RETAIL TECHNOLOGY AND THE CUSTOMER EXPERIENCE: THE USE OF AUGMENTED REALITY AS A SHOPPING TOOL

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Abstract

Recent years have seen augmented reality (AR) gain increased attention as a tool for enhancing customer experience in the retail industry. Yet questions remain regarding the implications of this emerging technology from the consumer perspective. Against this backdrop, the research aim of this thesis is to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. The derived research objectives are threefold. The first objective is to investigate consumer perceptions of, and experiences with, AR as a shopping tool. The second objective is to investigate the impact of customer experience with AR as a shopping tool on AR experience outcomes. The third objective is to identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool.

The macro-theoretical foundation of this thesis builds upon the affective cognitive theory. This theory states that consumers respond to stimuli in three ways: affectively, cognitively, and behaviourally. The affective cognitive theory provides a multi-layer perspective for understanding the mechanisms responsible for translating a customer’s experience through affect into action. It is applied to the research objectives to understand how the customer experience with AR impacts relevant consumer actions such as purchase intention. This thesis follows a three-study mixed-method research design, where each research objective is addressed by one study. Together, the three studies provide an understanding of how consumers react and respond to AR in retail through a combination of exploratory qualitative methods, and descriptive quantitative methods.

The first study (Study 1) is exploratory, utilising qualitative methods of semi-structured interviews regarding consumer experience while using AR. The results identify seven core themes pertinent to the impact of AR on the customer experience throughout the customer journey. The primary contributions of Study 1 are highlighting the various ways AR can both help or hinder the customer experience and identifying how the consumer perceptions of AR have an impact on the consumer journey. This study builds on Baudrillard’s (1983) notion of hyperreality, whereby AR plays a role in the integration of the real and the virtual. This research shows that this blending can both enhance and harm the customer experience. The themes identified in Study 1 are further explored in the subsequent studies.

The second study (Study 2) was designed based on the core themes identified in Study 1 that relate to the AR retail customer experience. Study 2 expands on these themes to better
understand the relationship between a consumer’s previous experience with AR (independent variable), the experiential value from engaging with AR (mediator), and the impact of information overload, which is the potential for AR to over-stimulate shoppers (moderator), on consumer experience outcomes, including: attitude toward AR, willingness to purchase using AR, and decision confidence (dependent variable). Moderated mediation effects are hypothesised and tested on a sample of 503 consumers through data collected in an online survey. The findings indicate that motivations, measured by the experiential value scale, mediate the consumer outcomes including decision confidence, willingness to purchase using AR, and attitude toward AR. The primary contribution of Study 2 is identifying the importance of providing a product that not only provides efficiency, but also enjoyment to consumers. These findings provide retailers with a deeper understanding of the influence of motivations on different outcomes when using AR as a shopping tool while expanding on motivation theory.

The third study (Study 3) explores how consumers differ in terms of the value they receive from using AR, as well as the trade-offs they experience when using the technology for shopping. Specifically, this study explores the individual characteristics that lead to these differences by segmenting consumers according to their perceptions of, and attitudes toward, AR as a shopping tool. A Latent Class Analysis segmentation model is applied to survey data of 503 consumers. Four consumer segments that differ in terms of their attitude toward AR, experiential value, choice confidence, and perceived information overload are identified. Hence, the primary contribution of Study 3 is documenting that heterogeneity in attitudes toward AR exists. The heterogeneity of consumer attitudes toward AR is driven by consumers’ perceptions of decision confidence, information overload, and experiential value. Hence, retailers should leverage these dimensions when communicating the value of AR in assisting consumers when shopping. This study contributes to theory by extending on the Technology Acceptance Model in the context of AR within the retail context to study hedonic or utilitarian values.

Taken together, this thesis makes several contributions to existing literature and practice. The three-study research design allows a deep investigation around AR and the customer experience, more specifically, providing further understanding of AR technology and the interplay between consumer attitudes, perceptions, and consumer outcomes. As a conceptual contribution this thesis explores how AR can help or hinder the customer experience,
focusing on factors influencing these impacts, such as affective, cognitive and behavioural factors.

From a practical point of view, this thesis provides retailers with knowledge around consumers and their attitude and perceptions around this technology. Recommendations are made around caution to be exercised when implementing AR in retail, as outcomes are not always favourable for all consumer segments. As an emerging technology, it is important for retailers to educate consumers around the benefits they could gain from using this technology. This thesis provides ways for retailers to evaluate this emerging technology and apply it in a way that benefits customer experience while minimising potential negative outcomes.

**Keywords:** retail technology; augmented reality; consumer attitudes; consumer outcomes
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Statement of declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed. Where the work is based on joint research or publications, I have disclosed the relative contributions of the respective authors in the Authorship Declaration forms here included.

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Chapter 1: Introduction

1.1 Chapter introduction

Chapter 1 provides a broad introduction to the research underpinning this thesis, presenting the background and rationale of the research topic and the broad structure of the thesis document. This chapter begins by outlining the relevant research background (Section 1.2), such as the increasing implementation of consumer-facing technologies to improve the customer experience in the retail sector. Next, the research context is analysed (Section 1.3) and the focus on the emergence of augmented reality (AR) as a shopping tool is contextualised. Subsequently, the research gaps and calls for future research based on the current literature are identified (Section 1.4). In Section 1.5, the research problem is recognised; which is followed by the research aims and objectives (Section 1.6.), and a summary of the research contributions (Section 1.7). To conclude, an outline of the thesis is provided (Section 1.8) before a summary of the chapter (Section 1.9).

1.2 Research background

Digital technologies are increasingly disrupting the way businesses operate as well as the way consumers engage with brands, and even each other. Indeed, innovation is especially important to customer experience (CX) in industries that face high competition, such as retail (Pantano & Vannucci, 2019). CX refers to the overall perceptions a customer has of a brand based on their interactions with the company across all touchpoints (Meyer & Schwager, 2007). Technology in retail can take different forms to meet different consumer needs and business goals (Noble et al., 2022). For retail businesses, digital technologies are increasingly being utilised to reduce costs and augment interactions with consumers (van Doorn et al., 2016). For consumers, digital technologies are enhancing shopping convenience and delivering new channels for purchasing (Duarte et al., 2018).
Given these trends, technology is considered a principal driver of change in retail (Grewal et al., 2020). Technology allows retailers to deliver a better customer experience through improved logistics and personalisation (Varadarajan et al., 2010), while aiding consumers in their decision-making by providing access to real-time information (Pantano & Vannucci, 2019). Hence, technology is driving change not only in how retailers do business, but also the ways that consumers shop.

Technological innovations have rapidly developed in recent years. A clear example is the rapid transition from staffed store checkouts to self-checkouts and now to checkout-free stores such as the Amazon Go concept within only 10 years (Cusumano, 2017). As a result of these rapid developments, the global retail digital transformation market was valued at $143.55 billion in 2020 and is expected to reach $388.51 billion by 2026 (Mobindustry, 2022). The speed of innovation is also increasing. For example, 5G-technology is expected to underpin retailers’ ability to deploy immersive communication to connect consumers and brands in new ways by as soon as 2023 (Wang, 2020). Hence, retailers must adapt to new technologies quickly to keep up with rapid innovations.

Partly due to the benefits technology provides consumers, there is now an imperative for retailers to provide engaging customer experience across all the company’s channels (de Bellis & Johar, 2020; Grewal & Roggeveen, 2020). Consumers in fact now demand their needs are satisfied through a seamless experience with few or no points of friction (Zhang et al., 2018). When retailers can meet these demands for seamless experiences, the benefits for retailers include higher profit, increased consumer satisfaction, and enhanced loyalty (Pine & Gilmore, 2011). Hence, retailers are increasingly turning to innovative new technologies to enhance, or augment, brand-consumer interactions across channels throughout the customer journey (Guha et al., 2021).
Retail technologies are becoming increasingly immersive whereby they replicate physical shopping experiences and interactions in a digital environment (Bonetti et al., 2019). These developments are leading to the growth of a new multi-spaced environment, the metaverse. The metaverse is the potential next iteration of the internet, supporting decentralized, online 3-D virtual environments (Bourlakis et al., 2009). The word *metaverse* is the combination of the prefix *meta* (meaning beyond) and *universe*; the term is typically used to describe the concept of a future iteration of the internet, made up of persistent, shared, 3D virtual spaces linked into a perceived virtual universe (Schafer, 2016, p. 50). This technological evolution will likely see a wide variety of brands adapt to use digital technologies and devices such as Artificial Intelligence (AI), advanced robotics, Intelligent Agents, the Internet of Things (IoT), Virtual Reality (VR), Augmented Reality (AR), and cross-reality (XR). All these technologies will, in some way, alter the interaction between consumers and companies (Larivière et al., 2017). Example of retail companies that have entered the metaverse are luxury brands such as Gucci, Louis Vuitton, and Dolce and Gabbana (McDowell, 2022). One technology that is particularly relevant to the Metaverse is augmented reality (AR), which has gained traction among practitioners, researchers, and consumers as a result (Whang et al., 2021). AR is a technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view. More specifically, AR allows consumers to virtually engage with products (either by visualising or manipulating) prior to purchase through a computer or other smart device. For example, Swedish retail conglomerate IKEA developed an AR mobile application that allows consumers to virtually place furniture (true-to-scale 3D models) in their own space. More broadly, retailers have introduced various AR apps in a range of retail sectors, including fashion, automotive, and furniture among others (Heller et al., 2019). In each of these cases, AR is used to provide consumers a means to interact with products virtually. The AR industry
is expected to grow, with retailer investment in AR technology expected to increase at annual rates of up to 135% between now and 2023 (IDC, 2019).

For retailers and consumers, AR technology provides a range of possible benefits. This technology can leverage the main downsides that both bricks and mortar and e-commerce retail experiences possess, namely the ability to efficiently experience items in the consumer’s own space (such as in furniture) or even body (such as fashion or beauty products) prior to purchase. AR technology provides consumers greater convenience, accessibility, and increased ability to interact with products (Roy et al., 2017). Further, it allows consumers to make purchases at a time and place of their convenience and can also overcome uncertainty that can exist when purchases are made online (Fernandes et al., 2021). Consumers’ increased confidence could have a knock-on effect for retailers, by reducing the number of items consumers return (Robertson et al., 2020). This is important, given that roughly 10% of retail sales are returned to retailers (Robertson et al., 2020). Beyond the monetary cost, returns also have detrimental effects on the environment and drive-up sustainability carbon costs (Cullinane et al., 2019).

Lastly, the metaverse is relevant to AR in retail because it represents a potential future state where AR experiences could be seamlessly integrated into virtual shopping environments. The concept of the metaverse is all about creating immersive, interconnected virtual worlds that transcend traditional boundaries between physical and digital spaces (Dwivedi et al., 2022). This has significant implications for the future of retail, as it could enable new forms of virtual shopping experiences that seamlessly blend physical and digital elements.

Hence, the background to this research is the growing imperative for retailers to provide an engaging customer experience, coupled with the increasing disruption and opportunities caused by emerging technologies in the retail industry. Technologies are
becoming an increasingly critical tool for retailers to enhance the customer experience, and AR is one technology that has vast potential for retailers and consumers alike. Given this potential and the evolution of the technology, AR frames the focus of this thesis and will be further explained in the next sections.

1.3 Research context

The research context of thesis lies within the retail sector. Retail is a major industry globally (Grewal et al., 2017), this means that advancements and new implementations are likely to be used as an influence for other industries. There is no doubt that technology is having a strong impact on the retail landscape (Grewal et al., 2020). Customer-oriented technologies have been bridging the gap between online and traditional retail, enabling a holistic omni-channel experience (Verhoef et al., 2015). Retail technology is increasingly seen as an interface between brand and customer interactions (van Doorn et al., 2016), which is relevant to all the stages of the customer journey experience. It is increasingly important that retail marketers use innovative technologies, such as AR, to strategically achieve differentiation in order to maintain their marketing quality and their sales (Flostrand et al., 2019). This thesis focuses on the impact that AR as a shopping tool can have on the customer experience.

AR falls under the broader category of cross reality (XR) technologies, which include VR, AR, haptics, holograms and all tools that use and enhance our natural senses. This type of technology has been gaining increasing popularity and has started significantly impacting a variety of industries (Accenture, 2019). The number of patent applications for AR/VR between 2014-2016 increased by five times (Accenture, 2019). Furthermore, the investment in AR/VR startups has grown by 237% between 2014 and 2016 (Accenture, 2019). Yet industry spending on XR exceeds consumer spending; the growth in industry spending is 134%, whereas growth in consumer spending is 69% (IDC, 2019). Hence, XR is an emerging
category of technologies whose potential could be further realised by an improved understanding of customer experience.

The COVID-19 pandemic accelerated the shift to digital shopping by roughly five years, accelerating the interest in XR and AR specifically (Papagiannis, 2020). Many retailers were forced to comply with lockdowns and close physical stores (KPMG, 2020). During these times, only shopping online was allowed, which led to drastic increases in online retail sales, and subsequently led many retailers to invest in digital technologies (KPMG, 2020). Retailers particularly sought strategies to allow consumers to virtually experience products while stores were closed, leading to enhanced interest in AR and its ability to simple online shopping by enhancing the vision (Chen et al., 2021). Even as restrictions on physical stores have eased, the need for hygiene and safety are still a top priority. Additionally, many consumers experienced new ways of shopping online that may have impacted their expectations from retail technologies. Hence, now is a valuable time to explore the impact of AR on the customer experience in retail.

Consumer interest in AR further increased in October 2021 whereby Mark Zuckerberg rebranded Facebook to Meta, stating that “Meta is moving beyond 2D screens toward immersive experiences like augmented and virtual reality to help build the next evolution in social technology” (Meta, 2021). As one of the most influential companies in the world had identified the potential of AR and started investing in it, that was a sign of the importance of this technology.

AR enables retailers and brands to virtually display products, accessories, and customisation options - allowing consumers to imagine what these would look like prior to purchase (Pantano & Servidio, 2012). AR can be delivered in multiple ways: 1) through mobile phone apps, whereby consumers through an app can view holographic content as a part of the physical world around them, 2) through websites, whereby consumers can use a
camera on a computer or laptop, and 3) smart mirrors, whereby consumers can look at themselves in a mirror and see items of clothes projected on them. In the retail fashion industry, AR enables consumers to virtually experience events, including fashion shows and catwalks (Stromberg, 2018). In retail stores, the technology enables consumers to use virtual fitting rooms, smart mirrors and social try-on rooms (Hilken et al., 2017). Taken together, these types of AR allow consumers to engage in virtual try-ons of clothing, browse different colours and sizes, and even share pictures of the items via social media (Beck & Crié, 2018).

In the global market, these tools were valued at US$2.5 billion in 2017, and it is anticipated that this will increase at a compound annual growth rate of 22.7% by 2026 (Transparency Market Research, 2018).

Hence, in view of the above-mentioned characteristics and trends around AR, which is becoming a frequently used technology by retailers, and the focus of retailers around stimuli, such as AR technology, that can positively influence the customer experience, the context of this research lies within the creation of customer experience in the retail industry through the use of AR. This technology involves overlaying visual information onto a customers’ smartphone, computer, or mirror, in order to enhance the experience. Retailers are making significant investments in this technology. This trend was enhanced by the COVID-19 pandemic, and the advancements of the metaverse. As still considered an emerging technology, it is important to investigate what we know, and what we need to know.

1.4 Research gaps

It is now critical for retailers to understand the characteristics, applicability and outcomes of emerging technologies in order to maximise return on investment (Roggeveen et al., 2016). Existing research has shown that consumer-facing technologies such as AR can be applied as a tool to provide both utilitarian or hedonic values depending on the context (Sarkar, 2011). The former allows the customers to achieve a specific goal, such as locating an item in store;
whereas the latter allows the customer to have a pleasurable and entertaining experience, such
as gamification (Bonetti et al., 2018; Van Kerrebroeck et al., 2017). However, it is important
to note this technology has the capability of integrating both at the same time by providing a
hedonic experience and delivering a utilitarian outcome (Piotrowicz & Cuthbertson, 2014;
Puccinelli et al., 2009). Throughout this thesis, there are references to values and motivations.
These concepts are related, with value, being the practical benefits of a product or service,
while motivations being the personal motives of meeting the outcome sought (Bagozzi et al.,
1999).

The challenge with emerging technologies like AR is that they continually evolve
(Pantano et al., 2017). Research is therefore needed to understand consumer behaviour with
these emerging technologies. In fact, new iterations of the technology can be launched while
still not fully implemented. Hence, it is necessary for new research to continually explore the
impact of technologies as capabilities evolve.

Along with the rapid development of retail technology, the knowledge about the role
of AR is increasing (Kumar, 2021; Lavoye et al., 2021). For instance, recent research on AR
has examined the experiences delivered by AR marketing (Chylinski et al., 2020, van
Kerrebroeck et al., 2017); and the relationship between individual characteristics, such as
consumers’ control (Whang et al., 2021), and mental intangibility (Heller et al., 2019), and
the AR experience. However, multiple gaps still remain in the understanding of AR’s impact
on the customer experience. Specifically, there is little knowledge about how and whether
such technology enhances or detracts from the customer experience at different stages of the
customer journey, from pre-purchase to purchase and then post-purchase. In fact, past studies
focused on a particular stage, such as product evaluation (Heller et al., 2019). This is a
significant gap, as omnichannel research shows that the stages are linked (Zhang et al., 2018),
so it is important to look at the impact across stages holistically. In this way, the customer
journey can provide a framework to base the customer experience on. Hence, by understanding customer experience with AR at each stage, better insights into the impact of the technology will be gathered, and tailored implementations and detailed strategies can be suggested for practitioners wishing to implement the technology.

Second, there is a need for research to further investigate the effects of AR as a shopping tool on the customer experience and other relevant decision-making outcomes. Such outcomes could include a consumer’s confidence in their purchase decision, and intention to purchase (Kang et al., 2020). For instance, being able to interact with a product virtually prior to purchase may help some consumers feel they have made the ‘right’ purchase (Pantano et al., 2017). However, other consumers may be drawn to AR purely for hedonic purposes such as having fun rather than to support a purchase, which could mitigate AR’s value as a purchasing tool and reduce its impact on purchase intentions (de Bellis et al., 2020). Some consumers may also feel apprehension towards the technology for range of reasons, such as privacy, which could negatively impact both a consumer’s intention to use the technology, and how the technology impacts their customer experience (Inman & Nikolova, 2017). Hence, this is an important research gap as the potentially mixed impacts AR may have on decision-making outcomes can provide retailers an understanding of whether AR is a beneficial tool for shopping or not.

Lastly, little is currently known about consumers’ differing attitudes toward AR. Much research on customer-facing AR in the retail context has focused on consumers as a homogenous group, focusing on average attitudes (e.g. Kumar, 2021). Therefore, there is limited understanding as to which consumers may be more, or less, likely to use AR technology in the retail experience or the differing attitudes these consumer segments have. Yet research into other emerging technologies shows consumers often differ in their attitudes and behaviour regarding using the technology (Pallant et al., 2022). It is therefore key to
explore how consumers differ in terms of the value they receive from using AR, as well as the trade-offs they experience when using the technology for shopping. Retailers can benefit from the understanding of the heterogeneity of consumers as this could influence the way they target AR toward different consumers. This is an important research gap as different strategies may need to be implemented based on the differing attitudes and perceptions of AR technology among consumers. For example, some consumers may feel comfortable in using it without prompts based on experience or general technology aptitude, while others may need assistance. This would lead to different customers having a different interaction with the technology, resulting in different outcomes for brands who utilise it. Retailers may therefore be able to provide a more personalised experience through understanding how different customer segments experience AR, could ultimately lead to an improved customer experience (Cranmer et al., 2020).

In conclusion, multiple research gaps exist within the literature surrounding AR and its impact on customer experience. These include: 1) understand how AR enhances, or detracts, from the customer experience throughout each stage of the customer journey (pre, during, post), 2) understand the impact of AR on decision-making outcomes, such as consumer’s confidence in the purchase decision, and 3) to understand the heterogeneity among consumers in attitudes and perceptions toward AR. Further research is required to advance knowledge of the customer experience with the use of AR technology particularly due to the increasing interest toward AR, driven by the metaverse and COVID-19 pandemic. It is particularly critical to establish a consumer view of AR-enabled technology within service encounters in the retail industry as the implementation will have an impact on the end users, customers. This will encourage novel academic research on the topic, and also assist managers to adjust their focus when making strategic decisions about the development and deployment of AR systems. Hence, this thesis addresses important research gaps by
examining customer heterogeneity in attitudes and perceptions of AR as a shopping tool within retail service encounters.

1.5 Research problem

As previously noted, retailers are increasing implementing AR across physical retail settings, online and digital channels, and even the emerging metaverse. Substantial investment is being made in the industry; yet this technology is still not fully developed (Javornik, 2016). It is therefore important to gain a deeper understanding of the implications and applicability of AR as a shopping tool to maximise the potential return on investment. As with all emerging technologies, it is vital to understand the customers’ behaviour in relation to the new technology, in order to correctly identify the relevant opportunities and challenges (Pantano et al., 2017). Indeed, there have been multiple calls for research to better understand the impact of AR in online retailing based on the rapid growth of this technology (Bonetti et al., 2018; Kumar, 2021).

The application of technology in the retail setting is not novel, nonetheless, new technologies with unique characteristics are constantly being introduced (Grewal et al., 2017). When understanding the role of technology, from a consumer behaviour point of view, this can be considered a stimulus as it drives a behaviour (Whang et al., 2021). In fact, stimuli evoke a reaction that influences an outcome. Therefore, individuals might perceive a stimulus such as a technology differently, leading to diverse outcomes (Inman et al., 2009).

Existing academic research has examined the impact of technologies in the retail setting in different ways. A common approach has been to analyse the impact of a specific technology across the various stages of a ‘customer journey’: need recognition, information search, evaluation of alternatives, purchase, and post-purchase evaluation (Lemon & Verhoef, 2016). This approach is particularly useful as it considers the various ways technology may influence customers, and the multiple touchpoints that could be involved. Other research has
investigated emerging technologies through examining the customer needs that the technology could try to help them address (Piotrowicz & Cuthbertson, 2014). This can be related to hedonic (i.e. driven by the desire for fun, entertainment and satisfaction) and utilitarian (i.e. driven by functionality) needs (Puccinelli et al., 2009; Sarkar, 2011).

Compared to the customer journey, this needs-based approach allows for more generalisability as it views the experience in a holistic way. However, it is important to note that utilitarian and hedonic values are specific to each individual and each situation, as people might, in fact, interpret a certain technology differently (Puccinelli et al., 2009). For instance, at one point a consumer might find a situation more hedonic but less so at another time based on factors such as time pressure. Additionally, the same technology might be used to satisfy different needs either simultaneously or at different times (Jain & Bagdare, 2009). Hence, it is important to consider that consumers may find the benefits of same technology differently.

Against this backdrop, this thesis addresses the research problem of enhancing the knowledge around the application of AR in the retail setting, while accounting for the different approaches that have been taken in prior literature. More specifically, to deliver a comprehensive viewpoint, the combination of both the customer journey, and needs-based, approaches taken from the literature are followed. Specifically, in analysing the impact of AR on the retail customer experience, this thesis considers both the various values (hedonic and utilitarian) AR could provide consumers, but also considers them along the customer journey. In doing so, the thesis is able to provide a more holistic consideration of the impact of AR as a shopping tool within retail.

1.6 Research aims and objectives

As outlined earlier in the context of the research, digital technologies are increasingly disrupting the way businesses operate and the way consumers engage. AR is a technology that has been gaining increasing traction. By 2023, it is expected that 5G-technology will
underpin retailers’ ability to deploy immersive communication to connect consumers and
brands in new ways, as the conversation around the metaverse enhances (Wang, 2020). The
development of technologies in retail will, in some way, fundamentally alter the interaction
between consumers and companies (Larivière et al., 2017).

The previous sections have introduced the background to this thesis, including the
disruptive nature of technology and the importance of customer experience. Further, the
increasing focus and implementation of augmented reality (AR) was explored. Yet, multiple
research gaps were identified including the need for better understanding of the impact of AR
from a consumer perspective within retail, while accounting for customer heterogeneity, as
well as both a value-based and customer journey perspective. Against this backdrop, the
primary aim of this thesis is:

To explore the impact and value of AR as a shopping tool on the customer
experience in retail along the customer journey.

In order to achieve this aim, three research objectives are derived.
First, AR is an emerging and quickly evolving technology. Hence, in order to explore the
impact of AR as a shopping tool on the customer experience, it is important to start by
gathering firsthand insights from consumers about their perceptions and experiences of the
technology. These preliminary findings would then be able to inform subsequent themes to be
investigated in greater depth. The first research objective is therefore to:

(RO1) Investigate consumer perceptions of, and experiences with, AR as a shopping
tool

Next, there is a need to understand the interplay of attitudes toward AR and decision-
making outcomes. For instance, it is important to consider whether, and how, consumer
perceptions and experiences with AR might impact their attitude toward the technology,
willingness to purchase using AR, and their decision confidence. This leads to the second research objective:

**(RO2)** *Investigate the impact of customer experience with AR as a shopping tool on decision making outcomes.*

Lastly, consumer perceptions and attitudes toward technology differ across individuals. Prior research has shown the existence of differing consumer segments in relation to customer experiences as far as shopping intentions in multichannel settings (Sands et al., 2016), and item customisation (Pallant et al., 2022). Based on this, it is reasonable to expect some level of heterogeneity among consumers in attitudes toward AR as a shopping tool. Exploring this heterogeneity will be beneficial for practitioners in deciding how to tailor AR solutions to different consumers, and for theoretical understanding of how these different segments emerge. Therefore, the third research objective is to:

**(RO3)** *Identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool.*

These objectives are addressed in three sequential studies as described in Chapter 4: Exploratory perceptions of AR (Study 1), Chapter 5: The impact of AR on decision-making (Study 2), and Chapter 6: Segmenting consumer attitudes toward AR (Study 3). Each study further identifies and then addresses specific research questions which derive from these objectives.

