., 2005) | The augmented reality online shopping experience would be fun for its own sake  
The augmented reality online shopping experience would make me feel good  
The augmented reality online shopping experience would make me feel excited  
The augmented reality online shopping experience | Fun                    | Childers et al., 2001  
α 0.875 & 0.928                                                                 |
<p>|                                                |                                                                                       |                                                                                                                                             | Feeling                |                                                                 |
|                                                |                                                                                       |                                                                                                                                             | Excitement             |                                                                 |
|                                                |                                                                                       |                                                                                                                                             | Enjoyment              |                                                                 |</p>
<table>
<thead>
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<th>Source of inspiration</th>
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<td>The consumers' effectiveness in choosing the right product during the shopping experience (Holbrook &amp; Hirschman, 1982 as cited in Fiore et al., 2005)</td>
<td>The augmented reality online shopping experience would be convenient for me</td>
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<td>Childers et al., 2001 α0.921 &amp; 0.933</td>
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<td>The consumers' intention of purchasing the (augmented) product (Hilken, 2017)</td>
<td>I would seriously consider buying a product online after experiencing it by augmented reality</td>
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Appendix 3: Questionnaire in Swedish

**Augmented reality inom e-handel**

Kära Deltagare,

Föddes du mellan åren **1982 - 2000** och bor i Sverige? Då söker vi dig!

Vi, Anne och Leonie, studerar masterprogrammet "Business Studies with an International Focus" på Dalarnas Universitet och skulle bli glada om ni vill bidra med era svar. Undersökningen görs i samband med vår Masteruppsats och handlar om Augmented reality, e-handel och konsument beteende.

Augmented reality är en sorts teknologi som kopplar samman den verkliga världen med den virtuella. Denna teknologi gör det möjligt att interagera med virtuella produkter i verkliga livet.


Om du använder en smartphone för att besvara undersökningen, föreslår vi att du håller den horisontellt, då frågorna kommer synas bättre.

Tack för din tid!
Anne & Leonie

---

Välj eller fyll i det svar som passar dig bäst

Vänligen ange ditt kön
O Kvinna
O Man
O Annat

Vänligen fyll i din ålder

Vänligen fyll i din nationalitet

Vänligen ange om du har/du kommer att bo i Sverige under minst ett år?
O Ja
O Nej

Vänligen ange din högsta avslutade utbildningsnivå
O Grundskola
O Gymnasium
O Lärlingstid/Yrkeshögskola
O Kandidatexamen
O Magister/Masterexamen
O Doktorsexamen
Vänligen ange din nuvarande sysselsättning
O Student
O Arbetslös
O Anställd
O Annat

Vänligen ange hur ofta du handlar på nätet
O Veckovis
O Månadsvis
O Minst en gång per år
O Aldrig

Anta att du vill köpa en stol på nätet och kollar därför igenom en e-katalog och hittar den här stoln. Vänligen kolla på stoln som är presenterad från e-katalogen:

Efter att du har sett bilderna på stoln vänligen besvara följande påståenden:

Produkt (5-gradig Likertskala)
1. Jag anser att stoln har ett bra värde
2. Jag anser att stoln har en hög kvalitet
3. Jag anser att produkten är pålitlig
4. Produkten verkar hållbar

Risk (5-gradig Likertskala)
1. Det är svårt att avgöra produktens kvalitet
2. Jag skulle vara tveksam kring produktens funktionella prestanda
3. Att det inte är möjligt att prova produkten i min omgivning gör det svårt att bedöma hur den passar in
4. Jag hade känt mig stressad av att handla online

Köpavsikt (5-gradig Likertskala)
Jag skulle seriöst överväga att köpa...
1. möbler online
2. en produkt om jag ser den på flera bilder
3. en produkt om jag ser den från flera olika vinklar
Vänligen kolla på videon som presenterar augmented reality

Efter att ha tittat på filmen, vänligen ange till vilken grad du instämmer om följande påståenden:

**Produkt (5-gradig Likertskala)**
Jag anser att stolen är…
1. av bra värde
2. av hög kvalitet
3. pålitlig
4. hållbar

**Risk (5-gradig Likertskala)**
Genom att använda augmented reality hade…
1. det varit svårt att bedöma stolens kvalitet
2. jag varit tveksam till produktens funktionella prestanda
3. det varit svårt att bedöma hur stolen passar in i min omgivning
4. jag känt mig stressad av att handla online

**Augmented reality upplevelse (5-gradig Likertskala)**
Om jag hade använt augmented reality hade jag…
1. känt att produkten var visualiserad ordentligt
2. gillat shoppingupplevelsen
3. funnit shoppingupplevelsen väldigt fördelaktig
4. funnit shoppingupplevelsen väldigt värdefull
5. funnit shoppingupplevelsen väldigt intressant

**Hedonisk upplevelse (5-gradig Likertskala)**
Shoppingupplevelsen online med augmented reality skulle…
1. vara rolig för sakens skull
2. ge mig en bra känsla
3. få mig att bli exalterad
4. vara rolig
5. få mig att känna mig obekväm

**Utilitarisk (5-gradig Likertskala)**
Shoppingupplevelsen online med augmented reality skulle…
1. vara bekväm för mig
2. spara mig tid när jag shoppar
3. vara effektiv
4. göra min shopping enklare
5. förse mig med den information jag behöver för att shoppa online
Köpavsikt (5-gradig Likertskala)
Jag skulle seriöst överväga att...
1. köpa en produkt online efter att ha upplevt den genom augmented reality
2. i framtiden köpa produkter efter att ha använt augmented reality
3. använda augmented reality som ett av mina första val när jag ska köpa produkter online

Tack för din medverkan. Vänligen fortsätt genom att trycka på “SKICKA”.

Om du har några ytterligare frågor eller bekymmer, tveka inte på att kontakta oss eller vår handledare Tao Yang.

Med vänliga hälsningar, Anne & Leonie

Anne Dybdal Andersen: h17aanne@du.se
Leonie Schreck: h17lesch@du.se

Tao Yang: tjn@du.se, Universitetslektor företagsekonomi, +4623778506

Likert skalan sträcker sig från 1-5, enligt nedan:
1 - Håller inte alls med
2 - Håller inte med
3 - Varken håller med eller inte
4 - Håller med
5 - Håller helt med
Appendix 4: Questionnaire in English

Augmented reality within e-commerce

Dear participants,

Were you born between 1982 - 2000 and are living in Sweden? Then we are looking for you!

We, Anne and Leonie, are studying the Master program "Business Studies with an International Focus" at Dalarna University and would be happy if you support us with your responses. The survey is about Augmented Reality, online retail and consumer behaviour and is carried out in the context of our Master Thesis. Augmented reality is a technology that combines the real and the virtual world. This technology makes it possible to interact with the virtual product in your real-life setting.

All information will be treated anonymously and with strict confidence. The results will not be used for any other purpose than for this study. Your participation in the survey is voluntary and you are always able to stop answering the questions in case you feel like doing so. The completion of the questionnaire will take only about 7 minutes. In the first part of the questionnaire, you will be asked to answer questions related to a picture. In the second part, a short video will be presented about an augmented reality tool, followed by questions related to it.

If you are using a smartphone to complete the questionnaire, we suggest to turn it horizontal as the the questions will be better visible.

Thank you for your time!
Anne & Leonie

Choose or fill in the answers that suit you the best

Please choose your gender
O Female
O Male
O Other

Please state your age

Please state your nationality

Please state if you have lived/will live in Sweden for at least one year
O Yes
O No

Please choose your highest completed level of education
O Primary school
O High school
O Apprenticeship
O Bachelor degree
O Master degree
O Doctor's degree

Please choose your current status of occupation
O Student
O Unemployed
O Employed
O Other
Please choose how often you purchase online

- Weekly
- Monthly
- Minimum once a year
- Never

Suppose, that you want to buy a chair online. You look through an e-catalogue and find this chair.
Please have a look at the chair presented in the e-catalogue:

After looking at the chair, please rate to which extent you agree with the following statements:

**Product (5-point Likert scale)**
1. I consider the chair to be of good value
2. I consider the chair to be of high quality
3. I consider this product as reliable
4. This product seems to be long lasting

**Risk (5-point Likert scale)**
1. It is difficult to judge the products quality
2. I would have doubts about its functional performance
3. The inability to try the product in my environment makes it hard to judge how it fits
4. I would feel stressed when buying online

**Purchase intention (5-point Likert scale)**
I would seriously consider buying...
1. furniture online
2. a product if I see it in several pictures
3. a product if I see it from different angles
Please watch the video featuring augmented reality

After watching the video, please rate to which extent you agree with the following statements:

**Product (5-point Likert scale)**
I consider the chair to be…
1. of good value
2. of high quality
3. reliable
4. long lasting