### 1.7 Research contributions

This research has important contributions for practice and theoretical knowledge. From a practice point of view, recommendations are made to retailers around the application of AR technology. And from a knowledge point of view, the findings contribute to the academic conversation around theory and AR. Details are discussed below.
Contributions to knowledge

The literature review has identified several important research gaps, as well as multiple calls for further research examining technology in the retail environment (Adapa et al., 2020; Grewal et al., 2017). As previously outlined, a need for research focusing on the effect of AR as a shopping tool on the customer experience is critical. Specifically, this thesis extends existing knowledge by offering a more nuanced understanding of how consumers perceive, and want to interact with, AR in shopping contexts. This includes an identification of the customer heterogeneity that exists among consumer perceptions, and the factors which relate to these identified differences. These factors include the boundary conditions and moderating factors playing a role in the use of AR, including efficiency and playfulness. Lastly, this thesis links customer motivation theory to decision-making outcomes and highlights areas for further theoretical development. In order to add knowledge to the field, a range of theories and concepts have been drawn upon to explain how consumers respond to AR in retail. Theories such as affective cognitive theory, are viewed on a macro level, with the aim of underpinning the research. Whereas other theories, such as technology acceptance model, flow, and situated cognition theory, are applied on a micro level within the studies. The current thesis contributes to the application of these theories by showing how they can relate in the case of an emerging technology, and highlights how their application may not work as predicted.

Contributions to practice

From a managerial perspective, this research brings more clarity into how customers experience AR in retail. This is a crucial understanding given the substantial investments retailers have already made to utilise AR. This thesis provides retailers an ability to better understand the role of AR as a shopping tool on the customer experience. Information relating to the consumer behaviour with this technology, as well as the influence of hedonic
and utilitarian motivations and prior experience on different outcomes when using AR as a shopping tool helps retailers to better make decisions on the implementation of this technology.

Further, this thesis shows practitioners that consumers differ in their experiences of AR, highlighting ways that retailers could better tailor the experience they provide consumers through AR. Hence, this thesis provides practitioners valuable insights into how they should consider the impacts of AR, and practical tips regarding how they can maximise the impact it has on customer experience.

1.8 Outline of thesis

This thesis will enable a deeper understanding of AR in the retail context and how this impacts the customer experience along the customer journey. This thesis is structured based on three studies, of which two (Study 1 and Study 3) have already been accepted and published in A-ranked peer reviewed academic journals, while Study 2 has been submitted and is under review at the Journal of Retailing and Consumer Services. The outline of this thesis document is as follows:

**Chapter 1: Introduction** provides the overarching narrative on which the next chapters are built on. This chapter starts with the research background and context, outlining the scope of the research. Then, the research gaps are identified, and the research problem is defined. This is followed by the research aim and objectives. Lastly, the research contributions are defined.

**Chapter 2: Literature review** presents an examination of the general literature associated with the research topic, to provide the overarching background and theoretical backdrop to the three studies. This chapter begins with the role of customer experience in retail, and then delves deeper into the role of technology in creating experiences, more specifically focusing on AR as a stimulus. Theories relevant to the investigation of AR in retail are then analysed,
including the technology acceptance model and flow. This chapter also provides the theoretical framework guiding this thesis, which identifies the research variables and propositions derived from the literature review.

**Chapter 3: Research Design** outlines the methodology and overarching research design of the thesis. The philosophical approach is identified, and the overarching methodology defined. Next, the research context and unit of analysis are delineated. Lastly, the outline of the research is delineated based on a three-study approach with the aim of investigating each of the three ROs.

**Chapter 4: Exploratory perceptions of AR (Study 1)** addresses RO1. This first study is an exploratory study which explores customer attitudes and perceptions around AR along the customer journey. The literature focuses on the customer journey, and the influence that technology and AR have on the customer experience. A qualitative research method is applied, utilising in-depth semi-structured consumer interviews. Exploratory themes emerge from the data on AR’s role in the customer journey, as well as findings in which AR can help and hinder the customer experience along the customer journey.

**Chapter 5: The impact of AR on decision-making (Study 2)** addresses RO2. This second study aims to investigate the impact of customer experience with AR as a shopping tool on decision making outcomes. To achieve this, a conceptual model is formulated based on the literature and the results of Study 1, and a testable model is developed. Moderated mediation effects are hypothesised and tested on a sample of 503 consumers through data collected in an online survey. The findings indicate that hedonic and utilitarian motivations mediate consumer outcomes.

**Chapter 6: Segmenting consumer attitudes toward AR (Study 3)** addresses RO3. This third study aims to develop understanding of heterogeneity in terms of consumer attitudes
and behaviours toward AR as a shopping tool. To achieve this, consumers are segmented based on their perceptions of AR as a shopping tool. The method follows a quantitative online survey with a sample of 503 participants. The data is analysed with Latent-Class Cluster Analysis (LCA). First, consumer segments are established based on AR attitudes and behaviours in retail. Second, the antecedents of these consumer segments are identified. Finally, the change in attitude toward AR based on an educational stimulus is investigated. This research reveals that heterogeneity in attitudes toward AR exists.

**Chapter 7: General discussion** delivers a summary of the findings from the analysis of the three studies and provides a conclusion. The three-study research design allows a deep investigation around AR and the customer experience, more specifically, providing further understanding of AR technology and the interplay between consumer attitudes, perceptions, and decision-making. As a conceptual contribution this thesis explores how AR can help or hinder the customer experience, focusing on factors influencing it, such as affective, cognitive and outcome factors. From a practical point of view, this thesis provides retailers with knowledge around customers and their attitude and perceptions around this technology.

Then, a conclusion based on the research aim of this thesis is presented, and recommendations are made around caution to be exercised when implementing AR in retail, as outcomes are not always favourable for all customer segments. Lastly, limitations and future research directions are outlined including the opportunity to undertake a longitudinal study to investigate the change of behaviour, if any, over time, and to extend on real applications of behaviour of AR.

### 1.9 Chapter Summary

This chapter established the foundations for the thesis by introducing the research background and research aim. The background to this research is that significant investment is being made in the retail industry into consumer-facing technology with the aim of
improving the customer experience. One of the technologies which has been gaining particular traction is augmented reality (AR). As this is an emerging technology, there is a need for further research into the customer experience related to the use of AR as a tool for shopping. Three research gaps have been identified: 1. Understand how AR enhances, or detracts, from the customer experience throughout each stage of the customer journey (pre, during, post); 2. Understand the impact of AR on decision-making outcomes; 3. Understand the heterogeneity among consumers in attitudes and perceptions toward AR.

These gaps informed the aim of the thesis, being to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey.

Subsequently, three research objectives were derived - RO1: Investigate consumer perceptions of, and experiences with, AR as a shopping tool; RO2: Investigate the impact of customer experience with AR as a shopping tool on decision making outcomes; RO3: Identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool. Table 1.1 provides a summary of the research gaps, and the related research objectives that address the gap in the literature.
Table 1.1 Summary of research gaps and objectives

<table>
<thead>
<tr>
<th>Research gap</th>
<th>Research objective</th>
<th>Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand how AR enhances, or detracts, from the customer experience throughout each stage of the customer journey (pre, during, post)</td>
<td><strong>RO1</strong>: Investigate consumer perceptions of, and experiences with, AR as a shopping tool</td>
<td>Building on Baudrillard’s (1983) notion of hyperreality, AR plays a role in the integration of the real and the virtual. This research shows that this blending can both enhance and harm the customer experience.</td>
</tr>
<tr>
<td>Understand the impact of AR on decision-making outcomes</td>
<td><strong>RO2</strong>: Investigate the impact of customer experience with AR as a shopping tool on decision making outcomes.</td>
<td>Theory, such as the TAM suggests that when consumers are overloaded, retailers should make the task easier, more efficiency. However, the results from this study show that that may not be the case. When consumers are overloaded, the impact of efficiency lessens, whereas escapism increases.</td>
</tr>
<tr>
<td>Understand the heterogeneity among consumers in attitudes and perceptions toward AR</td>
<td><strong>RO3</strong>: Identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool</td>
<td>Heterogeneity in attitudes toward AR are associated with psychographic variables. Specifically, it was found that innovativeness, time pressure, and shopping enjoyment are strong predictors of segment membership.</td>
</tr>
</tbody>
</table>

Next, the research contributions were presented, where the importance of this thesis lays in the unique contributions it makes to knowledge around AR and customer experience in retail.

Finally, the structure of the remaining thesis chapters was presented. The next chapter (Chapter 2:) provides a review of relevant literature to build the theoretical background for this research.
Chapter 2: Literature review

2.1 Chapter introduction
The prior chapter presented an overview of the thesis, including the broad field of study on which the research is based, the background and context to the research, and the subsequent research aim and objectives. The primary aim of this thesis is to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. In this chapter, existing theories and literature are reviewed to frame the conceptual underpinning of the thesis. More specifically, Chapter 2 presents a critical review of existing literature in the fields of marketing, consumer psychology, and information systems, outlining the overarching concepts that characterise this research. More specific literature reviews are presented in Chapters 4, 5, and 6 in relation to the specific studies presented in those chapters. The review presented in this chapter is designed to provide the overarching framework within which those studies are conducted.

The review of literature presented in this chapter highlights three areas pertinent to guide the development and conceptualisation of this research. First is the broad literature pertaining to customer experience (CX). This stream of literature is important because it provides the overarching conceptual framework within which this thesis examines the role of AR. Second is literature relating to the role of technology in the retail setting. This stream of literature is important because while AR is an emerging technology, existing literature has examined the role and impact of other similar technologies. The concepts and theories applied in that literature are used to develop the propositions of this study regarding the specific impact of AR as a shopping technology. Finally, literature that describes the role of affective cognitive theory is reviewed. This stream of literature provides the theoretical framework of this thesis. Affective cognitive theory is relevant as it provides a theoretical understanding of behavioural elements that help explain consumer interactions with AR, and
therefore its impact as a shopping tool in retail. These three bodies of literature are drawn on to guide and develop the conceptual background and associated research propositions and research questions, presented at the conclusion of this chapter.

The remainder of this chapter continues as follows. The next section (Section 2.2) presents an introduction to the concept of customer experience and its importance in the retail setting is presented. Section 2.3 focuses on how customer experience can be enabled with technology. In Section 2.4 the theoretical background of the thesis is presented, and the role of affective cognitive theory is analysed. Section 2.5 draws the review together and outlines the theoretical framework along with research propositions. Section 2.6 concludes the chapter with a summary.

2.2 The role of customer experience in retail

Retail has evolved from being a buying ritual in the exchange process to delivering a joyful shopping experience (Jain & Bagdare, 2009). This shopping experience is shaped by multiple factors within the control of the retailer. In fact, every interaction a consumer has with a retailer plays an important role in forming the perceptions of the shopping experience (Pine & Gilmore, 1998). These perceptions are critical as they drive and influence decision-making in multiple ways including when evaluating alternatives with the final purchase intention (Kang et al., 2020). Recently, businesses and researchers alike have acknowledged the importance of understanding and carefully managing interactions between customers and retailers, under the umbrella term ‘customer experience’. Customer Experience (CX) in fact encompasses every aspect of a company’s offering – the quality of customer care, but also advertising, packaging, product and service features, ease of use, and reliability (Meyer & Schwager, 2007). Thus, customer experience reaches beyond the product offering itself and encompasses every channel, every touchpoint, and every aspect of a business’s interactions with its customers (Lemon & Verhoef, 2016).
CX is defined as “the internal and subjective response customers have to any direct and indirect contact with a business” (Meyer & Schwager, 2007, p. 2). According to this definition, direct interactions occur when consumers experience the brand firsthand. For instance, common direct interactions happen during purchasing, using, and receiving service for a product (Pine & Gilmore, 2011). These direct interactions are therefore usually initiated by the customer. In contrast, indirect interactions most often involve unplanned encounters with representations of a company’s products, services, or brands. This can take the form of word-of-mouth (WOM), advertising, and online reviews (Meyer & Schwager, 2007). Hence, it is important to follow a holistic approach when considering the customer experience, making sure that both the direct and indirect interactions are included.

CX has been identified as a crucial aspect for retailers’ success and has been extensively explored in existing literature (Pine & Gilmore, 2011; Puccinelli et al., 2009; Schmitt et al., 2015). CX goes past the view that the product or service is the only important factor to consider and is based on the Experience Economy proposed by Pine and Gilmore (1998) and later updated in 2011. According to this view, the main source of competitive value in global economies has progressed from extracting commodities, to making goods, delivering services, to now staging experiences (Pine & Gilmore, 1998). According to this view, earlier economies were driven by fungible commodities, where the competitive position was undifferentiated, and the pricing followed the market pricing. Economies then evolved to tangible goods, where the competitive position became slightly more differentiated and the price higher than market pricing. Next came intangible services, where the competitive position became differentiated and the pricing premium. Now, a retailer’s core advantage increasing comes from experiences. In the experience economy, retailers gain competitive advantage by staging experiences, by charging premium pricing, and providing very differentiated offers (Pine & Gilmore, 1998).
Through time, the concept of customer experience has evolved to incorporate concepts that the literature considered as standalone topics. For example, researchers initially focused on measuring customer satisfaction and service quality (Verhoef et al., 2009). Other literature on retail experience has typically focused on store atmospherics and the impact of scents and music on customer’s affective responses to a retailer (Garaus et al., 2015). And lastly, a significant body of research focused on hedonic and utilitarian motivations. With time, the relationships between these constructs have been clarified, and their significant role played in the CX. Nowadays, CX is a construct that is holistic, and it involves the customer’s cognitive, affective, emotional, social, and physical responses to the retailer (Roggeven et al., 2020), and is applicable to different experience partners, touchpoints, and journey stages (Gahler et al., 2022). In order to provide a premium experience, it is important to have a clear value proposition in all the interactions.

Customer experience during any interaction with a retailer also depends on the consumer’s motivations, which can be hedonic or utilitarian. Hedonic motivations relate to consumption driven by the fun a consumer has in using the product, and the criteria for “success” are essentially aesthetic in nature (Hirschman & Holbrook, 1982). These motivations relate to the multisensory, fantasy, and motive aspects of consumption (Arnold & Reynolds, 2003). Hedonic motivations therefore refer to enjoyment, and this happens where entertainment is valued (Jones et al., 2006). On the other hand, utilitarian motivations are characterized by being task-related and rational. These motivations relate closely to whether a product acquisition “mission” is accomplished (Arnold & Reynolds, 2003). This can in fact refer to functional purchases, such as everyday commodities (Babin et al., 1994). The concept of CX has therefore further evolved to incorporate these two motivations as there is an understanding that consumers are driven by different motivations, therefore, the experience sought differs (Sarkar, 2011).
The dimensions of customer experience

CX refers to the whole experience a customer has while interacting directly or indirectly with a retailer and incorporates both hedonic and utilitarian motivations. Hence, it has been considered a holistic and multidimensional concept. The dimensions of CX differ slightly across existing literature. For instance, some studies focus on the cognitive and affective components (Javornik, 2016), where cognitive refers to memories, knowledge structures, and thoughts (Lavidge & Steiner, 1961), while affective refers to the emotional responses that consumers have based on their knowledge and experiences (Hirschman & Holbrook, 1982). More recent studies have considered additional components including physical (Bustamante & Rubio, 2017), relational (Alhouti et al., 2015), sensorial (Bleier et al., 2019), and symbolic (Gahler et al., 2022). Hence, it is critical to take a holistic approach when considering CX and how it may be impacted by a technology like AR.

The concept of customer experience is further complicated as it does not occur all at one moment. In fact, CX is developed across stages of consumers interactions between consumers and retailers (Gahler et al., 2022). These stages are often referred to as the ‘customer journey’ (Lemon & Verhoef, 2016), and typically include need recognition, information search, evaluation of alternatives, purchase, post-purchase evaluation (Bettman, 1979; Kotler & Armstrong, 2010; Schiffmann & Wisenblit, 2018). Need recognition occurs when the consumer first acknowledges an unmet need that has to be fulfilled. For example, a consumer identifies a need for a new outfit for an event. Then, in the information search stage, the consumer searches for a product or service that can fulfil that need, such as going into different stores or browsing online for options. When enough information is collected, then the evaluation of alternatives happens, i.e. different items and options are considered. This will lead to a choice within the purchase stage, i.e. when the consumer actually buys the preferred item. Lastly, the consumer will evaluate the experience in the post-purchase
evaluation, i.e. decide whether that item of clothing was a good purchase or not. The length and involvement in these stages is not fixed, in fact it can depend on the involvement there is in the purchase. Most often, items that are considered expensive will involve a lengthier pre-purchase process (information search, and alternative evaluation) (Lemon & Verhoef, 2016). On the other hand, everyday goods may require a shorter process as consumers can skip these stages and purchase known or regularly purchased products (Voorhees et al., 2017). For this research, the CX journey stages are classified as pre-purchase (combining need recognition, information search, and alternative evaluation), purchase, and post-purchase, in line with relevant studies (e.g. Sands et al., 2016; Gahler et al., 2022). Doing so allows for a comprehensive understanding of the customer journey, while focusing on the key differences across stages.

Different factors play a role in the analysis of each stage. In the pre-purchase stage, consumers can be influenced by internal and external stimuli (Pine & Gilmore, 2011) when deciding whether to engage with physical or online stores (Garaus, 2018). Internal stimuli are individual difference factors, such as purchase frequency and involvement (Puccinelli et al., 2009), while external stimuli are the environmental factors which can include design elements and technology (Jain & Bagdare, 2009). At the purchase stage, the consumer makes a choice and decides to purchase (Inman et al., 2009). It is important to understand the concept of consumer choice because, when consumers are more certain about a product and its features, they feel empowered and their level of choice confidence increases (Garaus & Wagner, 2016). An increase in choice confidence can occur when a consumer takes part in the creation process (Pallant et al., 2020). In addition, general positivity increases consumer confidence (Vahdat et al., 2020). However, retail technology offers consumers a multitude of items from which to choose (Swait & Sweeney, 2000), which can increase choice complexity and reduce choice confidence (Garaus & Wagner, 2016). As a result, cognitive dissonance
can occur when, after a customer evaluates the purchase, they feel that it does not meet their expectations or that a competing choice may have been wiser (Sweeney & Swait, 2008). At the post-purchase stage, the customer might have to decide whether to complain (Ro, 2015), and this decision can also influence other behaviours such as product return or WOM intentions (Bolkan et al., 2012).

Along the customer journey, consumers are exposed to different touchpoints that determine the customer experience (Kietzmann et al., 2018; Martin et al., 2015). Touchpoints are the points of contact or interaction a consumer has with a brand, which could include WOM, a website, and an employee. These moments significantly influence customer experience as well as brand perception. It is therefore important for businesses to identify the touchpoints in order to modify the experience accordingly. Importantly, some touchpoints may be ‘owned’ by the brand (such as a brand’s website) while others may be facilitated by others (such as a brand’s product listing on a marketplace like Amazon or eBay) (Roggeveen et al., 2020). Both types of touchpoints can influence CX and therefore it is important to provide a holistic experience across the whole journey.

In conclusion, the concept of customer experience has gained prominence in industry and academia over recent years in line with the rise of the Experience Economy. CX encompasses every aspect of a company’s offering, from the product/service itself, to also the quality of customer care. The experience can be classified according to the customer journey, looking at pre-purchase, purchase, and post-purchase stages. However, it is important to consider that the experience is holistic. In fact, every touchpoint and element of the brand can enhance or detract the overall experience. Therefore, to gather a comprehensive understanding of the customer experience, it is important to consider the different touchpoints between the brand and the consumer, which may provide a stimulus to consumers.
The impact of technology on customer experience

Technology has been identified as a critical component of customer experience delivery for current retailers (Grewal et al., 2017). The subject of technology in retail is in constant evolution and is of interest to researchers. Prior research has examined the impact and value of a range of specific technologies, such as self-service technologies, mobile payments, digital displays, among others (Inman & Nikolova, 2017; Pantano & Timmermans, 2014; Reinders et al. 2008; Robertson et al. 2016; Verhoef et al., 2007). Across these studies, a key finding is that the value of technology for retailers relies not only on what the technology can do, but also how consumers respond to it (Inman & Nikolova, 2017).

Technology is a tool that can help to deliver hedonic and functional experiences for consumers (Sarkar, 2011). Hedonic in a way to provide entertainment to the customer, and functional to facilitate the resolution of a task. The literature has addressed this combination by identifying mixed benefits (Martos-Partal & González-Benito, 2013), which refer to the search for utilitarian benefits, such as quality associations (Yoo et al., 2000) as well as a search for hedonic benefits related to the use (Fischer et al., 2010).

Consumer facing technologies have emerged with the aim of balancing online and offline consumption and delivering a holistic customer experience. Common issues that have arisen with the use of technology in retail are based on the balance of online and offline purchasing behaviour and channel switching (Willems et al., 2017). It has become more challenging for businesses to get customers to complete a transaction, and not switch to competitors. In fact, the online environment has enabled a broader selection of alternatives for customers, which means higher competition for retailers, where satisfaction, trust, and brand loyalty are more volatile (Verhoef et al., 2015). This is also where the phenomena of research shopping and showrooming have developed (Gensler et al., 2017). Research shopping refers to customers that search for an item online and then purchase it on another
channel (Verhoef et al., 2007). This is particularly prominent for the consumer electronics category, where the search occurs online, but the purchase in a physical store (Sands et al., 2016). On the other hand, showrooming occurs when the customers search in store and then purchase online (Zimmerman, 2012). This happens when the item is viewed physically, but then the prices are compared online, and in the end, the most convenient avenue is chosen (Gao et al., 2019). This behaviour is particularly common for items of clothing, or makeup, where the actual fit wants to be seen before purchasing it for a lower price. Research has found that customers are more likely to complete a transaction if the path to purchase is direct (Willems et al., 2017). New technologies, such as augmented reality (AR) have the potential to help to overcome these multi-channel issues by allowing the customers to try on items online and purchasing them on the same channel (Yim et al., 2017).

The value of technology to retailers depends not only on what the technology can do, but also how consumers respond to it (Inman & Nikolova, 2017). Consumers can, simultaneously, have both favourable and unfavourable attitudes toward a technology, and it is the balance of the two that determines whether they accept or reject the technology (Roy et al., 2018). To understand consumer perceptions, prior research has utilised concepts such as the Technology Acceptance Model (Davis et al., 1989), S-O-R framework (Mehrabian & Russell, 1974) and the Technology Readiness Index (Parasuraman, 2000). These theories will be explored in subsequent sections by applying them to the context of this research.

2.3 How augmented reality impacts customer experience

One emerging technology that retailers are increasingly utilising to improve the customer experience is augmented reality. AR is an interactive technology that enables brands to digitally enhance vision (van Esch et al., 2019). In other words, AR makes it possible for consumers to inspect the environment from a variety of perspectives that combine to make the most of their experience with a product and/or brand (van Esch et al., 2019). For example,
Swedish retailer IKEA developed an AR mobile application that allows consumers to virtually place furniture (true-to-scale 3D models) in their own space. Other retailers have introduced AR apps in a range of retail sectors, including fashion, automotive, and furniture among others (Chen et al., 2021). In fashion retail, AR technology can offer a virtual try-on that, by means of a digital projection, enables consumers to visualise how an item of clothing, or even a style of make-up, might look on them. These AR virtual try-ons can be applied in both physical and online stores. In physical stores, virtual fitting rooms with smart mirrors are the most common technology types, where consumers can visualise items projected onto themselves, without needing to try it on (Beck & Crié, 2018). In digital settings, a website or smartphone application can allow the consumer to virtually try items by using the phone’s camera or uploading a picture (Kim & Forsythe, 2008; Pantano & Gandini, 2017).

**Theories in AR shopping research**

Researchers have drawn on a range of theories to explain consumer responses to technology, and AR in particular. These include the Technology Acceptance Model (Huang & Liao, 2014; Spreer & Kallweit, 2014; Pantano et al., 2017), situated cognition theory (Chylinski et al., 2020; Hilken et al., 2017), and diffusion of innovation theory (Rogers, 2010). These theories are reviewed and applied throughout this chapter and thesis.

The technology acceptance model (TAM) is a very popular theory utilised in the academic literature to explain technology adoptions among potential users. Based on the Theory of Reasoned Action (Ajzen, 1985), the TAM was developed by Davis et al. (1989), who predicted that technology adoption is modelled by the perceived usefulness, perceived ease of use, and attitude towards a given technology. The theory has evolved over time and according to new contexts, such as via the development of e-TAM (Kim et al., 2017; Kim & Forsythe, 2008; Taylor, 2016) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). The TAM, and its extensions, has been applied to explore...
consumer reactions to technologies including smart in-store technology (Kim et al., 2017), and mobile app technology (Vahdat et al., 2020). Hence, it provides a potentially valuable framework for this study of AR in retail.

Situated cognition theory suggests that cognition is inseparable from the context in which it occurs (Wilson, 2002). In particular, knowledge and learning are revealed in terms of increased performance across situations, rather than in terms of information. More specifically, situated cognition enables customers to learn more about the value of an offering when the associated service experience enables them to link abstract facts with a real-time context and physical interaction (Hilken et al., 2017). Situated cognition theory has been applied to explore how consumers experience technologies such as retail mobile apps (Carrozzi et al., 2019). Given that AR is designed to help situate consumers within a virtual environment, situated cognition theory may provide value concepts to the study of AR and retail customer experience.

The technology acceptance model (Davis et al., 1989) and situated cognition theory (Robbins & Aydede, 2009), both imply that AR can have both positive and negative impacts on the overall consumer experience. Specifically, the technology acceptance model proposes that technology acceptance varies based on consumer perceptions of ease of use, usefulness, and general attitude toward the use of the technology. Together, these elements can drive positive and negative outcomes. For instance, if the AR technology is not easy to use, this might detract from the final decision leading to a purchase. Further, situated cognition suggests consumers learn about products by linking abstract facts in real time. Hilken et al. (2017) suggests AR can embed products in personally relevant contexts and allows the simulation of physical control over a product (i.e., being able to adjust sunglasses). Such features enhance customer engagement and enjoyment in shopping contexts. Yet, findings
from the situated cognition perspective that explores the impact of AR adoption on consumers' value perception and decision confidence remain mixed (Fan et al., 2019).

In addition to the perceived ease of use and usefulness of technology, individual characteristics affect the way different consumers perceive and react to technologies. The diffusion of innovation theory divides consumers into categories including innovators, early adopters, early majority, late majority, and laggards based on how quickly they adopt new technologies (Rogers & Shoemaker, 1971). This concept has been applied in studies in a variety of contexts including mobile payment technology (Al-Jabri & Sohail, 2012) and self-service technologies (Lee et al., 2010). Hence, it is important to consider how different individuals may experience AR based on their personal characteristics. This concept has also been paired to other concepts, such as technology readiness (Chiu et al., 2010; Liljander et al., 2006).

Technology readiness refers to people's propensity to embrace and use new technologies for accomplishing goals. A popular measure is the Technology Readiness Index (TRI), which includes drivers such as optimism and innovativeness; and inhibitors such as discomfort and insecurity (Parasuraman, 2000). These drivers can be derived from the concept of self-efficacy, which refers to the belief individuals have as to how well they can perform a task (Ozturk et al., 2016). Self-efficacy is defined as “the generative capability in which cognitive, social and behavioural sub-skills must be organized into integrated courses of action to serve innumerable purpose” (Bandura, 1982, p. 122). Self-efficacy can be enhanced by having prior experience. In fact, having completed a similar task in the past, can increase self-efficacy, as people can feel more confident in their abilities (Ozturk et al., 2016).
While the theories previously covered are considered the fundamental ones in understanding customer experience with AR, Table 2.1 provides a summary of various theories used in the literature in the context of AR’s use in retail.

Table 2.1 Summary of theories

<table>
<thead>
<tr>
<th>Theory</th>
<th>Explanation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective appraisal theory</td>
<td>An environment (AR for shopping) produces an emotional state that can be defined as pleasure, arousal, and dominance.</td>
<td>Zhao et al. (2018)</td>
</tr>
<tr>
<td>Affective-cognitive theory</td>
<td>Affective responses affect cognition.</td>
<td>Kang et al (2020);</td>
</tr>
<tr>
<td>Flow theory</td>
<td>Flow refers to the optimal state of experience when the consumer is fully immersed in the activity.</td>
<td>Huang et al. (2017)</td>
</tr>
<tr>
<td>Hedonic and utilitarian value</td>
<td>Utilitarian and hedonic values play an important role in the formation of consumers’ attitudes and behavioural intentions.</td>
<td>Sarkar (2011)</td>
</tr>
<tr>
<td>Stimulus organism response model (SOR)</td>
<td>The stimuli from using AR evoke consumers’ cognitive and affective states, which in turn leads to behavioural changes.</td>
<td>Van Kerrebroeck et al. (2017)</td>
</tr>
<tr>
<td>Technology acceptance model (TAM)</td>
<td>Technology adoption is modelled by the perceived usefulness, perceived ease of use, and attitude towards a given technology.</td>
<td>Kim et al., 2016; McLean &amp; Wilson (2019); Rese et al. (2017)</td>
</tr>
<tr>
<td>Theory of reasoned action (TRA)</td>
<td>This theory helps explain the effect of attitude on behavioural intention and actual behaviour.</td>
<td>Lombart et al. (2020)</td>
</tr>
<tr>
<td>Uses and gratification theory (U&amp;G)</td>
<td>U&amp;G theory demonstrates that entertainment is a crucial psychological factor for users, and AR can enhance that feeling.</td>
<td>Hsu et al. (2020)</td>
</tr>
</tbody>
</table>

In addition to these specific theories, researchers have further applied consumer behavioural concepts such as motivations to studies of AR and technology generally. As highlighted earlier, technology can enhance consumers’ purchase experiences through both utilitarian and hedonic value (Sarkar, 2011). Utilitarian value is derived when consumers achieve a specific goal (Sarkar, 2011), whereas hedonic value consists of purely entertainment-based outcomes (Bonetti et al., 2018). Technologies such as AR can integrate both utilitarian and hedonic benefits by providing an enjoyable and playful experience while also delivering utilitarian
outcomes by, for example, reducing effort by making evaluation easier (Piotrowicz & Cuthbertson, 2014).

**Characteristics of retail stimuli**

The customer experience is influenced by a combination of internal and external stimuli (Pine & Gilmore, 2011). A stimulus is something that provokes or causes an action or response (Pantano et al., 2017). Within a retail setting, internal stimuli refer to factors such as a consumer’s past purchase frequency and involvement in the purchase or product category (Puccinelli et al., 2009), whereas external stimuli include store design and a retailer’s use of technology (Jain & Bagdare, 2009).

Internal and external stimuli are relevant to both physical and online retail stores (Chang et al., 2011; Garaus, 2018). In physical stores, the physical environment is critical to customer experience, and this includes factors such as the ambience, lighting, scent and product placement (Pantano & Servidio, 2012). In contrast, online stores focus more on user experience, which is influenced by colours, font, and functionality (Verhoef et al., 2009). The use of technology in both settings has been found to be an important influencing factor of customer experience (Gentile et al., 2007; Roggeveen et al., 2016).

Technology has been shown to have dual effects, acting as both a positive and negative stimulus for consumers (Roggeven et al., 2020). The positive effects tend to encompass a technology’s ability to enable convenience and accessibility (Priporas et al., 2017). This leads to consumers having more flexibility in shopping modes and feeling more at ease with the experience, particularly through online or digital channels, as they can shop at their convenience (Garaus & Wagner, 2016). Furthermore, thanks to technology, consumers are exposed to more personalised experiences, which helps increase their engagement (Pallant et al., 2020). Retailers are leveraging this to provide personalised
experiences such as having the opportunity to customize products such as Nike ID shoes (Pallant et al., 2020).

Technology can also help consumers in their decision making. Technology can enhance the information provided to consumers about the product, which may help reassure consumers of their choice (Kang et al., 2020). This will in turn benefit them with their decision making when evaluating alternatives (Adapa et al., 2020). In fact, with the use of technology, the evaluation of alternatives can become more seamless and enable consumers to make a more informed decision by comparing prices and characteristics. For example, comparing products online can be easier than going to multiple bricks and mortar stores. However, this could also bring downsides. For example, when looking at many different products, consumers may find evaluating choices to be complex, leading to the phenomenon of choice complexity (Andrews, 2016). Hence, the level of stimulation brought by technology is not always positive as it can bring negative repercussions on the customer experience should the level of stimulus not be optimal (Roggeveen et al., 2020). Hence, there is a trade-off value with technology in retail, whereby it can result in positive and negative implications.

It is therefore key to understand the principles of consumer stimulus as it applies to technology to explore how it may relate to the impact of AR on customer experience. Stimulus load theory provides a valuable explanation for the impact stimulus can have on customer outcomes. Stimulus load theory encompasses affective, behavioural, and cognitive components and can be applied to positive (enhancing) as well as negative (irritant) environmental stimuli (Haugtvedt et al., 2018). Consumers can be exposed to the risk of over- (too much) or under- (too little) stimulation, with both having the potential to lead to environmental stress (Berlyne, 1960). For instance, as a result of over-stimulation, consumers can resort to certain strategies such as withdrawing or limiting attention. Whereas, when
under-stimulated, consumers may seek additional opportunities for interaction and information acquisition (Altman, 1975). However, the perception and interpretation of environmental stimuli differ among individuals, as do their responses to them (Orth, 2005).

Past research has shown that there is a limit to the number of stimuli that a consumer can process (Ketron et al., 2016). In fact, consumers can experience information overload if they receive too much information at once (Xu et al., 2014). Therefore, the use of technology, such as AR may act as a distractor for some consumers in completing a given shopping task if it leads to excess stimulus or information overload. Should the consumers be exposed to more information than can be processed in short-term or working memory, this would lead to information overload (Jacoby et al., 1974). Information overload can be both actual and perceived and is relative to the consumer’s mind (Ketron et al., 2016). That is, the level of information that leads to overload for one consumer may be more manageable for others. Consumers respond to information overload by becoming more aroused and by narrowing attention to a limited aspect of incoming information (Kahneman, 1973). As a result, the cognitive load derived from a stimulus like interacting with AR technology can influence consumers in multiple ways, with both positive and negative potential outcomes.

The perception and interpretation of stimuli is not always the same, in fact it can be influenced by situation factors, which can contribute to the relative stimulus overload (Arnold & Reynolds, 2003). Examples of situation factors are benefit sought and involvement. In fact, the motivations, values and involvement consumers have in a given situation might enable them to perceive technology in a different way. Hence, if the consumer is seeking for a solely hedonic experience, their perception of the technology might differ from a utilitarian experience (Jones et al., 2006). Furthermore, consumers that have strong motivators and involvement might have a different experience compared to a non-motivated individual (Puccinelli et al., 2009). Consequently, the interpretation of stimuli can change.
Individuals perceive stimuli differently, based on a range of individual characteristics such as attitude toward the stimulus (Orth, 2005). Perceptions are also influenced by previous experience with the brand and the technology (Pantano & Servidio, 2012). In fact, individuals who have previous experience with a certain technology, are more likely to have a lower perception of effort, and will probably experience less dissonance (Andriulo et al., 2014). In the case of mobile payment, it has been found that people with a higher technology readiness index were more likely to perceive it as a low effort task (Parasuraman, 2000). This is the reason it is expected that individual characteristics may influence the perception of AR across the customer journey.

The review of this section has broadly introduced the concept that technologies can have both positive and negative impacts on consumers. Relative factors include convenience, personalisation, choice complexity, stimulus load, and personal and situational characteristics. Hence, the impact that AR can have on customer experience is multi-faceted and explored in more detail in the following sections.

*How AR can enhance the customer experience*

As a retail technology, AR has been gaining popularity due to its ability to supplement online and offline shopping (Javornik, 2016). AR offers a range of potential benefits to the consumer and retailer. For consumers, it can provide greater convenience, accessibility, and increased ability to interact with products (Caboni & Hagberg, 2019). Moreover, it can help to overcome the uncertainty that often accompanies a decision to make a purchase online (Kang et al., 2020). This can benefit retailers by reducing the number of items that consumers return. This is important, given that roughly 10% of purchased items are returned (Robertson et al., 2020). Beyond the monetary cost, returns also have detrimental effects on the environment and increase sustainability costs (Robertson et al., 2020).
Regarding offline shopping, a major concern relates to effort and the fact that having to physically try on products (e.g., clothes) is not always a pleasurable experience for consumers (Barnes et al., 2016). As such, online shopping is often preferred to overcome this issue (Hao Suan et al., 2015). AR is expected to alleviate these issues and provide a better experience by delivering a playful experience, and reducing the effort to physically try on products. Perceived playfulness refers to the recreational element of the shopping experience (Kang et al., 2020). AR can enhance playfulness through a gamified experience. Pragmatically, AR is also designed to allow consumers to virtually try on products (e.g., clothing, accessories), potentially reducing the physical effort of doing so.

AR also aligns with the growing consumer demand for personalisation (Pallant et al., 2020), with an increasing number of brands offering consumers the ability to choose different features for their own product design (i.e., Nike ID shoes). AR provides an ability for consumers to personalise by allowing customers to view different options to build the final product. However, as previously noted, the consumer’s ability to visualise the final product during the design process varies and may deter consumers from engaging in the customisation of products (Kim & Lee, 2020; Pallant et al., 2020). Despite this, AR could enable consumers to be more confident with their decision making when customising products, which is especially important in online customisation, by allowing consumers to see customised products in more detail. This could provide a critical benefit to retailers as it may be difficult to re-sell returned customised items if they do not meet consumer expectations. In the case of online products, psychological ownership also increases when products are customised (Jussila et al., 2015). AR may be one way to enhance co-creation and personalisation value (Varadarajan et al., 2010), thereby increasing consumers’ feelings of psychological ownership (Jussila et al., 2015; Pantano & Servidio, 2012).
AR may also enhance consumers’ perceived psychological ownership prior to making a purchase (Pierce et al., 2003). Research has shown that consumers who touch products can increase perceived psychological ownership because of the endowment effect (Brasel & Gips, 2014). Many consumers find it important to touch an item prior to purchasing it (Liu et al., 2017). With the prominence of online shopping, many consumers engage in research shopping – searching for items on one channel and then purchasing them on another (Verhoef et al., 2007). A shopper might search online and then go to a physical store to see how the item actually looks. Consumers may find it difficult to visualise an item online and want to see it in person, demonstrating a strong need for touch. AR could diminish consumers’ need for touch, thereby reducing the amount of research shopping and channel switching. Research has shown that the more direct the path to purchase, the more likely it is that a consumer will complete a transaction (Willems et al., 2017).

Linked to the concept of touch, when making a purchase decision it is key for consumers to be able to imagine and to generate mental images that reflect products and experiences (Pearson et al., 2015). The generation of mental images can be derived from a range of auditory, verbatim or haptic stimuli (Heller et al., 2019). Imagery, evoked by object interactivity, such as AR could be influenced by the flow state of the consumer. In marketing, evoking the imagination can be used as a strategy of influence. Imagery in fact, was found influencing the consumers’ behaviour and judgements (Petrova & Cialdini, 2018). Mental imagery helps explain functional as well as hedonic consumption experiences (Rodríguez-Ardura & Martínez-López, 2014). Customers often use mental imagery to fill in missing information about products (Schwartz & Black, 1999).

As mentioned above, AR may help enhance playfulness through the interactive use of AR technologies. Playfulness is based on Mathwick and Rigdon (2004) ‘perceived play’ as a concept that reflects intrinsic enjoyment and escapism (Kang et al., 2020). Playfulness differs
from the term *enjoyment*, which connotes an individual’s emotional state, rather than the mere outcome derived from the use of the technology (Goetz et al., 2006). It has been shown that AR is able to deliver this playful element (Kang et al., 2020). Consequently, AR as a tool for virtual try-on in retail would offer features such as informativeness and playfulness, that could improve the customer experience (Kang et al., 2020).

Escapism and playfulness link to flow theory, which argues that individuals can enter a state of flow where they are immersed in the activity (Csikszentmihalyi, 1990). Once individuals are experiencing a state of flow, they often find themselves in a situation where they are disconnected from the real world and become so immersed in an activity that they feel that undergoing a natural and enjoyable experience, out of the physical experience (Barhorst et al., 2021). Flow theory is a framework which is used to investigate consumer behaviour and the use of technology (Arghashi & Yuksel, 2022). In fact, AR can simulate an experience (Baudrillard, 1994) by blending the real and virtual worlds. In this way, AR enables consumers to view products in a simulated scenario (Baudrillard, 1983) and offers retailers the opportunity to strategically achieve differentiation and develop competitive advantage (van Esch et al., 2019).

Hence, there are many potential ways that AR could enhance customer experience including both utilitarian (e.g. convenience, personalisation, psychological ownership) and hedonic (e.g. playfulness, escapism, flow) benefits. However, AR may also detract from customer experience, as explored in the following section.

*How AR can detract from the customer experience*

One reason that consumers shop online is the lower perceived effort as browsing and purchasing can be undertaken easily while multitasking and require little effort and attention (Duarte et al., 2018). Based on the TAM; some consumers do not feel ready to adopt a technology, therefore being asked to interact with an AR tool may be significant detractor
should they not be ready to do so. Furthermore, for others, the use of AR as a virtual try-on tool would add an extra step to a consumer’s online shopping experience. For instance, shoppers may need to interact with an additional component of a website, or even download a separate mobile app. Some shoppers might consider this additional step as requiring too much effort. The concept of effort is comprised of four components: cognitive, emotional, time and physical effort (Dixon et al., 2010). It has been found that AR is able to save consumers’ time and effort, and improve their decision-making ability (Hilken et al., 2017). Yet, as noted above, the act of using the technology itself may require additional effort from the consumer, making consumer effort an important component to consider.

As AR is still a relatively new technology, with relatively few brands deploying it, it can be seen as highly novel (Javornik 2016). While consumers might want to try AR for its novelty, it is not known whether perceived usefulness or the novelty factor alone drives trial and usage, at least in the short term. Accordingly, there might be an initially large positive increase in willingness to use AR as a virtual try-on tool; however, the magnitude of change in usage resulting from novelty might reduce to baseline levels relatively quickly after an initial roll-out (Ferraro et al., 2017). Should this be the case, when the novelty factor diminishes, the use of the technology may decrease. In the future, this may act as a detractor from the experience.

Aligned to novelty, playfulness is another important factor to consider. AR has a component of playfulness (Kang et al., 2020), which might lead consumers to interact for fun, but not convert to purchase. In fact, it could be seen as a game or something to share via social networks, but not as a purchasing tool. Should the aim of the technology be to ease the purchase process, the playfulness factor may go against it. In sum, while AR is an emerging and exciting technology, there are gaps in our knowledge regarding the positive or negative effects of AR on the customer experience.
In conclusion, despite the potential benefits, there are also potential disadvantages of AR. For consumers, viewing products virtually may not satisfy their need for touch, which plays a role in their decision-making (Gatter et al., 2022). Moreover, some consumers may be apprehensive about using technology for a range of reasons (Inman and Nikolova, 2017). For retailers, the value of AR as a shopping tool could be decreased as some consumers may be drawn to AR purely for hedonic purposes (Kumar, 2021). Hence, as with all technologies, retailers should carefully consider both the potential positive and negative impacts that AR may have on the experience of different consumers.

2.4 Affective cognitive theory: An application to shopping in augmented reality

In the previous sections, general theories related to technology and customer experience were reviewed. In this section, the main theoretical framework that guides this thesis is reviewed in detail and applied to the research context, leading to a theoretical framework and research propositions introduced in the next section.

The affective cognitive theory has been identified as being the macro-theoretical foundation of this thesis. This theory is the fundamental underlying structure of other theories, such as the Theory of Reasoned Action and Technology Acceptance Model (Lee & Chow, 2020). The affective cognitive theory suggests that consumers respond to stimuli in three ways: affectively, cognitively, and behaviourally (Javronik 2016). This theory provides a multi-layer perspective for understanding the mechanisms responsible for translating a customer’s experience through affect into action (Qin et al., 2021). The theoretical background of this research lies in the affective cognitive theory as it provides a theoretical foundation to integrate technology characteristics and value creation in the context of AR; hence it provides a means to examine the effects of technologies in a consumer decision-making process.
Affective factors relate to the emotional responses that consumers have to the technology based on their knowledge and experiences with AR (Qin et al., 2021). Previous studies have considered enjoyment and immersion (Yim et al., 2017), and playfulness (Huang & Liao, 2017) in the context of creating e-shopping multisensory flow experience interactive technologies. Enjoyment happens where entertainment is valued (Arnold & Reynolds, 2003; Hirschman & Holbrook, 1982; Jones et al., 2006). Perceived playfulness refers to the recreational element of the shopping experience (Kang et al., 2020). This differs from the term enjoyment, which connotes an individual’s emotional state, rather than the mere outcome derived from the use of the technology (Goetz et al., 2006). It has been shown that AR is able to deliver this playful element (Kang et al., 2020). In these instances, escapism can also occur. This refers to a state of psychological immersion that allows shoppers to temporarily ‘get away from it all’ (Lombard & Ditton, 1997). Consequently, AR as a tool for virtual try-on in retail would offer features such as enjoyment, escapism and playfulness, that could improve the customer experience (Kang et al., 2020).

Cognitive factors are determined by memories, knowledge structures, and thoughts (Lavidge & Steiner, 1961). Previous studies around the enhancement of online services experiences have focused on cognitive aspects such as efficiency (Hilken et al., 2017), information overload (Xu et al., 2014), and prior experience (Rese et al., 2014). Efficiency refers to the ability of a technology, such as AR to provide the service consumers want. Theories, such as the TAM, suggests that efficiency is important for consumers to adopt and use a technology (Rese et al., 2014). Information overload measures whether the amount of information received exceeds consumers’ information processing capabilities, leading to information overload (Li, 2017). Consumers can face it when they receive what they perceive as, too much information at once (Xu et al., 2014). Rich information can therefore lead to a perception of high information overload, which could lead consumers to a worse subject state
towards decision. Novice consumers may face a more serious information overload problem (Chen, 2009). In fact, prior experience refers to the past learned behaviour, which can have an influence on future behaviour (Adapa, 2020). It has been found that prior experience influences current satisfaction, which in turn influences future usage (Bolton & Lemon, 1999; Lemon & Verhoef, 2016). Prior experience allows the customers to feel more confident with their choice (Flavián et al., 2016). Furthermore, individuals who have previous experience with a certain technology, are more likely to have a lower perception of effort, and will probably experience less dissonance (Andriulo et al., 2014).

The final component of affective cognitive theory is conation. Conation refers to the outcome, intended or actual behaviour of consumers (Garaus & Wagner, 2016). Consumer behaviour can be driven by the desire for experiences and draws attention to the mental events associated with the act of consumption (Hirschman & Holbrook, 1982). Therefore, conation is the consequence of the consumer decision-making process (Qin et al., 2021). Previous studies around emerging technologies have focused on different types of behavioural intentions, such as: attitudes toward the technology; decision confidence (Pantano et al., 2017; Qin et al., 2021) and the intention of purchasing a product (Park & Yoo, 2020; Kowalczuk et al., 2021). Attitudes toward technology can influence the behaviour, in fact, if they are negative this may result in resistance toward the use (Kim et al., 2017). On the other hand, if the attitude is positive, consumers would be willing to use the technology. In the decision-making process, decision confidence refers to the state whereby consumers are certain about their decision (Andrews, 2016). One outcome may be the intention of purchasing a product, which in this thesis is defined as ‘willingness to purchase using AR’, whereby a purchase decision has been made from the use of the technology (Park & Yoo, 2020). In the case of stimuli, such as AR, this technology can help with the decision-making, allowing the consumer to be sure about their purchase.
Hence, affective cognitive theory provides a valuable theory that underpins the overarching theoretical framework of this thesis, as detailed in the next section.

2.5 Theoretical framework and research propositions

Building on the literature reviewed in the previous sections and resulting theoretical background, Figure 2.1 presents the proposed theoretical framework for this research. This framework sets out an interpretation of the considered literature and presents the overarching theoretical framework guiding this thesis and the specific studies. The theoretical framework is explained below through the development of specific research propositions.

![Theoretical framework diagram]

Figure 2.1 Theoretical framework

Based on affective cognitive theory (see Section 2.4) consumers respond to stimuli, such as technology, through a combination of cognitive and affectual responses, culminating in various behavioural outcomes. While CX is a holistic measure of the customer retail journey, within the context of AR cognitive affective theory is useful to highlight the relevant aspects of CX that may affect behaviour in response to exposure to AR. This leads to the first
proposition, that AR experiences comprise Cognitive Aspects of AR CX and Affectual Aspects of AR CX which combine to influence relevant Outcomes (P1).

Based on the detailed literature review above, the theoretical framework further details specific responses within the broad categories of affective, cognitive, and outcome. For affective, the thesis focuses on enjoyment, playfulness, and escapism. Based on prior literature enjoyment is defined as the state or process of taking pleasure in an activity (Kim & Forsythe, 2008), in this thesis it is expected that utilising AR will generate enjoyment to the consumer. Playfulness is defined as the state of being full of high-spirited fun (Kang et al., 2020), which can be obtained from the use of gamified technologies. Lastly, escapism is defined as the mental diversion from aspects of daily life, typically through activities involving imagination or entertainment (Mathwick & Rigdon, 2004), and is expected to be a result of the use of immersive technologies such as AR. Therefore, this research suggests that the experiential factors of enjoyment, playfulness and escapism are the focal affective responses to AR. Next, the cognitive reactions this thesis considers are efficiency, information overload and prior experience. Efficiency refers to the ability of a technology, such as AR to provide the service consumers want (Xu et al., 2014). Information overload measures whether the amount of information received exceeds consumers’ information processing capabilities, AR could have an impact in how the consumers react to the information provided (Li, 2017). Prior experience refers to the past learned behaviour, which can have an influence on future behaviour (Adapa et al., 2020). Therefore, this research suggests that efficiency, information overload, and prior experience are the focal cognitive responses to AR. Finally, outcome responses are attitude toward AR, decision confidence and willingness to purchase using AR. Attitude toward AR refers to the consumer’s mindset and outlook toward the technology (Kim et al., 2017). Decision confidence refers to the intention of purchasing a product, which can be influenced by the use of AR (Andrews, 2016).
Willingness to purchase using AR refers to the choice of purchasing a product derived from the use of AR (Park & Yoo, 2020).

In conclusion, affective cognitive theory states that consumer decision-making is based on the interplay of cognitive and affective elements (Javronik, 2016). That is, conative responses (behavioural outcomes) are based on the combination of cognitive and affective factors. This leads to the second proposition, that the interplay of affective and cognitive aspects influences outcome response (P2). That is, it is expected that consumer attitudes towards AR (an outcome response) will depend on a combination of efficiency, information overload, and prior experience (affective responses) and the interplay between these factors and the affective components of enjoyment, escapism, and playfulness.

Finally, it is important to consider that consumer responses to stimulus are not homogeneous. As noted previously, consumers differ in terms of technology readiness (Parasuraman, 2000), learning (Hilken et al., 2017), and experience sought (Jones et al., 2006). Therefore, it is proposed that consumers will differ in their responses towards AR in retail. This leads to the third proposition, that heterogeneity exists in terms of consumer attitudes and behaviours towards AR as a shopping tool (P3).

The three respective propositions developed based on this theoretical framework are addressed in three studies throughout this thesis. Study 1 addresses P1: AR experiences comprise cognitive aspects of AR CX and affectual aspects of AR CX which combine to influence relevant outcomes. Study 2 addresses P2: The interplay of affective and cognitive aspects influences outcome response. Study 3 addresses P3: Heterogeneity exists in terms of consumer attitudes and behaviours towards AR as a shopping tool. More detailed information regarding the research design is provided in the next chapter.
2.6 Chapter summary

The goal of Chapter 2 was to review existing literature and theories relevant to this study’s research aim – to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. To begin, the concept of customer experience was introduced, defined as “the internal and subjective response customers have to any direct and indirect contact with a business” (Meyer & Schwager, 2007, p. 2). Technology was next identified as a key mechanism that underpins today’s customer experience.