**Risk (5-point Likert scale)**
By using augmented reality, …
1. it would be difficult to judge the chair’s quality
2. I would have doubts about its functional performance
3. it would be hard to judge how the chair fits into my environment
4. I would feel stressed when buying online

**Augmented reality experience (5-point Likert scale)**
By using augmented reality, I would…
1. feel that the product is properly visualized
2. like the shopping experience
3. find the shopping experience very favorable
4. find the shopping experience very valuable
5. find the shopping experience very interesting

**Hedonic experience (5-point Likert scale)**
The augmented reality online shopping experience would…
1. be fun for its own sake
2. make me feel good
3. make me feel excited
4. be enjoyable
5. make me feel uncomfortable

**Utilitarian experience (5-point Likert scale)**
The augmented reality online shopping experience would…
1. be convenient for me
2. allow me to save time when shopping
3. be efficient
4. make my shoppings easier
5. provide the information I need for shopping online
Purchase intention (5-point Likert scale)
I would seriously consider …
1. buying a product online after experiencing it by augmented reality
2. buying products with the use of augmented reality in the future
3. using augmented reality as one of my first choices when shopping products online

Thank you for your participation! Please continue by pressing "SEND".

If you have any additional questions or concerns, do not hesitate to contact us or our supervisor Tao Yang.

Best regards, Anne & Leonie

Anne Dybdal Andersen: h17aanne@du.se
Leonie Schreck: h17lesch@du.se

Tao Yang: tjin@du.se, senior lecturer in business administration, +4623778506

The Likert scale ranges from 1-5, as shown below:
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree
Appendix 5: Scatterplots

Scatterplot 1: Purchase intention (AR) by Product perception (AR)

Scatterplot 2: Purchase intention (AR) by Risk perception (AR)
Scatterplot 3: Purchase intention (AR) by General augmented reality experience

Scatterplot 4: Purchase intention (AR) by Hedonic augmented reality experience
Scatterplot 5: Purchase intention (AR) by Utilitarian augmented reality experience
Appendix 6: Hierarchical multiple regression analysis

Model Summary including control, dependent and independent variables

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a. Predictors: (Constant), Occ_Unemployed, Occ_Employed, Occ_Other, Gen_Female, Gen_Other, Educ_High school degree, Edu_Apprenticeship, Educ_Bachelor degree, Edu_Master degree, Educ_Doctoral degree, Onlinepurch_Monthly, Onlinepurch_Minimum once a year, Onlinepurch_Never, Age_29-36, Nationality_Non Swedish

b. Predictors: (Constant), Occ_Unemployed, Occ_Employed, Occ_Other, Gen_Female, Gen_Other, Educ_High school degree, Edu_Apprenticeship, Educ_Bachelor degree, Edu_Master degree, Educ_Doctoral degree, Onlinepurch_Monthly, Onlinepurch_Minimum once a year, Onlinepurch_Never, Age_29-36, Nationality_Non Swedish, AR_experience_hedonic, PerceptionRisk_AR, PerceptionProduct_AR, AR_experience_utilitarian, AR_experience_general

c. Dependent Variable: PurchaseIntention_AR

Control variables’ influence on the purchase intention

<table>
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<tr>
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<th>Coefficients&lt;sup&gt;a&lt;/sup&gt;</th>
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### Control variables’ influence on the relationship risk perception - purchase intention

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a. Dependent Variable: PurchaseIntention_AR
Control variables’ influence on the relationship general augmented reality experience - purchase intention

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<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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a. Dependent Variable: PurchaseIntention_AR
Control variables’ influence on the relationship hedonic augmented reality experience - purchase intention

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a. Dependent Variable: PurchaseIntention_AR
Control variables' influence on the relationship utilitarian augmented reality experience - purchase intention

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a. Dependent Variable: PurchaseIntention_AR
## Appendix 7: Moderation regression

**Moderation: Augmented reality experience - product perception - purchase intention**

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<sup>a</sup> Predictors: (Constant), PerceptionProduct_AR

<sup>b</sup> Predictors: (Constant), PerceptionProduct_AR, Moderator_PP_ARexpgen

<sup>c</sup> Dependent Variable: PurchaseIntention_AR

### Coefficients

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<sup>a</sup> Dependent Variable: PurchaseIntention_AR
Moderation: Augmented reality experience - product perception - purchase intention

Model Summary

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a. Predictors: (Constant), PerceptionRisk_AR

b. Predictors: (Constant), PerceptionRisk_AR, Moderator_PR_ARexpgen

c. Dependent Variable: PurchaseIntention_AR

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