Theories around the role and acceptance of technology were examined and their effects on the customer experience explored. More specifically, theories including Technology Acceptance Model, situated cognition theory, and diffusion of innovation theory. These theories were applied to the context of AR as a tool for shopping. Finally, the role of affective cognitive theory was explored. This theory supports the underlying structure of several other theories, such as the theory of reasoned action and technology acceptance model (Qin et al., 2021).

The affective cognitive theory suggests that consumers respond to stimuli in three ways: affectively, cognitively, and behaviourally (Javronik 2016). This theory is as the theoretical underpinning for the theoretical framework that guides this thesis, as highlighted in Section 2.5. Through this framework and the associated research propositions, this thesis aims to build on existing theoretical foundations and add knowledge to the literature by analysing the effect of AR as a shopping tool on the customer experience based on the interplay of affective, cognitive, and outcome factors, while exploring potential customer heterogeneity.

To synthesise this chapter, Table 2.2 below outlines the research objectives, propositions, and research questions that arose from the review of the literature. These elements are addressed in subsequent chapters.
Table 2.2 Research objectives, propositions, and questions

<table>
<thead>
<tr>
<th>Research objective</th>
<th>Proposition</th>
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<tbody>
<tr>
<td><strong>RO1</strong>: Investigate consumer perceptions of, and</td>
<td><strong>P1</strong>: AR experiences comprise Cognitive Aspects</td>
</tr>
<tr>
<td>experiences with, AR as a shopping tool</td>
<td>of AR CX, Affectual Aspects of AR CX and</td>
</tr>
<tr>
<td></td>
<td>Outcomes</td>
</tr>
<tr>
<td><strong>RO2</strong>: Investigate the impact of customer experience</td>
<td><strong>P2</strong>: The interplay of affective and cognitive</td>
</tr>
<tr>
<td>with AR as a shopping tool on decision making outcomes.</td>
<td>aspects influence outcome responses</td>
</tr>
<tr>
<td><strong>RO3</strong>: Identify and profile consumer segments</td>
<td><strong>P3</strong>: Heterogeneity exists in terms of consumer</td>
</tr>
<tr>
<td>regarding perceptions and attitudes toward AR as a</td>
<td>attitudes and behaviours towards AR as a shopping tool</td>
</tr>
<tr>
<td>shopping tool</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3: Research design

3.1 Chapter introduction
The prior chapter presented an examination of the relevant literature. Several streams of literature were reviewed including customer experience, the role of technology, and consumer behaviour. This review facilitated the identification of the key constructs and gaps in the literature to be addressed. To this end, this thesis is concerned with investigating the impact of AR as a shopping tool on the customer experience. The theoretical background and model guiding this thesis were discussed, leading to the establishment of a series of propositions. In this chapter (Chapter 3) the methodology employed to test the propositions are described and justified. The chapter begins with a discussion of the key methodological decisions relating to the research paradigm and research approach (Section 3.2), which lead to the research design outlined (Section 3.3). The research context and unit of analysis are then described (Section 3.4), followed by the research outline of the thesis with a focus on the distinct stages of analysis (Section 3.5). Finally, a chapter summary is provided (Section 3.6).

3.2 Philosophical approach
Prior to discussing the specific methodological approach, it is important to understand the philosophical view that shapes this research. The research philosophy refers to “a system of beliefs and assumptions about the development of knowledge” (Saunders et al., 2019, p. 130). It is important to outline the philosophical underpinnings of this research as it reflects on the nature of reality and knowledge. These form the basis of how things can be known and therefore how knowledge can be demonstrated throughout this thesis and the related research. Table 3.1 details the relevant philosophical approach applied in this research, which is detailed below.

The Ontology followed in this thesis, which is one’s understanding of the nature of reality, is objective, whereby reality is made of objects that can be measured and tested, and
which exist even though we might not directly experience them (Bhaskar, 2010). This is an appropriate ontology given the aim of this research is to measure and test how consumers respond to AR as a shopping tool. The Epistemological foundation of this research, which refers to the understanding of the nature of knowledge, is critical realism. This philosophy argues that knowledge is not unconditionally set but that it can be discovered through studies (Easton, 2002). This philosophy is appropriate as this thesis consists of multiple studies which aim to collectively discover the role of AR in the retail customer experience.

Based on this epistemology, this research follows a post-positivist paradigm. According to this perspective, reality cannot be known with certainty, so a scientific approach is used to try to discover truth (Chilisa & Kawulich, 2012). According to this paradigm, it is acknowledged that observations are influenced by the observer’s bias. However, objectivity can be achieved by using multiple measures such as triangulating the data to gain a clearer understanding of what is happening. This thesis applies this paradigm through the use of a scientific method through the use of formal hypothesis testing, while also conducting multiple studies utilising multiple measures to triangulate the data.

Table 3.1 Research methodology decisions

<table>
<thead>
<tr>
<th>Ontology</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epistemology</td>
<td>Critical realism</td>
</tr>
<tr>
<td>Paradigm</td>
<td>Post-positivist</td>
</tr>
<tr>
<td>Methodological choice</td>
<td>Mixed methods</td>
</tr>
<tr>
<td>Strategy</td>
<td>Qualitative study followed by two quantitative studies</td>
</tr>
<tr>
<td>Data collection</td>
<td>Semi-structured interviews, followed by an online survey</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Descriptive statistics, reliability, validity analysis, CFA, LCA, PROCESS SPSS</td>
</tr>
</tbody>
</table>

Source: adapted from Saunders et al. (2019)

Next, the methodological choices and procedures are detailed based on the described philosophical approach.
3.3 Methodological choice

In Chapter 1: the research aims and objectives underpinning this thesis were outlined. The aim being to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. The research objectives being to investigate consumer perceptions of, and experiences with, AR as a shopping tool (RO1), to investigate the impact of customer experience with AR as a shopping tool on decision making outcomes (RO2), and to identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool (RO3). Based on these objectives, and on the philosophical underpinnings, a multi-study, mixed-method, research design was created as highlighted in Figure 3.1.

A mixed methods approach was deemed the most appropriate design as it allowed both exploration and confirmation in line with the research aim objectives. AR is still a relatively novel technology, lending itself to a preliminary exploratory approach. Then, based on this exploration and the nature of the research objectives, a confirmatory approach is required.

Hence, as detailed in Figure 3.1, the research process began with an extensive review of marketing, consumer behaviour, psychology, and information systems literature to understand the underlying concepts related to AR in retail. The objective of the first stage was to provide insights, establish research problems and to provide direction towards which the research should be approached. Key dimensions of customer experience, value, motivations and perceptions were identified in the literature review, as well as the theoretical background of affective cognitive theory (Chapter 2:). The gaps in the literature informed the development of the conceptual framework.

This conceptual framework led to the development of three specific studies, which are described in further detail in Section 3.5. The first study was qualitative, in the means of
semi-structured interviews to explore general attitudes and perceptions of AR among consumers. The following two studies were quantitative designed in turn to test the relationships between relevant concepts (Study 2) and customer heterogeneity (Study 3). The data for Study 2 and Study 3 were collected through a quantitative survey, and the analysis method were descriptive statistics, reliability, validity analysis, CFA, LCA, PROCESS SPSS.
Literature review
• Critical review of theories and literature
• Identification of key constructs
• Identification of gap

Research design
• Development of conceptual model
• Development of research plan and research context

Study 1
• Exploring consumer perceptions of AR as a shopping tool
• Instrument design
• Ethics approval
• Semi-structured interviews
• Analysis of themes

Quantitative Data collection
• Instrument design
• Ethics approval
• Pilot study
• Data collection

Study 2
• Exploring antecedents and boundary conditions of AR as a shopping tool
• Data analysis process model (moderated mediation)

Study 3
• Segmenting consumer attitudes toward AR as a shopping tool
• Data analysis latent class model (segmentation)

Reporting
• Interpretation and reporting of results
• Discussion, limitations, and future directions

Figure 3.1 Thesis research design
3.4 Research context and unit of analysis

Research context

The global market for AR in the retail industry was valued at US $2.5 billion in 2017, and it is anticipated to expand at a compound annual growth rate of 22.7% during 2018-2026 (Transparency Market Research, 2018). AR can have applications in both physical stores and online. For the former, virtual fitting rooms with smart mirrors are the most common technology types, where customers visualise the item projected on a mirror, without the need to actually try it on (Beck & Crié, 2018; Poushneh, 2018; Rese et al., 2017). Whereas for the latter, the brand website or phone apps can allow the customer to visualise items just by using the camera of their smartphone or computer (Kim & Forsythe, 2008; Pantano et al., 2017).

Overall, the main applications of AR currently applied by retailers include trialling makeup applications, alternating styles of glasses, seeing how clothing items may fit and look, and viewing furniture (Hilken et al., 2017; Rese et al., 2017; Yim et al., 2017). Current examples include ModCloth x Zeekit, Sephora Virtual Artist, Virtual try on for glasses, Maybelline Try it on, and IKEA Place (l’Oréal Paris, 2020; Sephora, 2020; Vision Direct, 2020; Zeekit, 2020; Ikea, 2020)

AR in retail has been gaining popularity due to its capability of overcoming flaws of traditional online and offline shopping (Javornik, 2016). One of the main issues related to online shopping is the hesitation that derives from the failure of identifying how the item would look like in reality (Cordier et al., 2001; Duarte et al., 2018). In fact, the clothing retail industry has been experiencing a high number of returns due to this issue (Duarte et al., 2018).

As far as offline shopping, one of the major concerns is related to effort, and having to physically try on clothes (Barnes et al., 2016). Online shopping is often preferred to
overcome this issue (Hao Suan et al., 2015). This is where this research expects that AR would be able to alleviate these issues and provide a better experience.

Nevertheless, it is important to note that the implementation of AR would entail possible risks for retailers. Firstly, the perception of an unrealistic experience on the customer’s behalf could arise should they not feel confident with this technology (Kim & Forsythe, 2008). Furthermore, feelings of confusion could emerge (Oh et al., 2008). In fact, by utilising AR, customers would be faced with an increased number of choice selection. This could generate confusion, and the feeling of being overwhelmed, which could provoke a higher choice dissonance (Garaus, 2018). Lastly, a higher number of choices means a greater number of players, leading to higher competition and more difficulty in achieving loyalty due to low switching costs (Horppu et al., 2008). Due to the exponential investments in AR in retail, and their projected usage, it is important to understand the consumer attitudes and behaviours with this emerging technology, with retail presenting a valuable context for this study.

**Unit of analysis**

The unit of analysis refers to what or who should provide the data and what their relationships are (Zikmund et al., 2013). It is important to identify the unit of analysis in the initial stages of research as this informs the focus of the study, sampling frame and data collection techniques (Zikmund et al., 2013). The scope of this research is to understand the impact of AR in retail on the customer experience. The unit of analysis is therefore retail consumers. This is defined as people over the age of 18 that have purchased an item in a physical and/or online retail store in the last three months (Deloitte, 2019). Two screening questions were therefore used in each of the three studies explored in this thesis to exclude respondents who did not meet these recruitment criteria. The first screening question asked if
respondents were aged 18 and over. The second concerned respondents’ involvement in the purchase of an item in a physical and/or online retail store in the last three months.

3.5 Research outline

The aim of this thesis is to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. To do so, a three-study approach was followed, employing an exploratory study (Study 1), a quantitative mediation study (Study 2), and a consumer segmentation study (Study 3). Figure 3.2 provides an overview of the research design.

<table>
<thead>
<tr>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore consumer perceptions of AR as a shopping tool</td>
<td>Investigate the impact of customer experience with AR as a shopping tool on decision making outcomes</td>
<td>Segment consumer attitudes toward AR as a shopping tool</td>
</tr>
<tr>
<td>• Interviews</td>
<td>• Online survey</td>
<td>• Online survey</td>
</tr>
<tr>
<td>• Experience</td>
<td>• Process model</td>
<td>• Segmentation</td>
</tr>
<tr>
<td>• Test RO1</td>
<td>• Moderated mediation</td>
<td>• Latent-Class analysis</td>
</tr>
<tr>
<td>• Published in Australasian Marketing Journal</td>
<td>• Test RO2</td>
<td>• Test RO3</td>
</tr>
<tr>
<td></td>
<td>• Under review at Journal of Retailing and Consumer Services</td>
<td>• Published in International Journal of Retail and Distribution Management</td>
</tr>
</tbody>
</table>

Figure 3.2 Studies research design

Study 1: Exploring consumer perceptions of AR as a shopping tool

As previously identified, AR is an emerging technology and research in the area is fragmented, meaning a deeper understanding of the issue is key. Therefore, an exploratory study was deemed most appropriate to begin with. The aim of the first study is to understand the customer attitudes, previous experiences, and unveil themes regarding AR in retail. This addresses the first research objective, to investigate consumer perceptions of, and experiences with, AR as a shopping tool. Qualitative interviews were conducted to gather an initial understanding of
consumers’ currently levels of experience using AR technology, and their attitudes towards it. Then, consumers were provided an AR tool to use with the aim of uncovering themes around perceptions towards the technology and how using the technology impacted customer experience. This study is outlined in Chapter 4 and highlighted key themes that were further explored in the subsequent studies. This study has also been published in the *Australasian Marketing Journal*, a peer-reviewed ABDC A-ranked journal.

**Study 2: Investigate customer experience with AR as a shopping tool on decision making outcomes**

From Study 1, an understanding of AR was developed, including themes related to how AR can both enhance and detract from customer experience. Building on those findings and the overall theoretical framework, the aim of Study 2 was to better identify the relationships between key variables. More specifically, Study 2 explored the interplay between previous experience with AR, experiential value, and information overload, and how these factors impact consumer attitudes towards AR and relevant decision-making outcomes. An online survey was conducted, and a moderated mediation model was developed and tested to address the second research objective, to investigate customer experience with AR as a shopping tool on decision making outcomes. This study is outlined in Chapter 5, and has also been submitted, and is now under review at the *Journal of Retailing and Consumer Services*, a peer-reviewed ABDC A-ranked journal.

**Study 3: Segmenting consumer attitudes toward AR as a shopping tool**

Study 1 explored general attitudes towards AR among consumers, while Study 2 tested the interplay between relevant factors. The aim of Study 3 was to build on these findings by exploring consumer heterogeneity regarding attitudes and perceptions of AR. Hence, Study 3 is a segmentation study based on results of an online survey which also included a hypothetical shopping scenario. This study addresses research objective 3, to identify and
profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool. This study is further outlined in Chapter 6, and has been published in the *International Journal of Retail & Distribution Management*, a peer-reviewed ABDC A-ranked journal.

### 3.6 Chapter summary

This chapter presents the research design. It began with an identification of the philosophical underpinnings of this research, following a post-positivist paradigm. According to this perspective, reality cannot be known with certainty, so a scientific approach is used to try to discover truth (Chilisa & Kawulich, 2012). In line with the positivist philosophy, this thesis is based on three studies. The first follows a qualitative approach, followed by two quantitative studies. The chapter progressed to discuss the research context and unit of analysis. As the scope of this research is to understand the impact on the customer experience of AR as a shopping tool, the unit of analysis is therefore retail consumers. Lastly, the research outline was provided detailing the three-study approach. Study 1 is a qualitative study aimed at exploring consumer perceptions of AR as a shopping tool. Study 2 explores the customer experience with AR as a shopping tool on decision making outcomes through a moderated mediation model. Lastly, Study 3 is a quantitative study exploring heterogeneity in consumer perceptions of AR as a shopping tool through a segmentation study. Each of these studies will be explored in the three subsequent chapters.
Chapter 4: Exploratory perceptions of AR (Study 1)

4.1 Chapter introduction
The previous chapter outlined the post-positivist paradigm that influenced the research design. A three-study approach is undertaken with the first study being qualitative, followed by two quantitative studies. This chapter outlines the first study, which addresses research objective 1, to investigate consumer perceptions of, and experiences with, AR as a shopping tool. Semi-structured interviews are conducted to investigate consumers’ past experiences with AR as a shopping tool, to gather an initial understanding of the customers’ previous experience using this technology, and attitudes towards it. Additionally, consumers engaged with an AR shopping tool with the aim of uncovering themes around perceptions usage intentions. The chapter comprises five sections, Section 4.1 provides the background to this study. Section 4.2 presents the method, including the sample and procedure and measurements. The results of the analysis are delineated in Section 0 and the findings are discussed in Section 4.4. Section 4.5 concludes the chapter with a summary.

https://doi.org/10.1016/j.ausmj.2020.06.010

4.2 Method
To address the research question of how AR can impact the customer journey, data were collected via semi-structured interviews (Galletta, 2013). Given the exploratory nature of this research, a qualitative methodology was deemed appropriate due to its ability to acquire a deep
understanding of consumers’ perceptions and feelings (Guba & Lincoln, 1982; Hammersley, 2011). An inductive approach was adopted, whereby a social phenomenon is observed and trends in the data are examined (Creswell & Poth, 2016).

**Sample**

Given the exploratory nature of this research, a small set of fifteen semi-structured interviews were conducted with consumers who have had varying levels of prior experience with AR technology in a virtual try-on setting. Although small, such qualitative sample sizes have been deemed appropriate for the investigation of emerging concepts (Guest et al., 2006; van Esch & van Esch, 2013). During the interview, respondents first described their perceptions and experiences of AR as a virtual try-on tool in general, and then were presented with an AR as a virtual try-on technology to use (see Figure 4.1). The technology is a real AR tool embedded within the mobile app of a leading Australian online fashion retailer, which allows consumers to virtually try on a variety of sneaker shoes.
Figure 4.1 Illustrative example of AR as a tool for virtual try-on

As the study was intended to be an exploration of theory (constructs and propositions), it was important to include a range of consumers with some variation in their level of experience with AR in virtual try-on settings. Therefore, a purposive sampling plan (Glaser & Strauss, 1967) was used to ensure that respondents with diverse experience with AR, ranging from no experience, limited experience, to moderate experience, were included in the sample frame. Recruitment started with post-graduate students over 18 years of age and then via snowballing. The information sheet and consent form can be found in Appendix A1. - Information Statement and Appendix A2. – Consent form

Subsequent, potential participants were identified based on their prior experience with AR. Once recruited, respondents were advised they were participating in a research project to
better understand their experience with regard to shoe shopping and were given a coffee voucher as an incentive to participate. In total, fifteen participants, aged between 23 and 51, were interviewed (Table 4.1 provides the sample profile). Participants were assigned pseudonyms to protect their privacy. Data collection ended once it was deemed saturation occurred and that any additional data was unlikely to change the findings.

Table 4.1 Sample profile

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Gender</th>
<th>Age</th>
<th>Occupation</th>
<th>Prior experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophie</td>
<td>Female</td>
<td>23</td>
<td>Hospitality</td>
<td>No Experience</td>
</tr>
<tr>
<td>Peter</td>
<td>Male</td>
<td>23</td>
<td>Hospitality</td>
<td>No Experience</td>
</tr>
<tr>
<td>Barbara</td>
<td>Female</td>
<td>26</td>
<td>Researcher</td>
<td>No Experience</td>
</tr>
<tr>
<td>Karen</td>
<td>Female</td>
<td>51</td>
<td>Administration</td>
<td>No Experience</td>
</tr>
<tr>
<td>Max</td>
<td>Male</td>
<td>25</td>
<td>Student</td>
<td>No Experience</td>
</tr>
<tr>
<td>Meg</td>
<td>Female</td>
<td>34</td>
<td>Freelance</td>
<td>No Experience</td>
</tr>
<tr>
<td>Leah</td>
<td>Female</td>
<td>31</td>
<td>Administration</td>
<td>No Experience</td>
</tr>
<tr>
<td>Abby</td>
<td>Female</td>
<td>28</td>
<td>Researcher</td>
<td>No Experience</td>
</tr>
<tr>
<td>Holly</td>
<td>Female</td>
<td>27</td>
<td>Student</td>
<td>Limited</td>
</tr>
<tr>
<td>Ben</td>
<td>Male</td>
<td>25</td>
<td>Student</td>
<td>Limited</td>
</tr>
<tr>
<td>Emily</td>
<td>Female</td>
<td>29</td>
<td>Teacher</td>
<td>Limited</td>
</tr>
<tr>
<td>Julie</td>
<td>Female</td>
<td>45</td>
<td>Stay at home mother</td>
<td>Limited</td>
</tr>
<tr>
<td>Christine</td>
<td>Female</td>
<td>24</td>
<td>Consultant</td>
<td>Moderate</td>
</tr>
<tr>
<td>Josh</td>
<td>Male</td>
<td>29</td>
<td>Consultant</td>
<td>Moderate</td>
</tr>
<tr>
<td>Sarah</td>
<td>Female</td>
<td>42</td>
<td>Manager</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

*Note:* Prior experience is defined as - No experience = not previously trialled AR as a tool for virtual try-on; Limited experience = trialled AR as a tool for virtual try-on on 1-2 prior occasions; Moderate experience = trialled AR as a tool for virtual try-on on 3-5 prior occasions; All respondents provide consent to participate as per the requirement of ethics approval.

*Procedure and Measurement*

The research ethics application was approved by Swinburne University Human Research Ethics Committee (SUHREC), project 20201585-3348. Interviews lasted between 30 and 60 minutes. Interviews were audio recorded and professionally transcribed, resulting in 223 double spaced
Prior to data analysis, transcripts were checked for precision by the investigator (myself) and the research team (supervisors). All interviews followed the protocols pertaining to long interviews (McCracken, 1988). Data were analysed by the research team, employing open, axial, and selective coding (Spiggle, 1994). Open coding was undertaken by myself and my Primary Supervisor, with both discussing passages and adding insights gleaned from an understanding of the context and from personal experience. Initial coding was utilised to search for similarities and differences among the data (Charmaz, 2006). Then, following an inductive approach, pattern coding was used to identify the major themes emerging from the data (Marshall & Rossman, 2014). All research team discussed these findings. Best practices in qualitative analysis were followed, such as the triangulation of data by the researchers to ensure reliability (Wallendorf & Belk, 1989). All researchers agreed that the final structure of the findings would offer the best insights into the ways that AR affects the customer journey.

4.3 Results

The findings are coded based on whether they help or hinder the customer experience. The summary of the findings are included in Appendix A4. Help themes from interviews and Appendix A5. Hinder themes from interviews. The summary theme coding from interviews is presented in Appendix A6. Summary theme coding.

Interpretation of results

The findings reveal seven themes across three stages of the customer journey: prior to purchase, the point of purchase, and post-purchase. Below, are outlined each stage of the journey and its respective themes.
4.3.1.1 How AR influences the early stage of the purchase journey

Four ways in which AR can affect the customer experience prior to purchase have been identified. First, respondents felt that the use of AR technology to try products would likely expand the range of products they might consider and try on. Second, respondents tended to feel that AR virtual try-on technology would be useful in narrowing the choice derived from the identified consideration set. Third, it was found that using AR to trial products has the potential to mitigate the value of brand. Each of these themes is explained in more detail below.

4.3.1.1.1 Theme 1: Widens product consideration

AR was discussed in terms of expanding the consumer consideration set. In any purchase decision, a consumer has an initial consideration set based on their perceptions and knowledge of the product category (Hauser, 2014). The findings revealed that when AR is used for virtual try-on, it could expand consumers’ consideration set, particularly in terms of design or style. This theme was illustrated by Josh, who mentioned a prior AR virtual try-on experience,

“I was changing from a very square [eye wear] frame to a round frame ... it was interesting to see how that style looked on my face as I had no experience with this style before. I actually tried a few different styles that I had not initially considered” (Josh, 29, moderate).

It was common for respondents to trial more products. As Karen notes, she would be encouraged to try different things more so than she would normally:

“... in the privacy of your own home you try-on stupid glasses and then see what kind of style suits your face, it was for fun. Whereas in-store I would be probably a bit more serious. Yeah, at home you can try the ones that you wouldn’t without looking like a crazy lady” (Karen, 51, no experience).
It was found that AR virtual try-on led consumers to try products, styles, and designs they might not normally consider. In terms of product style, participants were willing to experiment with more eclectic styles compared to what they would typically consider. Consumers reported that AR would help them to change their image and trial new styles. Julie expresses this when commenting that she was interested in trying shoes she had not previously considered:

"Brands like Reebok and Converse I've seen them so often I wouldn't want to virtually try these on. But for brands I am not so familiar with, it would be nice to try these on with an augmented reality app" (Julie, 45, limited).

The data reveals a consistent theme of consumers wanting to use AR to experiment with new styles in a virtual try-on setting. As evident, AR allows consumers to broaden their consideration set and experiment – often in the comfort of home rather than in-store. This distinction between the in-store and at-home experience was important, as consumers reflected on the benefits of having less social pressure when trying products on at home by means of AR. As Meg commented:

"...the confidence of trying new things, being able to do that and going, 'Oh, that actually looks really good!' Because when I'm in a store, especially let’s say for glasses, I get a bit shy trying new styles, even if the shop assistant says 'try this one, this might look good' I get nervous. So, I think using AR would be cool in this regard" (Meg, 34, no experience).

Meg’s sentiments align with those of others who saw the advantage of trialling new styles in their home: they felt safe in a familiar environment without the societal norms of a retail setting. Consumers are social beings who feel judgement, pressure, and the need to behave
appropriately in a social setting (Fishbein & Ajzen 1975); hence, AR enables consumers to feel more comfortable and expand their consideration set.

4.3.1.1.2 Theme 2: Narrows the choice set

Apart from expanding the consideration set, conversely, AR was seen as helping consumers to narrow their choice set. Consumers found that AR was most useful in the preliminary stages of their decision-making, when they tended to want the most options available for consideration. AR can expose consumers to a wide set of alternatives, but it can also help consumers by reducing choice overload and choice confusion (Garaus et al., 2015). The use of AR in the early stage of consumer decision-making may help consumers feel more certain about their product choice, potentially increasing choice confidence (Garaus & Wagner, 2016). As Ben noted, AR can assist in narrowing his choice set:

“*It could be a cool way to narrow down what style you choose. Like, it’s quite overwhelming when you’re looking at all the glasses in a store in front of you. So, I think then it would be cool to have an idea of what brands and what styles you like before you go into store*” (Ben, 25, limited).

The narrowing of the choice set was a common theme discussed by respondents. While AR may assist consumers to narrow their choice set, its usefulness might be decreased in settings where there are fewer options to begin with, such as mainstream smartphone models (Puad et al., 2016). There may well be a threshold in terms of usefulness and option availability that will strengthen choice confidence.
4.3.1.1.3 Theme 3: Mitigating the value of brand

When the respondents were presented with AR as a tool for virtual try-on, they reported paying little attention to brand. Following her experience with the AR tool, and when asked what shoe she had trialled, Karen commented:

“What was the brand I tried on? I don’t know. I didn’t notice. But that didn’t come into my decision making at all because when I was scrolling through looking at the shoes, I was just looking for the ones that I liked the best, I was just too excited to try them on” (Karen, 51, no experience).

Karen’s comments indicate her immersion in the AR try-on experience, which can be compared to a flow state (Csikszentmihalyi, 1990). Similar to online shopping (Mathwick & Rigdon, 2004), the use of an AR virtual try-on tool involves the process of searching for information and could be challenging as it can lead to consumer tension resulting from the complexity of the task. During this flow state, the value of the brand dissipates, with the consumer’s self-consciousness disappearing and sense of time becoming distorted (Csikszentmihalyi & LeFevre, 1989).

These findings are supported by Holly’s experience. She noted:

“Honestly, I didn’t even know what brand I was looking at. I was basically choosing based on the design – I liked the plain white shoes and their style ... I have no idea what brand they were” (Holly, 27, limited).

Holly’s comments indicate active engagement and flow (Csikszentmihalyi & LeFevre, 1989). It was found that for many of the interviewees, use of the AR tool decreased the importance of brand prior to purchase. Participants seemed to care more about the style of the product and the style being available for virtual try-on. The respondents described the encounter as exciting and reported being lost in the experience – paralleling moments of flow – which, for some, obviated
the importance of the brand. This could be an opportunity for new and emerging brands to gain access to new customers; however, it may pose a challenge for established brands, with consumers considering hitherto unknown brands.

4.3.1.2  How AR impacts the point of purchase

Three themes emerged that revealed ways in which AR influences the point of purchase. First, AR as a means of enabling virtual try-on was perceived to add value as a tool for curation, in particular the curation of outfits rather than the assessment of individual items. Second, AR was seen as enhancing the hedonic experience by delivering playfulness and enjoyment at the point of purchase. Third, while elements of play were inherent in the use of AR at the point of purchase, it was discussed that this hedonic benefit may be a short-term gain in customer experience value. As such, the magnitude of change for any positive benefit will likely return to baseline very soon after the deployment of AR quickly becomes the new normal. In the following sections, each theme will be elaborated.

4.3.1.2.1  Theme 4: AR’s role in curation

Consumers tended to think that AR would be a useful virtual try-on tool that could assist them with the curation of outfits, as it enabled them to see, virtually, how items go together. Respondents discussed that a key benefit of AR is that it enables them to determine an item’s aesthetic appeal, rather just than the functional benefit of ‘fit’. It was most common for consumers to discuss AR as a means of gaining value via the curation of products worn together. As Peter stated:

“When I want to buy something to see if it suits me if it's something that I would look good with, but I wouldn’t know how it fits me though” (Peter, 23, no experience).
Online shopping can pose challenges in terms of size and fit (Kim, 2016). However, consumers see value in AR being able to provide a visual representation of the products worn together. As Christine stated:

“The main benefit is that you can see whether or not it just suits you from a visual point of view. [...] so, from a visual thing, I think you care about how the glasses look on you, and it's less dependent on fit. I think for clothes too it's more important to look good” (Christine, 24, moderate).

The benefit of curation at the point of purchase is further highlighted by Sophie, who noted: “[It would be useful] to see if it's something that would look good with my outfit when I am about to buy it” (Sophie, 23, no experience). This is because AR offered a less onerous environment than one where customers must remove their clothes in order to put together and try different outfits. Reducing the need for effort in the shopping experience is important given that consumers strive to maximise their time and minimise the effort required to achieve a goal (Roy et al., 2018). Effort consists of cognitive, emotional, time and physical components; hence, AR technology gives consumers the opportunity to see how different items would look combined, without the need to physically try them on, which would be a waste of time (Chen & Wang, 2010).

Consumers tried on a specific item to see if it would go with an outfit they had thought of, but could not visualise, such as Christine:

“I can see how it could fit a need where you already have an outfit planned. And you need a pair of shoes to go with the outfit. Because you don’t have a pair, or your last pair died or something like that. You have like a certain something in mind. Like, it's a visual function. You have an outfit in mind going for an event or whatever. And then you need to
see if it looks good with the outfit that you had in mind at home” (Christine, 24, moderate).

Therefore, AR may provide opportunities for retailers to sell across categories.

4.3.1.2.2 Theme 5: AR drives hedonic value through playfulness

It was common for the respondents to identify playfulness as a key benefit of utilising AR at the point of purchase. Engaging in innovative technology, such as AR, enhances consumer enjoyment and sense of fun (Kang et al., 2020). Perceived play comprises intrinsic enjoyment and escapism (Mathwick & Rigdon 2004), the former referring to the entertainment that is derived from the use of AR (Bloch et al., 1986), the latter referring to a state of psychological immersion that allows shoppers to temporarily ‘get away from it all’ (Lombard & Ditton, 1997).

Sophie’s comment highlights the appeal of playfulness and its ability to immerse her, stating:

“It's fun, I suppose sometimes shopping online can be boring, because you're just going click, click, click... But here [with AR] you can sort of have an experience, because it’s engaging, it is easy to get caught up in it and lose time!” (Sophie, 23, no experience).

Despite the potential benefits of playfulness at the point of purchase, there are also downsides. First, it was mentioned that playfulness could override the perceived usefulness of AR. That is, playfulness draws consumers into the element of fun (Kang et al., 2020), but can also override the purpose of purchase. Reflecting on the usefulness of AR as a virtual try-on, Abby commented:

“I don’t think I’d find this technology [AR] particularly useful in retail, but it definitely does make the shopping experience more fun” (Abby, 28, no experience).

Second, the benefit of AR at the point of purchase may not be long-lasting for retailers, relative to its investment. It is known that innovation drives excitement for consumers (Pantano,
2014), which was evident in our data indicating that participants displayed high levels of enthusiasm using AR. However, many commented that the novelty effect of AR might wear off – meaning that there was a balance between AR’s elements of perceived play (hedonic) and perceived usefulness (utilitarian). As illustrated by Max:

“I mean, for me, it’s like ‘whoa, new, new!’; I would use this just to check it out. But I don’t think it would help me make a decision to buy them” (Max, 25, no experience).

In general, participants were willing to try the tool and went in with an open mind, given its novelty. However, the novelty meant that there was likely a short-term gain in terms of customer experience rather than the more long-term intrinsic value of the technology. Leah commented on the novelty factor: “It was fun, but I don’t know how much of that is probably just the novelty, because I haven’t done that before” (Leah, 31, no experience). It is possible that the associated novelty might mean that there is a short-term gain in any customer experience value – with the resulting magnitude of change returning to baseline relatively quickly (Ferraro et al., 2017). Based on the assimilation-contrast theory (Sherif et al., 1958), magnitude of change is based on the perceived difference between an initial reference point and any subsequent information (Ferraro et al., 2017). In this case, the AR technology results in an initial increase which is likely to decrease rapidly once the novelty and playfulness wear off.

4.3.1.3 How AR impacts post-purchase

A key theme emerged about the role of AR beyond purchase, revealing two ways in which AR can influence the customer experience at point of purchase. First, it was found that virtual try-on with AR can increase consumer choice confidence, given consumer’s ability to derive information in a virtual setting which simulates reality. Second, it was found that in some
situations, the use of AR for virtual try-on can amplify consumer cognitive dissonance. Each theme is elaborated below.

4.3.1.3.1 Theme 6: Consumer choice confidence

It was found that respondents perceive the benefit of AR technology when it enhances their customer experience or makes the customer journey more seamless (Puccinelli et al., 2009). In traditional settings, when consumers make online purchases, they have very clear expectations about what they will receive. Upon receipt of the item, consumers may have different reactions, including delight or disappointment (Barnes et al., 2016; Sweeney & Swait, 2008). After using AR technology as a try-on tool, the respondents reflected on their expectations post purchase. For many, the AR experience, in comparison to simply seeing a two-dimensional image, gave them greater confidence in their choice. The use of AR was discussed as potentially reinforcing their decisions across the customer journey (prior to purchase and purchase), making them more comfortable with the final product received. Emily expressed this sentiment when stating:

“I feel it gives the reassurance of how it is going to look. Especially for a product that I haven't tried before. Like a first-time customer” (Emily, 29, limited).

4.3.1.3.2 Theme 7: Amplification of cognitive dissonance

Given the high level of choice confidence, some consumers might experience a higher level of cognitive dissonance when they receive a product that does not meet expectations. Cognitive dissonance is the result of an immediate post-purchase comparison of what was purchased versus the other alternatives that were available (Powers & Jack, 2013). In this study it was found that the amplification of cognitive dissonance has both a product dimension and an emotional dimension (Elliot & Devine, 1994; Sweeney et al., 2000). Product dissonance is the cognitive aspect of dissonance related to the product trialled with AR and subsequently purchased, that can
result in an emotional dissonance upon product receipt if expectations are not met. Ben reflects on the disappointment that could arise from the discrepancy between expectations and the actual item:

“If we had both bought it using the virtual try-on technology, and assumed it would have looked like that, we would have been really disappointed because it looks really different” (Ben, 25, limited).

When shopping online, consumers acknowledge the possibility that the item might differ slightly in some respects from what is expected. Therefore, one of the main aspects that our respondents looked for in an online retailer is flexibility regarding returns. This is because consumers know that the actual item might differ from the image; hence, should they not be satisfied with it, they can return it at no cost to them and with relatively little effort. On the other hand, when AR is used to try an item virtually, consumers may feel more assured of what the item looks like and of their choice, and hence more certain that they will like it. In situations where this is not the case, it is possible that there is an amplification of cognitive dissonance; therefore, consumers may seek to undo the effects of their regrettable choice by returning the product in question (Gilovich & Medvec, 1995; Zeelenberg et al., 1996). Leah’s comment illustrates this potential for increased disappointment:

“I guess if it did give them a false sense of assurance, that could make it more negative later if they decided that they regret the purchase. Because they'll be like, ‘oh, but I tried it, and it seemed good.’ And then now they may regret it even more” (Leah, 31, no experience).
4.4 Discussion

The aim of the first study was to acquire an understanding of the promises and perils associated with AR. This research focused on customer experiences across the customer journey, using AR technology as a tool for virtual try-on settings. Adopting a qualitative research methodology, interviews were conducted during which participants revealed several key themes. In terms of how AR can help the customer experience, found four common themes were found in this research: AR can expand the consumer’s consideration set, is most useful earlier in the decision-making process, is considered useful as a tool to curate outfits (rather than only individual products), and is seen to enhance the hedonic aspects of the customer experience. Barriers, or ways in which the technology could harm the customer experience, were also identified. Specifically, AR has the potential to mitigate the value of brand, can amplify cognitive dissonance, is not perceived as beneficial by all shoppers, and there may be only a very short-term gain in any customer experience because of novelty. In concluding, implications for theory and practice are outlined before discussing limitations and future research directions.

Implications for theory

This research has several implications for theory. First, previous research has shown that a greater variety of products on offer can have negative effects, potentially leading to choice confusion (Garaus et al., 2015). The findings from this research indicate the potential for AR to enhance consumer choice confidence and subsequently reduce choice confusion. Further, it was found that AR can enable consumers to more effectively narrow their choice set when faced with a wide range of options. It is known that if customers are presented with a great number of choices at the consideration stage of the purchase journey, this choice overload can negatively influence their ability to make a choice. The findings from this research suggest that AR can help
to overcome this choice overload and may be able to strengthen consumers’ choice confidence by narrowing the number of choices offered to a consumer. When customers are faced with a large opportunity set, they could feel choice confusion resulting from choice overload. AR can help to mitigate this by enabling consumers to narrow their options. Furthermore, by being able to visualise the product, consumers may feel more confident about the product (i.e., style, specifications) that otherwise would reduce choice confidence.

Further, this research found that AR can assist consumers to mitigate cognitive dissonance by increasing the level of choice confidence following a purchase. Specifically, it was found that AR can help to decrease cognitive dissonance by providing greater certainty about purchases made online. However, it is possible that when an item does not meet the consumer’s expectations after she/he has used AR, their cognitive dissonance may be greatly amplified; in this instance, the increase in choice confidence can lead to greater disappointment. Hence, this research provides a more nuanced understanding of how cognitive dissonance may be influenced in conflicting ways by innovative and sometimes disruptive technologies. Finally, this study contributes to the growing stream of research on the blending of real and virtual worlds. Building on Baudrillard’s (1983) notion of hyperreality, AR plays a role in the integration of the real and the virtual. This research shows that this blending can both enhance and harm the customer experience. This distinction between real and virtual will become increasingly blurred and has implications for the way that retailers engage consumers via AR.

Implications for practice

From a managerial perspective, caution should be exercised when deciding whether to implement AR for the purpose of virtual try-on. Rather than AR being purely a means of enhancing the customer experience, this research found that it can equally help and harm it.
Hence, it is important that managers be aware of the positive and negative aspects of AR. Ultimately, given that AR is in the early stages of development, it can be argued that early adopters should proceed with caution. One positive aspect for managers concerns viral sharing. With AR being relatively new and attracting wide attention, consumers are likely to share their experiences among their network and spread positive WOM. However, it begs the question: will this technology drive purchase or merely increase consumer engagement? Further, AR is likely to deliver an initially large increase in key outcomes; however, it is unknown for how long any increase can be sustained prior to a return to the baseline. This research suggests that the novelty appeal may be short-lived at this stage. While this research finds that AR can extend a consumer’s consideration set, it is found that this is most likely when AR is used at home. When used within a store, social norms may influence the way consumers behave (Fishbein & Ajzen, 1975), since many expressed a preference for engaging with this technology in private where they felt freer to experiment.

Finally, this research found that consumers paid more attention to style than brand when engaging with AR for virtual try-on. This could be potentially harmful to established brands and may require them to consider innovating their style and design rather than relying on the built-up equity inherent in their brand. To enhance the customer journey, established brands might also consider offering consumer benefits such as flexible returns, which gives consumers the confidence to buy the product and return it free of change if it does not fit. Conversely, if consumers are paying less attention to brand, this provides an opportunity for new and emerging brands. For these operators, AR encourages flow and immersion which can prompt consumers to focus on style attributes. In Table 4.2, the findings are synthesised and integrated with key
literature, furthermore, current best-practice in guiding practitioner decision-making across the customer journey are highlighted.

Table 4.2 AR’s role in the customer journey

<table>
<thead>
<tr>
<th>AR’s application in the customer journey</th>
<th>Prior to Purchase</th>
<th>Point of Purchase</th>
<th>Post-Purchase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need/ want recognition and Consideration</td>
<td>Provides potential benefit to consumers in product search and subsequent consideration set.</td>
<td>Provides ability for consumers to visualize product combinations in a playful and engaging way.</td>
<td>Enhance consumer post-purchase evaluations by facilitating virtual trial.</td>
</tr>
<tr>
<td>Objective of AR</td>
<td>Allow consumers to discover, be inspired, and curate product choices and combinations.</td>
<td>Balance of utilitarian (seeing products) and hedonic (playfulness) elements at the point of purchase</td>
<td>Facilitate choice confidence beyond purchase.</td>
</tr>
<tr>
<td>Potential role of AR (identified themes)</td>
<td>Widens product consideration. Narrows the choice set. Mitigating the value of brand</td>
<td>AR’s role in curation Drives hedonic value through playfulness</td>
<td>Consumer choice confidence Amplification of cognitive dissonance</td>
</tr>
<tr>
<td>Illustrative examples</td>
<td>The Iconic Visualise Warby Parker Virtual Try-On</td>
<td>Maybelline Virtual Makeover Ikea Place</td>
<td>Zeekit x ModCloth Gap DressingRoom</td>
</tr>
</tbody>
</table>

Limitations and future directions

This study, like all, is subject to certain limitations. As it is a qualitative study, this was able to provide initial conceptualisations; however, further research should consider ways to quantify the findings from this research and validate them by means of a larger sample. In addition, the sample size means that the results are exploratory rather than definitive – future work could focus on different consumer segments or design experimental scenarios to test these initial findings. Further, the scenario that was presented to respondents was hypothetical and did not require consumers to make an actual purchase. However, to address this limitation, the sample consisted of respondents who had made a purchase of footwear in the past three months and
represent a range of people with various levels of experience using AR as a tool for virtual-try on. Future studies extending ours to real applications of behaviour in AR are called for. Finally, while it is suggested that novelty will wear off, as a longitudinal study was not conducted, this assumption cannot be validated. Further research over a longer period with actual shoppers or data from an online retailer would be useful in this regard.

4.5 Chapter summary

This chapter addressed research objective 1: Investigate consumer perceptions of, and experiences with, AR as a shopping tool. This consisted of the first study of this thesis. A set of 15 semi-structured qualitative interviews were conducted to gather an initial understanding of the customers’ previous experience using this technology, and attitudes towards it. Additionally, consumers were provided an AR tool to use with the aim of uncovering themes around perceptions. Results indicated that AR can both help and hinder the customer experience. In addition, exploratory themes emerged from the data on AR’s role in the customer journey. Prior to purchase it can: widen product consideration, narrow the choice set, and mitigate the value of brand. At the point of purchase, AR plays a role in curation and drives hedonic value through playfulness. While post-purchase it can affect consumer’s choice confidence and amplify cognitive dissonance. Further discussion of these themes and their implications for research and industry is outlined in the following Chapters. Considering these findings, the researcher thought it pertinent to triangulate the qualitative results obtained in Study 1 with quantitative data from Studies 2 and 3, as a means to further understand the impact of AR as a shopping tool on the customer experience. Triangulation allows increased confidence and convergence of results, with the ability to develop richer data and further clarify data (Jick, 1979). Results obtained through Study 1 were therefore employed to assist in interpretation,
clarification, development and expansion of the results obtained in subsequent studies. Utilising between-method triangulation allowed this thesis to limit any bias inherent in a particular data source, researcher or method (Denzin, 2009).
Chapter 5: The impact of AR on decision-making (Study 2)

5.1 Chapter introduction

The themes and findings that emerged qualitatively informed Study 2, which is outlined in this chapter. This study aims to expand on this knowledge and better understand the relationship that occurs between previous experience with AR, the derived experiential value from engaging with AR, and the outcomes of attitude toward AR, decision confidence, and willingness to purchase using AR. This chapter addresses the second research objective: Investigate customer experience with AR as a shopping tool on decision making outcomes.

To achieve this, a quantitative model is developed, and moderated mediation effects are analysed based on motivation theory. Taken together, the findings of this study provide retailers an ability to better understand the influence of motivations and prior experience on different outcomes when using AR as a shopping tool. The chapter contains six sections, first providing the background to this study (Section 5.1), then the conceptual framework and related hypotheses are delineated (Section 5.2), before the method is presented (Section 5.3). The results of the analysis are explained in Section 5.4 and the findings are discussed in Section 5.5. The final provides a summary of the chapter. A version of the findings presented in this chapter has been submitted and is currently under review at the Journal of Retailing and Consumer Services.

5.2 Conceptual framework and hypotheses development

The overarching theory of this thesis is affective cognitive theory, which is a fundamental underlying structure of several theories that consider consumer behaviour and decision-making (Qin et al., 2021). This study aims to better understand the consumers’ responses to AR when information overload is experienced. To help better understand this context,
motivation theory is applied. This theory links to the macro theory overarching this thesis, the affective cognitive theory.

Motivation theory is a theory that can be applied to understand why consumers behave in a certain way. In the case of AR, it is important to understand why consumers would use this technology; whether the use is because it leads to a goal, or simply because it generates enjoyment. Motivation theory consists of extrinsic and intrinsic motivation. Extrinsic motivation is defined as “the performance of an activity because it is believed to be instrumental in achieving valued outcomes that are separate from the activity” (Atkinson & Kydd, 1997, p. 54). Lee et al. (2005) explained that behavior is driven by its perceived values and benefits derived. In this case, this would refer to a goal, i.e., the technology allows consumers to achieve an outcome. Applied to the experiential value variables, extrinsic motivation could refer to efficiency, economic value, and service excellence. This is since these variables refer to benefits derived from the use of the technology. On the other hand, intrinsic motivation is defined as “doing an activity simply for the enjoyment of the activity itself, rather than its instrumental value” (Ryan & Deci, 2000, p. 55); this concept was explained by Lee et al. (2005), who noted that behaviour is evoked from the feeling of pleasure, joy, and fun. Davis et al. (1992) verified that extrinsic and intrinsic types of motivation are important determinants of behaviour intention with technology.

The role of prior experience

Prior experience can be considered a determinant of attitudes and outcomes. Research has found that prior experience influences current satisfaction, which in turn influences future usage (Bolton & Lemon, 1999; Lemon & Verhoef, 2016). Prior experience allows the customers to feel more confident with their choice (Flavián et al., 2016). Furthermore, individuals who have previous experience with a certain technology, are more likely to have
a lower perception of effort (Andriulo et al., 2014). Therefore, prior experience with AR may determine a different outcome. Hence, the following hypothesis arises:

\[ H_1: \text{Prior experience has a positive influence on the outcomes (} H_{1a}: \text{attitude toward AR;} \ H_{1b}: \text{Willingness to purchase using AR;} \ H_{1c}: \text{decision confidence}) \]

**How AR can bring value**

Technology can help to deliver hedonic and functional experiences for customers (Sarkar, 2011). The former refers to enjoyment, and this happens where entertainment is valued (Arnold & Reynolds, 2003; Hirschman & Holbrook, 1982; Jones et al., 2006). Whereas the latter refers to functional values, such as everyday commodities (Babin et al., 1994). It has been found that personalised AR applications lead to higher hedonic and utilitarian value than non-personalised ones (Pantano et al., 2017). Nevertheless, an issue that arises is that customers might perceive different values for the same technology. The literature has addressed this by identifying “mixed benefits” (Martos-Partal & González-Benito, 2013), which refer to the search for utilitarian benefits, such as quality associations (Yoo et al., 2000) as well as a search for hedonic benefits related to social image (Fischer et al., 2010). However, it is important to note that in the same setting, customers might seek different values, hence the experience wanted would be different. Hence, understanding the possible different experiences wanted according to individual characteristics is important.

The experiential value scale reflects the benefits derived from perceptions related to dimensions related to the experience, such as visual appeal, entertainment value, escapism, intrinsic enjoyment, efficiency, economic value, and service excellence (Mathwick et al. 2001). These values play a mediating effect in the relationship between AR experience and outcomes, as the experience sought can influence the related outcome. Values can serve as mediators between AR experience and outcomes by influencing people's perception and evaluation of the AR experience, as well as their subsequent behaviour and decision-making.
In fact, consumers with the same level of experience may be looking for a different experience from the technology, which would result in different outcomes achieved. Values are considered mediating effects rather than direct as it is believed they do not directly influence behaviour or outcomes. Instead, they can act as a filter through which people interpret and evaluate experiences, including AR experiences, and determine whether or not to engage with them. Therefore, since the experience plays a role in the perception and acceptance of AR, it is proposed that,

\[ H_2: \text{Experiential value (} H_{2a}: \text{visual appeal; } H_{2b}: \text{entertainment value; } H_{2c}: \text{escapism; } H_{2d}: \text{intrinsic enjoyment; } H_{2e}: \text{efficiency; } H_{2f}: \text{economic value; } H_{2g}: \text{service excellence)} \text{ mediates the relationship between AR experience and outcomes} \]

\[ \text{Information overload as a moderator} \]

Previous research on task-technology fit has implied that task complexity may have a key influence on the effectiveness of various service technologies (Speier & Morris, 2003). Payne (1976) provides evidence that increasing the information load (he referred to it as task complexity) leads consumers to resort to greater use of simplifying, choice heuristics. Stimulus load theory provides a valuable explanation for the balancing of too little versus too much stimulation (Haugtvedt et al., 2018). Information overload measures whether the amount of information received exceeds consumers’ information processing capabilities, leading to information overload. This aspect can moderate the outcome consumers have when using a technology, such as AR. In fact, consumers’ experiential values, or experience sought may be influenced by the perception of information overload, which could then have an effect on their outcomes. Therefore, information overload can moderate the relationship between values and outcomes, as it can impact how people prioritise and evaluate their values in relation to their desired
outcomes. While AR experience may influence people's values and attitudes towards technology, it is the interaction between values and outcomes that ultimately drives behavior and decision-making. In view of these considerations, the following hypothesis arises:

\[ H_3: \text{Information overload moderates the indirect association between the consumer values and the outcomes} \]

\[ H_{3a}: \text{Attitude toward AR} \]

\[ H_{3b}: \text{Willingness to purchase using AR} \]

\[ H_{3c}: \text{Decision confidence} \]

**Outcomes**

Consumer attitudes toward technology (including AR) indicate how technology is perceived. Attitudes are formed based on different stimuli, and they incorporate aspects such as emotions and brand perceptions (Faircloth et al., 2001). This concept helps indicate how the consumer feels about the technology in the given setting. Since the aim is to identify how AR impacts the customer experience, attitude toward AR is a key outcome.

Intention to purchase helps to understand whether the information gathered by consumers and the stimuli they have been exposed to have helped with the decision making (Juaneda-Ayensa et al., 2016). It has been found that the virtual experience of trying on clothing increased conversion rates from browsing to sales because of enhanced confidence in decision making (Nantel, 2004; Oh et al., 2008). Decision confidence refers to the consumer’s evaluation of how correct the decision was (Flavián et al., 2016; Harris & Gupta, 2008).

Therefore, an associated benefit of AR is that of choice confidence, which plays an important role in consumers’ decision-making process (Andrews, 2016). This decision confidence is the degree of certainty people hold about the appropriateness or optimality of their decisions (Parker et al., 2016). Prior research suggests that confidence is a reliable predictor of consumer attitudes and actual behaviours (Guillet et al., 2020). Oh et al. (2008) found that VR increases consumer decision confidence, so it is predicted that consumer
decision confidence from AR has a significant impact too. The resulting conceptual framework is outlined in Figure 5.1.

![Conceptual framework](image)

**Figure 5.1 Conceptual framework Study 2**

### 5.3 Method

*Data and sample*

520 US respondents were recruited via online research platform, Cloud Research. Online panels have been shown to provide access to demographically diverse respondents and a reliable representation of the population (Buhrmester et al., 2011). Following data cleaning, 3.3% (n=17) of the sample were removed for incomplete responses or failing attention checks, resulting in a final sample of 503 (46% female, Age\text{mean} = 36, S.D. = 9.73)

*Procedure and Measurement*

The research ethics application was approved by Swinburne University Human Research Ethics Committee (SUHREC), project 20204160-4940. Upon qualifying for participation, participants were asked about their general experience with AR in shopping situations (57.9%
reported having some experience with AR). Participants then watched a short video\(^1\) that showed AR technology in use and explained how AR can assist in shopping situations. This was done to make sure participants understood the role of the technology. Next, respondents rated a battery of items. The survey questions are outlined in Appendix B1. – Survey.

All measurement variables were adapted from existing scales and are outlined in Appendix B2. - Confirmatory factor analysis and construct reliability, along with scale items, validity, and reliability analysis. The Experiential Value Scale (EVS) measures the benefits derived from the perceptions of return on investment, service excellence, playfulness, and aesthetic appeal (adapted from Mathwick et al., 2001). Information overload measures whether the amount of information received exceeds consumers’ information processing capabilities, leading to information overload, and was adapted from Li (2017). Attitude toward AR measures the consumers’ attitude toward the technology as a tool for shopping, and was adapted from Rese et al., (2014). Willingness to purchase using AR measures the usage and purchase intention derived from the use of the technology, and was adapted from Vahdat et al., (2020). Decision confidence measures the degree of certainty consumers hold about their decisions and was adapted from Guillet et al. (2020). AR experience is a single-item scale, which measures previous experience with AR, this is based on previous studies (Flavián et al., 2016). Finally, demographic information was collected including gender, age and household income.

**Construct validity and reliability**

Prior to the main analysis, exploratory and confirmatory factor analysis were conducted to validate scales. CFA revealed that the measures used in this research displayed adequate psychometric properties and appeared to be free of systematic bias (Hair, 2006). Most standardized factor loadings are greater than .70 providing support for convergent validity.

\(^1\) https://www.youtube.com/watch?v=UudV1VdFtuQ
Items were retained as other reliability and validity measures of all the instruments were satisfactory (Adapa et al., 2020). Preliminary reliability analyses revealed that the internal consistency of all scales was above the minimum threshold (Cronbach $\alpha > .70$) except for service excellence, however Taber (2018) suggested that the threshold values of Cronbach's alpha seem not to suggest that the lower loadings implying an unsatisfactory value. Confirmatory factor analysis and construct reliability is found in Appendix B2. - Confirmatory factor analysis and construct reliability.

**Data analysis**

Data analysis was conducted using SPSS version 27.0 (IBM SPSS). Skewness and kurtosis for each variable were checked to determine whether the data had a normal distribution. Then, descriptive statistics and bivariate correlations analyses were conducted. Next, to test the study hypotheses, "spotlight" moderation analysis was conducted, which not only looks at high versus low, but pinpoints when and where effects become important for groups. The moderated mediation model was employed using Hayes PROCESS macro (Model 14) (Hayes, 2017). This moderated mediation model yields multiple coefficients of direct and indirect effects. Attitude toward AR, Decision confidence, and willingness to purchase using AR were entered into the moderated mediation model as the outcome variables, previous experience with AR as the predictor variable, experiential value as the mediator, and information overload as a moderator of the relationship between experiential value and the three outcomes. The 95% bias corrected confidence interval from 5000 resamples was generated using the bias-corrected bootstrapping method. The predictor and moderator variables were mean centred. Significant indirect effects were identified when the confidence interval (CI) did not include zero.
5.4 Results

The hypothesised moderated mediation model (see Figure 5.1) was tested in a single model using a bootstrapping approach to assess the significance of the indirect effects at differing levels of the moderator (Hayes, 2017). Previous experience with AR was the predictor variable, with experiential value as the mediator. The outcome variables were attitude toward AR, decision confidence, and willingness to purchase using AR. Information overload was the proposed moderator. Moderated mediation analyses test the conditional indirect effect of a moderating variable (i.e., information overload) on the relationship between a predictor (i.e., previous AR experience vs no previous AR experience) and an outcome variable (i.e., attitude toward AR, decision confidence, and willingness to purchase using AR) via mediators (i.e., experiential value).

The PROCESS macro, model 14, v4.0 (Hayes, 2017) in SPSS v27 with bias-corrected 95% confidence intervals (n = 5000) was used to test the significance of the indirect (i.e., mediated) effects moderated by information overload, i.e., conditional indirect effects. This model explicitly tests the moderating effect on the mediator to outcome path (i.e., path b). The model 14 macro enables one to use SPSS and ordinary least squares regression (OLS) to examine the conditional indirect effect of a predictor on an outcome variable via a mediator, where the indirect effect of a predictor on the outcome via the mediator is dependent on the level of a moderating variable (Preacher et al., 2007). Following recommendations for smaller samples (Preacher et al., 2007), bootstrapped estimates of the conditional indirect effects based on 5,000 samples were derived.

An index of moderated mediation was used to test the significance of the moderated mediation, i.e., the difference of the indirect effects across levels of need for cognition (Hayes, 2017). Significant effects are supported by the absence of zero within the confidence intervals. PROCESS model 14 measures conditional indirect effect of $X$ on $Y$ through $M_i = a_i$.
$(b_{1i} + b_{3i}Y)$ and direct effect of $X$ on $Y = c'$. Table 5.1 presents the unstandardized regression coefficients for path a in the moderated mediation model. In the mediation analysis, previous experience with AR positively predicted all aspects of experiential value. Visual appeal (path a: $\beta = 0.36, p < 0.001, 95\% \text{ CI} 0.188, 0.525$), Entertainment value (path a: $\beta = 0.43, p < 0.001, 95\% \text{ CI} 0.203, 0.657$), Escapism (path a: $\beta = 0.41, p = 0.003, 95\% \text{ CI} 0.141, 0.683$), Intrinsic enjoyment (path a: $\beta = 0.50, p < 0.001, 95\% \text{ CI} 0.241, 0.763$), Efficiency (path a: $\beta = 0.42, p < 0.001, 95\% \text{ CI} 0.228, 0.604$), Economic value (path a: $\beta = 0.33, p < 0.001, 95\% \text{ CI} 0.149, 0.516$), Service excellence (path a: $\beta = 0.32, p < 0.001, 95\% \text{ CI} 0.123, 0.515$).

Table 5.1 Moderated mediation testing path $X \rightarrow W$

<table>
<thead>
<tr>
<th>Path $X \rightarrow W$</th>
<th>$b$ (se)</th>
<th>LLCI, ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR experience $\rightarrow$ Visual appeal</td>
<td>0.36*** (0.09)</td>
<td>0.188, 0.525</td>
</tr>
<tr>
<td>AR experience $\rightarrow$ Entertainment value</td>
<td>0.43*** (0.12)</td>
<td>0.203, 0.657</td>
</tr>
<tr>
<td>AR experience $\rightarrow$ Escapism</td>
<td>0.41** (0.14)</td>
<td>0.141, 0.683</td>
</tr>
<tr>
<td>AR experience $\rightarrow$ Intrinsic enjoyment</td>
<td>0.50*** (0.13)</td>
<td>0.241, 0.763</td>
</tr>
<tr>
<td>AR experience $\rightarrow$ Efficiency</td>
<td>0.42*** (0.10)</td>
<td>0.228, 0.604</td>
</tr>
<tr>
<td>AR experience $\rightarrow$ Economic value</td>
<td>0.33*** (0.09)</td>
<td>0.149, 0.516</td>
</tr>
<tr>
<td>AR experience $\rightarrow$ Service excellence</td>
<td>0.32** (0.10)</td>
<td>0.123, 0.515</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001; LLCI = low limit confidence interval, ULCI = upper limit confidence interval
<table>
<thead>
<tr>
<th>Hyp</th>
<th>Path</th>
<th>Y1 = Attitude toward AR</th>
<th>Y2 = Willingness to purchase using AR</th>
<th>Y3 = Decision confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b (se)</td>
<td>LLCI, UCLI</td>
<td>b (se)</td>
</tr>
<tr>
<td>H1</td>
<td>Direct effects (X→Y)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AR Experience → Y</td>
<td>0.09 (0.06)</td>
<td>-0.016, 0.206</td>
<td>0.39*** (0.09)</td>
</tr>
<tr>
<td>H2</td>
<td>Indirect effects (X→M→Y)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2a</td>
<td>AR Experience → Visual appeal → Y</td>
<td>0.23 (0.12)</td>
<td>-0.005, 0.475</td>
<td>0.14 (0.20)</td>
</tr>
<tr>
<td>H2b</td>
<td>AR Experience → Entertainment value → Y</td>
<td>0.25* (0.11)</td>
<td>0.038, 0.47</td>
<td>0.01 (0.18)</td>
</tr>
<tr>
<td>H2c</td>
<td>AR Experience → Escapism → Y</td>
<td>0.04 (0.06)</td>
<td>-0.074, 0.154</td>
<td>-0.02 (0.09)</td>
</tr>
<tr>
<td>H2d</td>
<td>AR Experience → Intrinsic enjoyment → Y</td>
<td>-0.19* (0.09)</td>
<td>-0.365, -0.024</td>
<td>0.07 (0.14)</td>
</tr>
<tr>
<td>H2e</td>
<td>AR Experience → Efficiency → Y</td>
<td>0.65*** (0.11)</td>
<td>0.418, 0.873</td>
<td>0.86*** (0.19)</td>
</tr>
<tr>
<td>H2f</td>
<td>AR Experience → Economic value → Y</td>
<td>-0.10 (0.09)</td>
<td>-0.273, 0.071</td>
<td>0.09 (0.14)</td>
</tr>
<tr>
<td>H2g</td>
<td>AR Experience → Service excellence → Y</td>
<td>0.01 (0.10)</td>
<td>-0.191, 0.201</td>
<td>-0.25 (0.17)</td>
</tr>
<tr>
<td>H3</td>
<td>Moderator direct effect (W→Y)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information overload → Y</td>
<td>-0.05 (0.14)</td>
<td>-0.317, 0.212</td>
<td>-0.11 (0.22)</td>
</tr>
<tr>
<td>H3</td>
<td>Interaction effects (M * W→Y)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visual appeal * Information overload → Y</td>
<td>-0.01 (0.04)</td>
<td>0.934, -0.076</td>
<td>0.03 (0.06)</td>
</tr>
<tr>
<td></td>
<td>Entertainment value * Information overload → Y</td>
<td>-0.03 (0.03)</td>
<td>-0.098, 0.037</td>
<td>0.06 (0.06)</td>
</tr>
<tr>
<td></td>
<td>Escapism * Information overload → Y</td>
<td>-0.01 (0.02)</td>
<td>-0.043, 0.034</td>
<td>0.03 (0.03)</td>
</tr>
<tr>
<td></td>
<td>Intrinsic enjoyment * Information overload → Y</td>
<td>0.07** (0.03)</td>
<td>0.022, 0.128</td>
<td>0.02 (0.04)</td>
</tr>
<tr>
<td></td>
<td>Efficiency * Information overload → Y</td>
<td>-0.07* (0.03)</td>
<td>-0.139, -0.003</td>
<td>-0.14* (0.06)</td>
</tr>
<tr>
<td></td>
<td>Economic value * Information overload → Y</td>
<td>0.02 (0.03)</td>
<td>-0.027, 0.077</td>
<td>-0.04 (0.04)</td>
</tr>
<tr>
<td></td>
<td>Service excellence * Information overload → Y</td>
<td>0.02 (0.03)</td>
<td>-0.037, 0.079</td>
<td>0.06 (0.05)</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001
LLCI = low limit confidence interval, ULCI = upper limit confidence interval
Table 5.2 present the unstandardized regression coefficients for paths $X \rightarrow Y$; $X \rightarrow M \rightarrow Y$; $M \ast W \rightarrow Y$ in the moderated mediation model for each outcome. The direct effect of previous AR experience was significant on willingness to purchase using AR (path $c'$: $\beta = 0.39$, $p < 0.001$, 95% CI 0.204, 0.567). However, the direct effect of previous AR experience was not significant on attitude toward AR (path $c'$: $\beta = 0.09$, $p = 0.095$, 95% CI -0.016, 0.206), and on decision confidence (path $c'$: $\beta = 0.14$, $p = 0.085$, 95% CI -0.020, 0.311). These findings support only $H_{1b}$.

The effects of experiential value on attitude toward AR are highlighted in Table 5.2. Three aspects of experiential value significantly predicted attitude toward AR: Entertainment value (path $b_1$: $\beta = 0.25$, $p = 0.021$, 95% CI 0.038, 0.47), Intrinsic enjoyment (path $b_1$: $\beta = -0.19$, $p = 0.928$, 95% CI -0.365, -0.024), and Efficiency (path $b_1$: $\beta = 0.65$, $p < 0.001$, 95% CI 0.418, 0.873). The rest of experiential value aspects did not predict attitude toward AR: Visual appeal (path $b_1$: $\beta = 0.23$, $p = 0.055$, 95% CI -0.005, 0.475), Escapism (path $b_1$: $\beta = 0.04$, $p = 0.489$, 95% CI -0.074, 0.154), Economic value (path $b_1$: $\beta = -0.10$, $p = 0.248$, 95% CI -0.273, 0.071), and Service excellence (path $b_1$: $\beta = 0.01$, $p = 0.928$, 95% CI -0.191, 0.201). The findings support hypotheses $H_{2b}$, $H_{2d}$, $H_{2e}$. Next, the moderated mediation showed a significant interaction effect between intrinsic enjoyment and information overload on attitude toward AR (path $b_3$: $\beta = 0.07$, $p = 0.005$, 95% CI 0.022, 0.128), and between efficiency and information overload on attitude toward AR (path $b_3$: $\beta = -0.07$, $p = 0.039$, 95% CI -0.139, -0.003), supporting hypothesis $H_{3a}$.

The effects of experiential value on willingness to purchase using AR are highlighted in Table 5.2. One aspects of experiential value positively predicted attitude toward AR: Efficiency (path $b_1$: $\beta = 0.86$, $p < 0.000$, 95% CI 0.492, 1.236). This finding supports $H_{2e}$. The rest of experiential value aspects did not predict willingness to purchase using AR: Visual appeal (path $b_1$: $\beta = 0.14$, $p = 0.472$, 95% CI -0.249, 0.537), Entertainment value (path $b_1$: $\beta = 0.01$, $p = 0.928$, 95% CI -0.191, 0.201).
0.01, \( p = 0.97 \), 95% CI -0.346, 0.359), Escapism (path \( b_1: \beta = -0.02, p = 0.821 \), 95% CI -0.207, 0.165), Intrinsic enjoyment (path \( b_1: \beta = 0.07, p = 0.617 \), 95% CI -0.208, 0.350), Economic value (path \( b_1: \beta = 0.09, p = 0.521 \), 95% CI -0.189, 0.373), and Service excellence (path \( b_1: \beta = -0.25, p = 0.128 \), 95% CI -0.582, 0.074). Next, the moderated mediation showed a significant interaction effect between efficiency and information overload on willingness to purchase using AR (path \( b_3: \beta = -0.14, p = 0.011 \), 95% CI -0.255, -0.033). This finding supports H\(_{3b}\).

The effects of experiential value on decision confidence are highlighted in Table 5.3. One aspect of experiential value positively predicted attitude toward AR: Efficiency (path \( b_1: \beta = 0.78, p < 0.001 \), 95% CI 0.442, 1.119). This supports hypothesis H\(_{2e}\). The rest of experiential value aspects did not predict decision confidence: Visual appeal (path \( b_1: \beta = 0.04, p = 0.816 \), 95% CI -0.315, 0.400), Entertainment value (path \( b_1: \beta = 0.25, p = 0.126 \), 95% CI -0.071, 0.571), Escapism (path \( b_1: \beta = -0.08, p = 0.328 \), 95% CI -0.254, 0.085), Intrinsic enjoyment (path \( b_1: \beta = -0.14, p = 0.276 \), 95% CI -0.395, 0.113), Economic value (path \( b_1: \beta = -0.02, p = 0.848 \), 95% CI -0.281, 0.231), and Service excellence (path \( b_1: \beta = 0.19, p = 0.222 \), 95% CI -0.113, 0.484). Next, the moderated mediation showed a significant interaction effect between escapism and information overload on decision confidence (path \( b_3: \beta = 0.13, p < 0.000 \), 95% CI 0.071, 0.186), and between efficiency and information overload on decision confidence (path \( b_3: \beta = -0.16, p = 0.002 \), 95% CI -0.258, -0.056). These findings support H\(_{3c}\).

Table 5.3 Index of sig. moderated mediation

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Sig. mediator</th>
<th>Index</th>
<th>Boot SE</th>
<th>Boot LLCI</th>
<th>Boot ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision confidence</td>
<td>Escapism</td>
<td>0.05</td>
<td>0.022</td>
<td>0.016</td>
<td>0.101</td>
</tr>
<tr>
<td></td>
<td>Efficiency</td>
<td>-0.07</td>
<td>0.029</td>
<td>-0.128</td>
<td>-0.014</td>
</tr>
<tr>
<td>Willingness to purchase using AR</td>
<td>Efficiency</td>
<td>-0.06</td>
<td>0.027</td>
<td>-0.122</td>
<td>-0.015</td>
</tr>
<tr>
<td>Attitude toward AR</td>
<td>Intrinsic enjoyment</td>
<td>0.04</td>
<td>0.018</td>
<td>0.005</td>
<td>0.078</td>
</tr>
</tbody>
</table>

* Only sig mediators are presented in this table; Boot = bootstrapped, SE = standard error, LLCI = limit confidence interval, ULCI = upper limit confidence interval
Results of the analysis of the conditional indirect effect of AR experience on decision confidence, willingness to purchase using AR and attitude toward AR through experiential value for information overload were as follows: As shown in Table 5.3, for decision confidence, the indirect effect was significant with escapism (index = 0.05, Boot SE = 0.022, 95% Boot CI 0.016, 0.101) and efficiency (index = -0.07, Boot SE = 0.029, 95% Boot CI -0.128, -0.014). For willingness to purchase using AR, the indirect effect was significant with efficiency (index = -0.06, Boot SE = 0.027, 95% Boot CI -0.122, -0.015). And for attitude toward AR, the indirect effect was significant with intrinsic enjoyment (index = 0.04, Boot SE = 0.018, 95% Boot CI 0.005, 0.078).

As shown in Table 5.3 and Table 5.4, the magnitude of the relationship differed. The moderation effect of information overload on the relationship between escapism and decision confidence was significant for information overload 3.0 (β = 0.12, Boot SE = 0.045, 95% Boot CI 0.040, 0.218), and 4.2 (β = 0.19, Boot SE = 0.067, 95% Boot CI 0.063, 0.332). Further, the moderation effect of information overload on the relationship between efficiency and decision confidence was significant for information overload 1.4 (β = 0.23, Boot SE =
0.076, 95% Boot CI 0.101, 0.401) and 3.0 ($\beta = 0.13$, Boot SE = 0.045, 95% Boot CI 0.054, 0.228).

The moderation effect of information overload on the relationship between efficiency and willingness to purchase using AR was significant for information overload 1.4 ($\beta = 0.28$, Boot SE = 0.083, 95% Boot CI 0.129, 0.457), 3.0 ($\beta = 0.18$, Boot SE = 0.054, 95% Boot CI 0.083, 0.294), and 4.2 ($\beta = 0.11$, Boot SE = 0.049, 95% Boot CI 0.018, 0.210).

The moderation effect of information overload on the relationship between efficiency and attitude toward AR was significant for information overload 4.2 ($\beta = 0.06$, Boot SE = 0.033, 95% Boot CI 0.003, 0.134).

*Interpretation of results*

Prior experience with AR has an impact on the experiential value evaluations by consumers. This is consisted to prior literature, which has identified the role of prior experience with the technology as influencing future evaluations (Lemon & Verhoef, 2016). Therefore, the role of experiential value is linked to previous experience with AR. However, it is interesting to note that, out of the three outcomes considered, prior experience is a predictor of only willingness to purchase using AR. Which means that prior experience does not have a significant effect on attitude toward AR, or decision confidence.

Efficiency was the only experiential value that was significant consistently throughout all outcomes. Moreover, the interaction of efficiency and information overload led to a significant interaction with all three outcomes, attitude toward AR, willingness to purchase using AR, and decision confidence. As far as attitude toward AR, other than efficiency, also entertainment value and intrinsic enjoyment were significant variables. This signifies that the attitude toward AR is based on the entertainment value and intrinsic enjoyment that it brings to the consumers. Intrinsic enjoyment had a negative coefficient. Overall intrinsic enjoyment is negative, except when someone is overload. In fact, intrinsic enjoyment can detract from
the experience, except when someone is overloaded. As when information overload was considered, intrinsic enjoyment led to a positive significant outcome, but not entertainment value. This means that entertainment value is always important.

As far as willingness to purchase using AR, previous experience with AR and efficiency were the only significant variables. This could mean that consumers, when considering whether to use this technology or not to complete a purchase are interested in the efficiency and the value that brings to the experience. However, in saying that, efficiency had a significant interaction also when information overload was considered. This means that information overload would lead to a decrease in importance of efficiency. As far as decision confidence, efficiency was a significant indicator. Therefore, the considerations made for the previous outcomes apply. However, when information overload was considered, other than efficiency, also escapism showed significant interactions. From the significant relationships outlined in the model, implications for theory and practice are drawn.

When the moderating role of information overload was considered, results indicated that the impact of escapism and intrinsic enjoyment increased, whereas on the other hand, the effect of efficiency decreased. Therefore, the more overloaded a consumer is, the less impact efficiency has. In other words, information overload weakens efficiency. From this finding, implications are drawn.

5.5 Discussion
The retail industry is undergoing changes that have an impact on consumers’ perceptions and experiences. Technology is one of the main factors driving this evolution. AR is one of the customer-facing technologies that has been gaining increasing traction. Since the use of AR as a shopping tool is still novel, it is important to really understand the customers and their interactions with the technology, to better shape the experience. To maximise the benefits, it is important to understand the motivations that lead consumers to use the technology, and the
outcomes that result. Therefore, this study builds on previous knowledge by understanding the impact the motivations have on a relative outcome of using the technology. Specifically, it identifies the antecedents and boundary conditions of decision-making outcomes of AR as a shopping tool.

In order to achieve this aim, a conceptual model was developed based on the literature, and concepts identified in the previous studies outlined in this thesis. The results from this study support the model and support the interplay of variables that define the model. These highlight the importance of understanding consumers and the effects of this technology on the experience, as these promote a widespread understanding of the technology. More specifically, from the results, implications for theory and practice are drawn.

*Implcation for theory*

This study draws on motivation theory to explain consumers’ outcomes of interacting with AR as a shopping tool. Motivation theory consists of two elements: 1) extrinsic motivation and 2) intrinsic motivation (Qin et al., 2014). This study builds on this theory and highlights that both motivations are important, however they differ based on the outcomes. In this study emerge the importance of extrinsic motivations when achieving an outcome. Efficiency was considered an extrinsic motivation element, and it was found to be a significant variable for all three outcomes, attitude toward AR, willingness to purchase using AR, and decision confidence. On the other hand, it was noted that entertainment value and intrinsic enjoyment were significant only for attitude toward AR. Both entertainment value and intrinsic enjoyment can be considered intrinsic motivations (Qin et al., 2021). This means that as far as influencing consumers’ attitudes toward AR, it is important to consider the intrinsic motivations too. However, for more extrinsic outcomes, such as willingness to purchase
using AR and decision confidence, this is not the case. This is consistent with previous studies (Dacko, 2017), where entertainment was not rated as highly by users as efficiency.

This study aims to understand the antecedents and boundary conditions of decision-making outcomes of AR as a shopping tool. When analysing the impact of AR on the customer experience, literature has focused on the TAM (Davis et al., 1989). The basis of the TAM is that a technology should be easy to use for consumers to use it. This has a strong focus on extrinsic motivation values. However, the results from this study highlight that when considering a technology, such as AR, it is important to understand that it is not enough to focus on extrinsic values. In fact, intrinsic values appeared to be as important. The importance of considering both intrinsic and extrinsic values support the use of motivation theory as a basis of application in the use of technology, more so than simply the TAM. This study builds on the use of motivation theory as a basis of the investigation of the effects of AR as a shopping tool on the customer experience. Moreover, it addresses the call for research to better understand the use of AR in retail with the aid of motivation theory (Lee et al., 2005).

Information overload played a moderating role in the model, and this is consistent with stimulus load theory. Stimulus load theory provides a valuable explanation for the balancing of too little versus too much stimulation (Haugtvedt et al., 2018). As far as information overload, theory suggests that it can lead to negative outcomes. The interaction with efficiency is significant with all three outcomes. While, with attitude toward AR, it is significant also with intrinsic enjoyment. And with decision confidence, escapism. This means, that when the consumer is overloaded, enjoyment and escapism are more important than efficiency.

Theory, such as the TAM suggests that when consumers are overloaded, retailers should make the task easier, more efficiency. However, the results from this study show that
that may not be the case. When consumers are overloaded, the impact of efficiency lessens, whereas escapism increases. Therefore, this study suggests that when consumers are overloaded, it is important to focus on escapism and intrinsic enjoyment, rather than making it more efficient. From this consideration, further implications for practice are derived.

**Implications for practice**

Exploring antecedents and boundary conditions of AR as a shopping tool can provide valuable insights to retailers. AR is an emerging retail technology; however, little is known about the effect of prior experience with the technology on the consumer behaviour. This study addresses this and identifies the role of previous experience with the outcome. If the consumer has previous experience with the technology, they are more likely to make a purchase using the technology.

Moreover, the findings of this study highlighted the importance of efficiency. Retailers need to make sure their AR tool helps consumers to achieve an outcome. In fact, efficiency was identified being an aspect of extrinsic motivation, whereby it should help consumers achieve a goal. On the other hand, if the aim of the retailer is to increase the attitude toward AR, that is where intrinsic motivations come into play. In fact, entertainment value and intrinsic enjoyment were identified being significant variables as far as attitudes toward AR. Therefore, an AR tool should not be just efficient as the opposite outcome could occur. In fact, especially in difficult situations (i.e., being overloaded), efficiency can lead to a negative outcome. In the case of overload, consumers focus on intrinsic motivations, such as escapism and enjoyment. Therefore, a key take-away for retailers, is that when consumers are overloaded, they should not focus on making the tool more efficient but making it more enjoyable.
Limitations and future directions

This research is subject to limitations. First, this study was cross-sectional in nature which means the data was collected at a single point in time. Since AR is still an emerging technology, it is believed perceptions and attitude toward AR may change and develop over time. Future research could build on this study and identify whether, and how, these perceptions may evolve over time.

Second, this study focuses on a single product category – furniture. While this context is one that has seen significant investment in AR, future research should consider the applicability of these findings to other categories. There may be other important mediators and moderators that enhance (or decrease) AR attitudes in different retail contexts.

Finally, previous experience with AR is identified being a predictor. At this stage this technology is not widespread yet, hence in the future more consumers will probably have more experience with this technology, leading to different results. As AR is still in its infancy, future research could investigate whether these results would be consistent also when the technology reaches a more widespread application.

5.6 Chapter summary

The aim of this chapter was to address the second research objective: Investigate customer experience with AR as a shopping tool on decision making outcomes. To achieve this, a conceptual model was formulated based on the literature and the previously conducted exploratory study, and a process model was developed. Moderated mediation effects were hypothesised and tested on a sample of 503 consumers through data collected in an online survey. The findings indicated that motivations mediate the decision-making outcomes. More specifically, efficiency is the only consistent mediator throughout all relationships. This means that making sure using AR as a tool for shopping should be efficient. However, when information overload was included in the relationship, it was found that the importance of
efficiency decreased the more overload was perceived, and on the other hand, the importance of escapism and intrinsic enjoyment was found. These results deliver significant implications to theory and practice. To theory, by understanding the interplay of extrinsic and intrinsic motivations balancing motivations theory and stimulus load. And to practice, by highlighting the importance of providing a product that not only provides efficiency, but also enjoyment. Taken together, these contributions provide retailers an ability to better understand the influence of motivations and prior experience on different outcomes when using AR as a shopping tool.
Chapter 6: Segmenting consumer attitudes toward AR (Study 3)

6.1 Chapter introduction

The previous studies generated a more in-depth understanding on the customer experience with AR, and related influence on decision-making outcomes. The aim of this study is to explore how consumers differ in terms of the value they receive from using AR, as well as the trade-offs they experience when using the technology for shopping. This study addresses the third research objective: Identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool. To achieve this, consumers are segmented based on their perceptions of AR as a shopping tool, to develop understanding of heterogeneity in terms of consumer attitudes and behaviours. First, consumer segments based on AR attitudes and behaviours in retail are established. Second, the antecedents of these consumer segments are identified, including innovativeness, time pressure, shopping enjoyment, price consciousness, perceived ease of use, and perceived usefulness. Finally, the change in attitude toward AR based on an educational stimulus are investigated. Taken together, these contributions provide retailers an ability to better understand the heterogeneity that exists regarding AR in retail. The chapter contains six sections. This section (Section 6.1) provides the background to this study. The conceptual framework and related hypotheses are delineated in Section 6.2. The method, including the sample and procedure and measurements, construct validity and reliability, and data analysis are outlined in Section 6.3. The results of the analysis are explained in Section 6.4, and the findings are discussed in Section 6.5. The final section summarises the chapter.

The study presented in this chapter underpins a paper that has been peer reviewed and published in the International Journal of Retail & Distribution Management (ABDC A-ranked), appearing as: Romano, B., Sands, S., & Pallant, J.I. (2022). Virtual shopping: segmenting

6.2 Conceptual framework and hypotheses development

The aim of this study is to segment consumers based on their attitudes toward AR in retail, and to understand the antecedents of these segments. In line with prior segmentation studies (e.g., Konuş et al., 2008; Maggioni et al., 2020), no assumptions are made on the number or nature of these segments. Instead, existing theories are drawn to identify the relevant constructs used as the basis for segmentation. The review of the literature in Chapter 2: has highlighted the elements that have an impact on the way consumers perceive AR in the retail setting. Below the key concepts are highlighted and relevant hypotheses developed.

How consumers might respond to AR retail experiences

To better understand consumers and their perceptions of AR, potential responses to AR which could distinguish the segments are first explored. In this regard, consumer attitudes toward the technology (AR) are important (Rese et al., 2014), as these attitudes indicate how technology is perceived. Attitudes are formed based on different stimuli, and they incorporate aspects such as emotions and brand perceptions (Ketron et al., 2016). This concept helps indicate how the consumer feels about the technology in a given setting. Since the aim is to identify how AR influences the customer experience, attitude toward AR is a key concept. Hence, it is proposed that:

\[ H_1: \text{AR attitude is a significant indicator of AR consumer segments} \]

Apart from consumer attitudes toward AR, it is important to consider different aspects of customer experience. Customer experience includes both intrinsic and extrinsic values (Holbrook
et al., 1984). The former includes aspects such as playfulness and aesthetics, whereas the latter includes consumer return on investment and service excellence (Mathwick et al. 2001). Experiential value reflects the benefits derived from perceptions related to experiential dimensions, such as visual appeal, entertainment value, escapism, intrinsic enjoyment, efficiency, economic value, and service excellence (Mathwick et al. 2001). Since the experience plays a role in the perception and acceptance of AR, it is proposed that:

**H2**: Experiential value is a significant indicator of AR consumer segments

With the advent of technology in retail, consumers are faced with an increasing number of items from which to choose (Robertson et al., 2020). Due to the simplicity of retrieving information online, consumers have become more informed (Guha et al., 2021). AR allows consumers to experience products prior to physically interacting with them early in the purchase journey (Romano et al., 2020). This makes it possible for consumers to become more certain about a product’s features and feel empowered, increasing decision confidence (Garaus & Wagner, 2016). However, according to stimulus load theory, if consumers are exposed to too much information, information overload could occur (Jacoby et al., 1974). Therefore, it is proposed that:

**H3**: Perceived information overload is a significant indicator of AR consumer segments

The virtual experience of trying on clothing can increase conversion rates from browsing to sales because of the consumer’s greater confidence in decision making (Oh et al., 2008; Andrews, 2016). Decision confidence refers to the degree of certainty that people have about the appropriateness of their decisions (Oh et al., 2008). Prior research suggests that decision confidence is a reliable predictor of consumer attitudes and actual behaviours (Guillet et al., 2020). Oh et al. (2008) found that virtual reality increases consumer decision confidence; hence,
it is predicted that consumer decision confidence derived from AR may differ across segments as well. Hence, it is proposed that:

\[ H_4: \text{Decision confidence is a significant indicator of AR consumer segments} \]

*How individual consumers might differ in their evaluations (covariates)*

AR is a relatively new technology; therefore, it is important to understand the factors that may play a role in its acceptance. The degree to which consumers accept any new technology varies based on their perceptions of ease of use, usefulness, and general attitude toward the use of the technology (Davis et al., 1989). In this study, the focus is on perceived ease of use and perceived usefulness as segment covariates. Perceived ease of use is the degree to which a person believes that the use of a particular system would be free of effort, being easy to comprehend or use (Davis et al., 1989). It is a prominent construct in research on the use of technology in the retail industry (Kumar, 2021). Whereas perceived usefulness refers to the belief that the use of a particular system would lead to a useful outcome. Hence, it is proposed that:

\[ H_5: \text{Perceived ease of use is a significant segment covariate} \]

\[ H_6: \text{Perceived usefulness is a significant segment covariate} \]

Individuals who share demographic and/or psychographic characteristics can also have similar attitudes and behaviours towards technologies (Maggioni et al., 2020). Psychographic factors include innovativeness, time pressure, price consciousness, and shopping enjoyment. These factors have been used to segment consumers in the case of channel preferences (Konuş et al. 2008; Sands et al., 2016) and views towards personalization through data (Pallant et al., 2022). Innovativeness is the degree to which consumers seek out new experiences and different products (Konuş et al., 2008). Time pressure refers to an individual’s predisposition to consider time as a scarce resource (Kleijnen et al., 2007). Time pressure may
influence one’s attitude toward technology and its usefulness. Price consciousness refers to the importance consumers place on price and price changes. Although this might not be directly related to AR, it could be related to consumers’ decision confidence when given information. Shopping enjoyment is the extent to which the individual enjoys shopping. In the case of AR, this could influence the perception of the technology and its potential usefulness (Romano et al., 2020). In view of these considerations, it is proposed that:

H7: Individual psychographic factors – innovativeness (7a), time pressure (7b), price consciousness (7c), and shopping enjoyment (7d) – are significant segment covariates

In this study, demographic variables such as age, gender, education, and income are also included as segment covariates as they have been shown to influence consumer behaviour (Raajpoot et al., 2008). Therefore, it is believed that demographics could influence attitudes toward a new technology. Hence, it is proposed that:

H8: Demographic variables – specifically, age (8a), gender (8b), education (8c), and income (8d) – are significant segment covariates

The conceptual framework is depicted in Figure 6.1. Specifically, the role of four segmentation indicator variables and seven covariates is investigated.
Data and sample

Cloud Research, an online research platform, was used to recruit 520 US respondents for this study. The chosen unit of analysis were retail consumers. This was defined as people over the age of 18 who had purchased an item in a physical and/or online retail store in the last three months (Deloitte, 2019). Therefore, two screening questions were used to exclude respondents who did not meet these recruitment criteria. The first screening question asked if respondents were aged 18 and over. The second concerned respondents’ involvement in the purchase of an item in a physical and/or online retail store in the last three months.

Online panels have been shown to provide access to demographically diverse respondents and a reliable representation of the population (Buhrmester et al., 2011). Data cleaning removed 3.3% (n=17) of the sample (i.e., incomplete responses, failing attention checks), yielding a final sample of 503 (46% female, Mean_{age} = 36, S.D. = 9.73), deemed sufficient for segmentation as it is more than 30 times the number of variables in the empirical model (Dolnicar et al., 2016).
Procedure and Measurement

The research ethics application was approved by Swinburne University Human Research Ethics Committee (SUHREC), project 20204160-4940. Upon qualifying for participation, respondents were asked about their general experience with AR in shopping situations (57.9% reported some experience with AR). Respondents were then asked to rate their general attitude toward AR as a tool for shopping (items adapted from Rese et al., 2014), which was used as a baseline assessment (time 1). Participants then watched a short video showing AR in use that explained how AR can assist in shopping situations in the context of furniture shopping. This setting was informed by previous studies (Oh et al., 2008; Kang et al., 2020). Next, respondents rated a battery of items based on the scenario of furniture shopping, including a time 2 (post-video) assessment of attitude toward AR. The aim of measuring attitude toward AR at time 1 and time 2 was to determine whether a stimulus video could improve consumer attitude toward AR. The survey questions are outlined in Appendix C1. – Survey.

All measurement variables were adapted from existing scales and are outlined in Appendix C2. – Confirmatory factor analysis, along with scale items, validity, and reliability analysis. Perceived ease of use and perceived usefulness were adapted from the Technology Acceptance Model (TAM) (McLean & Wilson, 2019). Perceived information overload measures whether the amount of information received exceeds consumers’ information processing capabilities, leading to information overload, and was adapted from Li (2017). Decision confidence measures the degree of certainty that consumers have about their decisions and was adapted from Guillet et al. (2020). The Experiential Value Scale (EVS) measures the benefits derived from the perceptions of return on investment, service excellence, playfulness, and aesthetic appeal (adapted from Mathwick et al., 2001).
Finally, psychographics covariates were adapted from Konuş et al. (2008), and include innovativeness, time pressure, and shopping enjoyment. Demographic covariates were gender, age, and household income.

*Construct validity and reliability*

Prior to the main analysis, exploratory and confirmatory factor analysis were conducted to validate scales. CFA revealed that the measures used displayed adequate psychometric properties and appeared to be free of systematic bias (Hair, 2006). All standardized factor loadings were greater than .70 (except for shopping behaviour) providing support for convergent validity. These items were retained as the other reliability and validity measures of all the instruments were satisfactory (Adapa et al., 2020). Preliminary reliability analyses revealed that the internal consistency of all scales was above the minimum threshold (Cronbach $\alpha > .70$) except for EVS and shopping behaviour. However, Taber (2018) proposes that the threshold values of Cronbach's alpha seem not to suggest that the lower loadings imply an unsatisfactory value. Confirmatory factor analysis and construct reliability are found in Appendix C2. – Confirmatory factor analysis.

*Data analysis*

Segmentation analysis was conducted with Latent-Class Cluster Analysis (LCA) using the Latent GOLD software. Latent GOLD explores the extent to which the indicators and covariates differ between the resulting consumers segments (Vermunt & Magidson, 2013). This clustering method provides a statistical basis for selecting the number of clusters to include (Sands et al., 2020). The LCM also accommodates a variety of variables from several different scale types (Vermunt & Magidson, 2013). An analysis of variance (ANOVA) was conducted to identify whether differences in change in attitude towards AR existed for each segment.
6.4 Segmentation results

LCA is an efficient clustering method that provides a statistical basis for deciding on the final number of clusters to be included (Vermunt & Magidson, 2013). LCA solutions were estimated for a variety of different cluster sizes (1 to 10). The best model was selected by applying the Bayesian information criterion (BIC), with classification error used as a secondary criterion (Nylund et al., 2007). The four-cluster model provided the lowest BIC and had a minimal classification error as shown in Table 6.1; hence, this model was deemed the most suitable and chosen as the final solution.

Table 6.1 Log-likelihood statistics for model selection

<table>
<thead>
<tr>
<th>Model</th>
<th>LL</th>
<th>BIC(LL)</th>
<th>Npar</th>
<th>Class.Err.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Cluster</td>
<td>-312.21</td>
<td>6274.19</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2-Cluster</td>
<td>-2607.18</td>
<td>5444.51</td>
<td>37</td>
<td>0.03</td>
</tr>
<tr>
<td>3-Cluster</td>
<td>-2382.79</td>
<td>5176.15</td>
<td>66</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>4-Cluster</strong></td>
<td><strong>-2236.93</strong></td>
<td><strong>5064.82</strong></td>
<td><strong>95</strong></td>
<td><strong>0.06</strong></td>
</tr>
<tr>
<td>5-Cluster</td>
<td>-2158.66</td>
<td>5088.68</td>
<td>124</td>
<td>0.06</td>
</tr>
<tr>
<td>6-Cluster</td>
<td>-2099.33</td>
<td>5150.40</td>
<td>153</td>
<td>0.07</td>
</tr>
<tr>
<td>7-Cluster</td>
<td>-2018.78</td>
<td>5169.71</td>
<td>182</td>
<td>0.06</td>
</tr>
<tr>
<td>8-Cluster</td>
<td>-1941.64</td>
<td>5195.82</td>
<td>211</td>
<td>0.04</td>
</tr>
<tr>
<td>9-Cluster</td>
<td>-1925.99</td>
<td>5344.91</td>
<td>240</td>
<td>0.04</td>
</tr>
<tr>
<td>10-Cluster</td>
<td>-1861.77</td>
<td>5396.88</td>
<td>269</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Notes: LL = Log likelihood; BIC(LL) = Bayesian information criterion (based on log-likelihood); Npar = number of model parameters; Class.Err. = Classification error.

Table 6.2 displays the results for the indicator variables, covariates, and profiling variables for each cluster. All hypotheses were proven to be significant aside from price consciousness (H7c; p = .07), and demographic elements (H8a; p = .76; H8b; p = 0.98; H8c; p = 0.55). Therefore, it can be concluded that consumers’ attitude toward AR (H1), experiential value (H2), perceived information overload (H3), and decision confidence (H4) are significant indicators when segmenting consumer perceptions toward AR as a shopping tool. Furthermore, perceived ease of
use (H5), perceived usefulness (H6), and psychographic factors including innovativeness (H7a), time pressure (H7b), and shopping enjoyment (H7c) are significant covariates in segmenting consumer attitudes toward AR as a shopping tool. Table 6.3 provides the means for AR attitude before (time 1) and after (time 2) the provision of the video stimulus.

Table 6.2 Latent-class cluster profiles (n=503) and hypotheses testing

<table>
<thead>
<tr>
<th>Cluster</th>
<th>AR Averse (12%)</th>
<th>AR Hesitant (32%)</th>
<th>AR Open (39%)</th>
<th>AR Enthusiastic (14%)</th>
<th>Variabl e Sig.</th>
<th>Hypotheses/ Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicator variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR Attitude</td>
<td>3.67</td>
<td>5.42</td>
<td>6.25</td>
<td>6.91</td>
<td>&lt;0.001</td>
<td>H1/ Yes</td>
</tr>
<tr>
<td>Experiential value</td>
<td>3.60</td>
<td>4.68</td>
<td>5.47</td>
<td>6.34</td>
<td>&lt;0.001</td>
<td>H2/ Yes</td>
</tr>
<tr>
<td>Decision confidence</td>
<td>3.14</td>
<td>4.20</td>
<td>5.13</td>
<td>6.34</td>
<td>&lt;0.001</td>
<td>H3/ Yes</td>
</tr>
<tr>
<td>Information overload</td>
<td>3.61</td>
<td>3.34</td>
<td>2.70</td>
<td>2.18</td>
<td>&lt;0.001</td>
<td>H3/ Yes</td>
</tr>
<tr>
<td><strong>Covariate variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>3.91</td>
<td>4.40</td>
<td>5.04</td>
<td>5.64</td>
<td>&lt;0.001</td>
<td>H5/ Yes</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>3.82</td>
<td>5.36</td>
<td>6.16</td>
<td>6.82</td>
<td>&lt;0.001</td>
<td>H6/ Yes</td>
</tr>
<tr>
<td>Innovativeness</td>
<td>2.53</td>
<td>3.08</td>
<td>4.16</td>
<td>5.01</td>
<td>&lt;0.001</td>
<td>H7a/ Yes</td>
</tr>
<tr>
<td>Time pressure</td>
<td>3.83</td>
<td>4.24</td>
<td>4.59</td>
<td>4.64</td>
<td>0.019</td>
<td>H7b/ Yes</td>
</tr>
<tr>
<td>Price consciousness</td>
<td>5.62</td>
<td>5.64</td>
<td>5.95</td>
<td>6.30</td>
<td>0.07</td>
<td>H7c/ No</td>
</tr>
<tr>
<td>Shopping enjoyment</td>
<td>4.58</td>
<td>4.69</td>
<td>5.48</td>
<td>6.10</td>
<td>&lt;0.001</td>
<td>H2/ Yes</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>35</td>
<td>0.76</td>
<td>H8a/ No</td>
</tr>
<tr>
<td>Gender - Female</td>
<td>49%</td>
<td>46%</td>
<td>44%</td>
<td>46%</td>
<td>0.98</td>
<td>H8b/ No</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.55</td>
<td>H8c/ No</td>
</tr>
<tr>
<td>High School</td>
<td>31%</td>
<td>21%</td>
<td>25%</td>
<td>35%</td>
<td>0.38</td>
<td>H8d/ No</td>
</tr>
<tr>
<td>College degree</td>
<td>54%</td>
<td>60%</td>
<td>60%</td>
<td>42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s degree</td>
<td>9%</td>
<td>13%</td>
<td>12%</td>
<td>19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>34%</td>
<td>27%</td>
<td>16%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$20,000 - $40,000</td>
<td>29%</td>
<td>21%</td>
<td>24%</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$40,001 - $60,000</td>
<td>14%</td>
<td>23%</td>
<td>24%</td>
<td>18%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$60,001 – $90,000</td>
<td>12%</td>
<td>16%</td>
<td>18%</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$90,001 – $120,000</td>
<td>3%</td>
<td>5%</td>
<td>10%</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$120,001 - $150,000</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than $150,000</td>
<td>4%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interpretation of segments and their characteristics

6.4.1.1  Segment 1: AR Averse (segment size 12%)

The first segment represents 12% of the shopping population; these consumers have the lowest attitude toward AR (3.67) as a shopping tool. Given the segment’s general perception of AR, this segment is labelled AR Averse. Those in this segment rate the lowest positive benefits (attitude = 3.67, value = 3.60, decision confidence = 3.14) and report having the highest relative information overload from using AR (3.61). AR Averse consumers exhibit the lowest perceived ease of use (3.91) and perceived usefulness (3.82) of AR for shopping. This segment has very low innovativeness (2.53) and time pressure (3.83). It was found that AR Averse consumers do shift their attitude in regard to AR when presented with detailed educational information about how AR can assist them with the shopping process. However, they had the smallest relative change (time 1 vs. time 2) in attitude towards AR.

6.4.1.2  Segment 2: AR Hesitant (segment size 32%)

The second segment represents 32% of the shopping population. These consumers have a moderately positive attitude toward AR (5.42) as a shopping tool. Given the segment’s perception of AR, this segment is labelled AR Hesitant. Those in this segment give a moderate rating to all variables (attitude = 5.42, value = 4.68, decision confidence = 4.20; information overload = 3.34). AR Hesitant consumers exhibit moderate perceived ease of use (4.40) and
perceived usefulness (5.36) of AR for shopping. This segment has low innovativeness (3.08) and moderate time pressure (4.24). It was found that AR Hesitant consumers shifted their attitude toward AR when presented with detailed educational information about the way that AR can help them when shopping. Specifically, those in this segment had the second largest positive change in attitude toward AR (Mean$_{time1}$ = 4.73, Mean$_{time2}$ = 5.42, p = <0.001).

6.4.1.3 Segment 3: AR Open (segment size 39%)

The third segment is the largest, representing 39% of the shopping population. These consumers have generally positive attitudes toward AR as a shopping tool (6.25). Given the segment’s perception of AR, this segment is labelled AR Open. Those in this segment rate relatively high (attitude = 6.25, value = 5.47, decision confidence = 5.13) and low in terms of information overload (2.70). AR Open consumers exhibit relatively high perceived ease of use (5.04) and the highest relative perceived usefulness (6.16) of AR for shopping. This segment has moderate innovativeness (4.16) and time pressure (4.59). It was found that AR Open consumers had the greatest change in attitude towards AR (Mean$_{time1}$ = 5.44, Mean$_{time2}$ = 6.25, p = <0.001).

6.4.1.4 Segment 4: AR Enthusiastic (segment size 14%)

The final segment represents 14% of the shopping population. These consumers have very positive attitudes toward AR as a shopping tool (6.91). Given the segment’s perception of AR, this segment is labelled AR Enthusiastic. Those in this segment rate high attitude (6.91), value (6.34) and decision confidence (6.34) and have the lowest perceptions of information overload (2.18). AR Enthusiastic consumers exhibit the highest perceived ease of use (5.64) and perceived usefulness (6.82) of AR for shopping. This segment has high innovativeness (5.01), time pressure (4.64), and exhibits the highest price consciousness (6.30). It was found that AR Enthusiastic consumers’ attitude towards AR changed significantly between time 1 and time 2
(Mean$_{time1}$ = 6.37, Mean$_{time2}$ = 6.91, p = <0.001). In summary, our analysis supported our hypotheses and general proposition that consumers are heterogeneous in how they view AR as a shopping tool. Crucially, this includes the level of stimulus overload that AR produces in different consumers. Figure 6.2 provides a visual summary of the four identified segments.
Figure 6.2 Segment summary

<table>
<thead>
<tr>
<th>Segment, % sample</th>
<th>AR Averse, 12%</th>
<th>AR Hesitant, 32%</th>
<th>AR Open, 39%</th>
<th>AR Enthusiastic, 14%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR attitude</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Experiential value</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Information overload</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Decision confidence</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Attitude change following stimulus</td>
<td>Smallest + shift</td>
<td>Moderate + shift</td>
<td>Moderate + shift</td>
<td>Largest + shift</td>
</tr>
</tbody>
</table>
6.5 Conclusion and discussion

Customer experience is impacted by multiple aspects of the shopping environment, including the provision of technology-based shopping tools (Roggeveen et al., 2020). Recent years have seen AR being increasingly deployed in retail settings, with a future prediction of further implementation with the metaverse. Therefore, it is important to understand how consumers react to, and want to engage with, AR when shopping. To maximise the potential benefit of AR, retailers need to consider the heterogeneity that exists among consumers in relation to the technology. Hence, it is important to recognize consumer perceptions and attitudes toward AR to understand their impact on the customer experience (Chen et al., 2021). This study builds knowledge by uncovering consumer similarities and differences across distinct segments based on their attitudes toward AR in retail. To the best of the researcher’s knowledge, no previous studies have analysed AR retail consumers. However, segmentation studies have been conducted as far as shopping behaviour, and heterogeneity was found as far as shopping intentions in multichannel settings (Sands et al., 2016), and item customisation (Pallant et al., 2022). The findings of this study are consistent with those of previous research, finding that consumers are not homogenous. Specifically, it was found that heterogeneity exists in consumer perceptions of AR, with segments of different sizes underpinned by distinct variables.

Four consumer segments that differ in terms of their attitude toward AR, experiential value, choice confidence, and perceived information overload are identified. Commonalities and differences between these segments are recognised. The segments with a greater positive attitude toward AR also recorded higher experiential value and decision confidence, and lower perceived information overload. Segments with a less positive attitude toward AR had lower experiential value and decision confidence, and higher perceived information overload. Further, attitude toward AR was measured at two points in time. It was noted that, after being
provided with more information about the benefits of the technology, consumers in all segments had a more positive attitude toward AR, albeit to varying degrees. This shows that the attitude toward AR is not fixed but can be improved by education.

Implications for theory

This research has important implications for theory. Specifically, past research is extended by offering a more nuanced understanding of how consumers perceive, and want to interact with, AR in shopping contexts. Despite AR’s widespread application by retailers globally, it is shown show that attitudes toward AR as a shopping tool are not always positive. Importantly, this research builds on prior findings that indicate the dual – positive and negative – effects of technology (Roggeven et al., 2020), showing that AR shopping tools can lead to positive and negative outcomes for consumers. Specifically, AR offers more convenience to some consumers (Garaus & Wagner, 2016) because, for instance, their virtual interaction with a product via an AR shopping tool can increase their decision confidence. However, AR Averse consumers have low decision confidence, and a higher perception of information overload. AR is likely to cause confusion and complication for these consumers, rather than enhancing their shopping experience. As such, it is shown that the effect of AR on shopping is not always positive. While previous research utilised the TAM and its extensions to study hedonic or utilitarian values (Lavoye et al., 2021), this research suggests that there is a need to balance hedonic and utilitarian value when deploying AR within retail contexts. Future research could determine a more holistic measure of value that would be able to encapsulate this need.

This research also reveals that heterogeneity in attitudes toward AR are associated with psychographic variables. Specifically, it was found that innovativeness, time pressure, and shopping enjoyment are strong predictors of segment membership. This aligns with prior research findings: that innovative consumers attach more importance to values such as
stimulation, creativity and curiosity (Steenkamp et al., 1996). This is consistent with the findings from this research in that innovativeness was measured as a psychographic variable, and found that consumers with high innovativeness also had a more positive attitude toward AR. Therefore, innovativeness can be considered as a key variable in the acceptance of an emerging technology such as AR. In contrast to psychographic variables, it was found that traditional demographic variables that have been shown to influence technological adoption (Hubona & Kennick, 1996), such as age and gender, were not associated with segment membership. This could imply a societal change that has made demographics no longer a predictor of technological adoption, or more specifically of AR adoption. It is suggested for future research to study the relationship between demographics and AR adoption, and to focus on variables that are more meaningful than demographics.

Finally, when considering the segment sizes, and their relative characteristics, the clusters follow a pattern like that found in the Diffusion of Innovation (Rogers, 2010) theory. While the Diffusion of Innovation theory focuses on how a technology could be adopted by consumers, in this study, how AR as a technology can act as a facilitator of shopping was examined.

Implications for practice

This research’s segmentation of consumer attitudes toward AR as a shopping tool offers important insights for retailers. First, this study gives practitioners a better understanding of how consumers perceive, and want to interact with, AR when shopping. Specifically, four distinct types of consumer segments are identified. Importantly, it was shown that heterogeneity in consumer attitude toward AR is driven by a consumer’s perception of decision confidence (how they see AR enhancing their ability to make choices), information overload (the potential for AR to over-stimulate shoppers), and experiential value (the derived value from engaging with AR). This means that consumers react differently to AR.
Retailers are encouraged to leverage these dimensions in communicating the value of AR to assist consumers in shopping. This research found that both ease of use and perceived usefulness are significant covariates, and therefore play an important role in how consumers form perceptions of AR. This means that retailers should focus on ensuring that AR is easy to use and useful for the shopping purpose. Whilst this may seem intuitive, it is possible for new technologies to be perceived as requiring greater consumer effort. Hence, design and messaging should focus on communicating these dimensions to consumers so as not to add to stimulus overload. This feature is going to be particularly important for future applications of AR in the metaverse. For consumers, in the metaverse, AR will not be the sole component to consider; rather, there will be an interplay of multiple factors. Therefore, making sure that the AR feature does not increase consumer effort will be key to providing a good customer experience.

Second, the findings from this research show that price consciousness is not a distinct driver of segment membership. Hence, AR might not be useful in shopping situations that are underpinned by price comparisons. It is likely that AR is more effective in purchase situations that have more qualitative evaluations (i.e., style, colour, etc) rather than price comparisons. Hence, AR might not be a worthwhile pursuit for brands that rely on consumer evaluations of price. The benefit of AR lies with retailers assisting consumers to ‘try’ products with AR. This helps make the brand more primed in the minds of consumers, who are then more likely to seek that brand for an actual purchase.

Finally, this research shows the positive effect of providing educational information about how AR can be used as a shopping tool. In all segments, and to varying degrees, the respondents’ attitudes to AR became more positive after watching a video on the benefits of AR when shopping. Importantly, even those consumers that were defined as AR Averse had positive shifts in their attitude towards AR. The largest segment, AR Open, had the largest
positive change in attitude towards AR. Hence, opportunity exists for retailers to educate consumers on the workings and benefits of AR. The expected outcome of this strategy would be an improvement in consumer perceptions and attitudes toward AR. In fact, consumers may have a better understanding and feel more confident with their decision. This implication could be relevant to other settings, where a shift in attitude can occur following the education of consumers.

Limitations and future directions
This research is subject to limitations. First, this study was cross-sectional in nature. Since AR is still an emerging technology, it is believed that perceptions of and attitudes toward AR could change and develop over time, as would the consumer segments. Future research could build on this study and identify whether, and how, these perceptions may evolve over time. Furthermore, future research could investigate whether consumers’ attitudes are fixed, or whether they can shift between segments over time.

Second, this study focuses on a single product category – furniture. While this context is one that has seen significant investment in AR, future research should consider the applicability of our findings to other categories. There may be other important mediators that determine attitudes toward AR in different retail contexts.

Finally, while the results show a positive change in attitude for each segment after exposure to educational information, it is recognized that AR is an emerging technology. Therefore, the results regarding change in attitude may be due to consumers’ lack of familiarity with AR. Future research could investigate whether these results remain consistent when there is a more widespread application of this technology.
6.6 Chapter Summary

The aim of this study was to address research objective 3: Identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool. To achieve this, consumers were segmented based on their perceptions of AR as a shopping tool, to develop understanding of heterogeneity in terms of consumer attitudes and behaviours. First, consumer segments were established based on AR attitudes and behaviours in retail. Second, the antecedents of these consumer segments were identified. These included innovativeness, time pressure, shopping enjoyment, price consciousness, perceived ease of use, and perceived usefulness. Finally, the change in attitude toward AR based on an educational stimulus was investigated. The method followed a quantitative online survey with a sample of 503 participants. The data was analysed with Latent-Class Cluster Analysis (LCA) using the Latent GOLD software. This research reveals that heterogeneity in attitudes toward AR exists. Four consumer segments that differ based on their attitude toward AR, experiential value, choice confidence, and perceived information overload were identified. Commonalities and differences between these segments were also identified. The segments with higher attitude toward AR also recorded higher experiential value and decision confidence, and lower perceived information overload. On the other hand, segments with lower attitude toward AR had lower experiential value and decision confidence, and higher perceived information overload. The results identify four distinct segments that vary in their attitude toward AR as a shopping tool – AR Averse, AR Hesitant, AR Open, and AR Enthusiastic. The heterogeneity of consumer attitudes toward AR is driven by consumers’ perceptions of decision confidence (how they see AR enhancing their ability to make choices), information overload (the potential for AR to over-stimulate shoppers), and experiential value (the derived value from engaging with AR). Hence, retailers should leverage these dimensions when communicating the value of AR in assisting consumers when shopping.
Chapter 7: General discussion

7.1 Chapter introduction
This thesis started with an introduction and overview of the topic which relates to the impact of AR on customer experience in retail (Chapter 1:). Then, the background of the thesis was established, including the theoretical background and research propositions based on the underlying theoretical underpinning of affective cognitive theory (Chapter 2:). The research design and methodology were then outlined including the research philosophy, and the multi-method, multi-study approach conducted (Chapter 3:). Then, the results and analysis of three studies were presented, respectively Study 1, Study 2, and Study 3 (Chapter 4, Chapter 5, and Chapter 6:). The purpose of this final chapter is to highlight, summarise and discuss the key results and findings obtained from the three studies as they relate to the overarching aims of this thesis. The findings are discussed in light of both existing literature and managerial implications. Lastly, research limitations and area for further research are outlined. The chapter contains six sections. This section provides the background to this study (Section 7.1) before the overview of findings are delineated (Section 7.2). Next, the contribution to literature are outlined (Section 7.3), before contributions to practice are detailed (Section 7.4). Finally, and the limitations and future directions are discussed (Section 6.5), leading to a summary of the chapter and thesis (Section 7.6).

7.2 Overview of findings
The aim of this thesis is to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. Three research objectives were identified, and a three-study approach was selected to address those objectives. The main findings from each study are outlined below.
Study 1 addressed research objective 1, to investigate consumer perceptions of, and experiences with, AR as a shopping tool. In this study, exploratory analysis was conducted to explore ways AR contributes positively or negatively to customer experience. By means of semi-structured interviews, seven core themes pertinent to the customer journey were identified. Findings suggested that, prior to purchase, AR can broaden consumers’ product consideration set, while narrowing the choice set. AR can also lessen brand value, thereby giving emerging brands the opportunity to connect with consumers. At the point of purchase, the findings also suggest that AR can help with product curation and drive hedonic value through playfulness. Finally, at the post-purchase stage, findings show that AR can influence consumer choice confidence, but can also amplify cognitive dissonance. From these themes, implications arise in terms of balancing the potential promises and perils of AR as a retail technology.

Study 2 addressed research objective 2, to investigate the impact of customer experience with AR as a shopping tool on decision making outcomes. Little was known from previous literature around the relationship that occurs between previous experience with AR, the derived experiential value from engaging with AR, and the outcomes of attitude toward AR, decision confidence, and willingness to purchase using AR. Moderated mediation effects were hypothesised and tested on a sample of 503 consumers through data collected in an online survey. The findings indicated that motivations indeed mediate the impact of prior experience on decision-making outcomes. For instance, efficiency was a consistent mediator throughout all relationships. However, when information overload was included in the relationship, it was found that the importance of efficiency decreased the more overload was perceived, and on the other hand, the importance of escapism and intrinsic enjoyment was found. Importantly, perceptions of the efficiency of AR was a consistent mediator throughout all relationships. The implication of this finding is that the potential value of AR as a tool for
shopping relies substantially on the technology being efficient. However, when information overload was included as a moderator in the relationship, it was found that the importance of efficiency decreased the more overload was perceived, and on the other hand, the importance of escapism and intrinsic enjoyment was found. Hence, the findings of Study 2 identified the important interplay between factors that impact consumer experiences while using AR as a shopping tool, as well as the boundary condition of information overload.

Finally, Study 3 addressed research objective 3, to identify and profile consumer segments regarding perceptions and attitudes toward AR as a shopping tool. From prior literature little was known about consumers’ differing attitudes toward AR. The aim of this study was therefore to explore how consumers differ in terms of the value they receive from using AR, as well as the trade-offs they experience when using the technology for shopping. Moreover, the study explored the individual characteristics that led to these differences by segmenting consumers according to their perceptions of and attitudes toward AR as a shopping tool. To identify the segments, latent class analysis (LCA) was conducted on the data collected from an online survey of 503 US consumers. The analysis yielded four distinct segments of consumers who vary in their attitude toward AR as a shopping tool – AR Averse, AR Hesitant, AR Open, and AR Enthusiastic. Covariate analysis indicated that the factors which drive membership of these segments include perceived ease of use, perceived usefulness, and psychographic characteristics such as innovativeness, time pressure, and shopping enjoyment. The heterogeneity of consumer attitudes toward AR was driven by consumers’ perceptions of decision confidence (how they see AR enhancing their ability to make choices), information overload (the potential for AR to over-stimulate shoppers), and experiential value (the derived value from engaging with AR). Hence, retailers should leverage these dimensions when communicating the value of AR in assisting consumers when shopping. Finally, this study highlights that heterogeneity exists in consumer attitudes
toward AR and suggests that the attitude toward AR is not a fixed value but can change through education.

Taken together, these studies enhance the understanding of the role of AR in retail in multiple meaningful ways. From the first study, which was exploratory in nature, themes emerged around the perceptions of AR in retail including the ways it can both enhance and detract from customer experiences. These themes, together with the literature influenced the subjects of investigation of subsequent studies. Study 2 investigated the role of previous experience on decision-making outcomes, confirming the important interplay between factors and the relevant boundary conditions that impact these relationships. Lastly, Study 3 analysed the different customer segments that exist in respect of the use of AR in retail, highlighting the heterogeneity that exists as well as the factors which drive these differences across consumers. The findings from these three studies lead to implications and contributions to knowledge and practice which are summarised in Table 7.1 and detailed in turn in the following sections.

Table 7.1 Summary of key findings and contributions

<table>
<thead>
<tr>
<th>Study</th>
<th>Key findings</th>
<th>Contributions</th>
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<tbody>
<tr>
<td>Study 1</td>
<td>AR can broaden consumers’ product consideration set, while narrowing the choice set. AR can also lessen brand value. AR can help with product curation and drive hedonic value through playfulness. AR can influence consumer choice confidence but can also amplify cognitive dissonance.</td>
<td>How AR enhances, or detracts, from the customer experience throughout each stage of the customer journey (pre, during, post).</td>
</tr>
<tr>
<td>Study 2</td>
<td>Motivations mediate the impact of prior experience on decision-making outcomes. Perceptions of the efficiency of AR is a consistent mediator throughout all relationships. However, when information overload is perceived, the importance of efficiency decreased the more overload is felt, whereas the importance of escapism and intrinsic enjoyment increased.</td>
<td>The impact of AR on decision-making outcomes. Affective factors impact customer experience with AR, as well as important boundary conditions (i.e., information overload).</td>
</tr>
</tbody>
</table>
Study 3 The heterogeneity of consumer attitudes toward AR is associated with consumers’ perceptions of decision confidence (how they see AR enhancing their ability to make choices), information overload (the potential for AR to over-stimulate shoppers), and experiential value (the derived value from engaging with AR). There are four distinct segments of consumers who vary in their attitude toward AR as a shopping tool – AR Averse, AR Hesitant, AR Open, and AR Enthusiastic.

Heterogeneity among consumers in attitudes and perceptions toward AR. AR is likely to cause confusion and complication for these consumers, rather than enhancing their shopping experience.

7.3 Contributions to literature

This thesis builds on the existing literature and the current understanding of how consumers respond to stimuli like technology, and specifically AR, in multiple ways. The importance of affective and cognitive factors, as well as specifically motivations and technology efficiency, are confirmed. However, this thesis also presents important nuance to the understanding of these factors by highlighting how these factors interact, the relevant boundary conditions, and how their impact can differ across consumers. In conclusion, this research acknowledges the importance of the existing theories in the literature, however, also identifies scope for more comprehensive theories to explain the use of emerging technology in retail.

This thesis builds on the broad emerging literature that focuses on consumer behaviour regarding emerging technologies in retail. This is an important area of research, as technology is increasingly central to the ways retailers deliver customer experience (Roggeveen et al., 2020), and customer experience is now a critical success factor for retailers (Grewal et al., 2020). Within this broad literature area, this thesis focuses specifically on augmented reality (AR) and its impact on the customer experience. As outlined in Chapter 2, there is an increasing research interest around this topic, however there is still significant room for further knowledge (Kumar, 2021). More precisely, this thesis aimed to fill three major gaps of knowledge in the literature around AR as a shopping tool and the impact on the customer experience in terms of (1) how AR enhances, or detracts, from the
customer experience throughout each stage of the customer journey (pre, during, post), (2) the impact of AR on decision-making outcomes, and (3) the heterogeneity among consumers in attitudes and perceptions toward AR. The three studies presented in this thesis were designed to address these three gaps respectively.

By addressing these identified literature gaps, this thesis and its findings contribute to the existing body of literature in several ways. Specifically, past research is extended by offering a more nuanced understanding of how consumers perceive, and want to interact with, AR in shopping contexts. A range of theories have been drawn upon to explain how consumers respond to AR in retail. While the affective cognitive theory is employed at a macro level to underpin the research, other theories are applied in a micro level guiding each study, such as technology acceptance model (Huang & Liao, 2014; Spreer & Kallweit, 2014; Pantano et al., 2017), flow theory (Javornik, 2016; Yim et al., 2017; Huang & Liao, 2017), and situated cognition theory (Chylinski et al., 2020; Hilken et al., 2017).

In building on these theories, this thesis makes contributions to existing literature in four main ways: 1) how consumer respond to stimuli, 2) how AR influences decision-making, 3) consumer psychological processes with AR, 4) the influence of psychographic variables. Each of these contributions is discussed in turn in the following sections.

**How consumers respond to stimuli**

Along the customer journey, consumers are constantly subjected to internal and external stimuli (Pine & Gilmore, 2011). These stimuli drive consumer shopping behaviour and decision making in a variety of ways, and can have both positive and negative impacts (Roggeven et al., 2020). Retail technologies such as AR act as external stimuli within a customer purchase journey, and therefore can impact their customer experience. The affective cognitive theory suggests that consumers respond to stimuli in three ways: affectively, cognitively, and behaviourally (Javornik, 2016). The understanding of this theory delivered
the overarching framework and theoretical basis of this thesis, which was applied with the aim to understand and support the relationships between AR, customer experience, and AR experience outcomes. The first contribution this thesis makes, relates to affective factors. Affective factors relate to the emotional responses that consumers have to the technology based on their knowledge and experiences with AR (Qin et al., 2021). Enjoyment is an example of emotional response. Multiple themes that emerged from Study 1 linked to the affective nature of AR in retail. For instance, consumers were drawn to use the technology due to its ability to generate a fun and play-like experience. Study 2 built on these findings and confirmed the importance of elements including escapism and enjoyment. Further, it was found that when subjected to stimulus load, consumers sought factors such as escapism and enjoyment from the technology, rather than efficiency. Hence, this thesis not only demonstrated how affective factors impact customer experience with AR, but it also highlights important boundary conditions (i.e., information overload) that impact the relative importance of these factors.

This thesis also contributes to the understanding of how cognitive factors impact consumer responses to AR in retail. Building on the overarching theoretical foundation, in Study 2 this thesis tests consumer motivations. Motivation theory helps understanding the reasons consumers behave in a certain way. This theory comprises of two elements: 1) extrinsic motivation and 2) intrinsic motivation (Davis et al., 1992). Extrinsic motivations refer to completing an activity because it is believed to be instrumental in achieving valued outcomes that are separate from the activity (Lee et al., 2005). In the case of technology in retail, this would refer to a goal, i.e., the technology allows consumers to achieve an outcome. On the other hand, intrinsic motivations refer to doing an activity simply for the sake of it, rather than for some separable consequence (Lee et al., 2005, Wetzels et al., 2009). Motivation theory has been applied in this thesis in order to explain consumers’ outcomes of
interacting with AR as a shopping tool. Study 1 highlighted the importance of motivations as consumers noted that if they were struggling to make a decision, AR could help them. Hence, this tool could enhance their confidence. Study 2 further builds on this theory and highlights that both internal and external motivations play a key role with AR, while also demonstrated how the impact of these motivations based on the outcomes. For instance, efficiency is a form of extrinsic motivation (Tanouri et al., 2019), and it was found to be a significant variable for all three outcomes, attitude toward AR, willingness to purchase using AR, and decision confidence. On the other hand, it was noted that intrinsic motivations were significant only for attitude toward AR. Hence, this thesis builds on both the affective cognitive theory, and motivations theory more specifically, by highlighting not only the important role both extrinsic and intrinsic motivations have in the customer experience and outcomes of AR, but also the situations in which the relative impact of these motivations varies. In view of these findings, future research should deliver a comprehensive theoretical understanding of the intersection of the two theories, and work toward a combination, in order to deliver a more comprehensive view of the experience.

The importance of efficiency highlighted by this thesis further builds on the technology acceptance model (TAM). In fact, this theory suggests that efficiency is important for consumers to adopt and use any new technology. The TAM is one of the most widespread and utilised technologies in the context of AR in retail (Kumar, 2021). The basis of the TAM is that a technology should be both useful and easy to use for consumers to accept and use it (Rese et al., 2014). Hence, this theory has a strong focus on extrinsic motivation values. However, the results from Study 2 highlight that when considering a technology, such as AR, it is important to understand that it is not enough to focus on extrinsic values only. In fact, intrinsic values are also important, and in some circumstances are even more important than extrinsic factors. The importance of considering both intrinsic and extrinsic values support
the use of motivation theory as a basis of application in the use of technology, more so than simply the TAM. Study 2 therefore, builds on the use of motivation theory as a basis of the investigation of the effects of AR as a shopping tool on the customer experience. Moreover, it addresses the call for research to better understand the use of AR in retail with the aid of motivation theory (Kim et al., 2014).

Furthermore, the TAM suggests that when consumers are overloaded, retailers should make the task easier. However, the results from Study 2 show that that may not always be the case. When consumers are overloaded, the impact of efficiency lessens, whereas escapism increases. Therefore, this study suggests that when consumers are overloaded, it is important to focus on escapism and intrinsic enjoyment, rather than simply making a technology more efficient. While previous research utilised the TAM and its extensions to study hedonic or utilitarian values (Lavoye et al., 2021), this research suggests that there is a need to balance hedonic and utilitarian value when deploying AR within retail contexts. Future research could determine a more holistic measure of value that would be able to encapsulate this need.

As emerged from Study 1, AR can lead to positive (enhancing) as well as negative (irritant) environmental stimuli. This is consistent with the literature, as drawing on the technology acceptance model (Davis et al., 1989) and situated cognition theory (Robbins & Aydede, 2009), it is believed that AR can have both positive and negative impacts on the overall consumer experience. Specifically, the technology acceptance model proposes that technology acceptance can vary based on consumer perceptions of ease of use, usefulness, and general attitude toward the use of the technology. Together, these elements drive positive and negative outcomes.

*How AR influences decision-making*

This thesis also builds on prior literature that indicate the dual – positive and negative – effects of technology (Roggeven et al., 2020). Past literature shows that AR shopping tools
can lead to positive and negative outcomes for consumers. Specifically, AR offers more convenience to some consumers (Garaus & Wagner, 2016) because, for instance, their virtual interaction with a product via an AR shopping tool can increase their decision confidence. Study 1 adds further context to these findings, highlighting using AR can impact consumer confidence. However, Study 3 shows that some customer segments can have low decision confidence, and a higher perception of information overload when using AR. AR is likely to cause confusion and complication for these consumers, rather than enhancing their shopping experience. Hence, this thesis makes important contributions to the existing understanding of how AR impacts customers experience, highlighting that the effect of AR on shopping experience is not always positive, and can in fact be quite negative for some consumer segments.

Further, this thesis contributes to the understanding of choice confidence and information overload, and the impact technologies like AR may have on these factors. During a purchase journey, if the number of choices presented to consumers is considered too high, that may lead to heightened choice overload (Ketron et al., 2016). Choice overload then can negatively influence consumers’ ability to make purchase decisions (Li, 2017). Study 1 suggests that AR can help to overcome this choice overload and may be able to strengthen consumers’ choice confidence. This is due to the characteristic of AR that enables consumers to quickly visualise different options, thereby reducing the number of options they may consider. Moreover, by being able to visualise the product, consumers may feel more confident about the product (i.e., style, specifications) that otherwise would reduce choice confidence. Furthermore, the findings from Study 2 suggest that when consumers felt information overload, they valued less the importance of efficiency, and more the importance of escapism and intrinsic enjoyment. This shows that efficiency, which can be delivered by
showing the right information on screen, could not be as beneficial as providing an enjoyable experience.

Finally, this thesis extends on the notion of cognitive dissonance. Study 1 found that AR can assist consumers to mitigate cognitive dissonance by increasing the level of choice confidence following a purchase. Specifically, it was found that AR can help to decrease cognitive dissonance by providing greater certainty about purchases made online. However, it is possible that when an item does not meet the consumer’s expectations after they have used AR, their cognitive dissonance may be greatly amplified; in this instance, the increase in choice confidence can lead to greater disappointment. Hence, this research provides a more nuanced understanding of how cognitive dissonance may be influenced in conflicting ways by innovative and sometimes disruptive technologies. Future research around AR should integrate these components in order to better picture a holistic view of the customer experience. In particular, theory should focus on understanding the interplay of information overload, choice confidence and behavioural outcomes.

*Consumer psychological processes with the augmentation of reality*

The use of tools that virtually enhance reality can lead to different psychological responses. Flow refers to the optimal state of experience when the consumer is fully immersed in an activity (Han et al., 2020). When individuals experience a state of flow, they often find themselves in a situation where they are disconnected from the real world (Csikszentmihalyi, 1990). In this state, they become so immersed in an activity so that they feel that they are undergoing a natural and enjoyable experience (Barhorst et al., 2021). Flow theory has been applied by past literature in the context of consumer behaviour and the use of technology, especially immersive technologies (Arghashi & Yuksel, 2022).

This thesis focuses on AR, an immersive technology that is integrated in the retail industry to blend the real and virtual world. This allows retailers and consumers to simulate
an experience as the image of an object is projected in a 3D version. Hence, when consumers use AR, they might enter a state of flow. This happens when both the real world and the virtual world blend. For instance, when consumers use AR to select furniture on for example, the IKEA app, they combine the real world (their real space to be furnished), with the virtual world (furniture on the app). The findings from Study 1 highlight that consumers can enter a flow state when they utilise AR. In fact, as consumers were provided a tool to virtually try on sneakers, they paid more attention to the experience rather than the technicalities, such as the brand name. This meant that they did not focus on the brand, but focused more on the style, and the overall trying on experience, representing a form of flow. Hence, this thesis contributes an understanding of how flow theory might be applied to emerging technologies such as AR.

This thesis also contributes to the growing stream of research on the blending of real and virtual worlds (Bourlakis et al., 2009). Building on Baudrillard’s (1983) notion of hyperreality, AR plays a role in the integration of the real and the virtual. The findings of this thesis show that this blending can both enhance and harm the customer experience. For instance, in Study 1 the respondents described the encounter with AR as exciting and reported being lost in the experience – paralleling moments of flow. This led them to focus more on the experience, rather than the shopping task. As technologies continue to evolve, the distinction between real and virtual will become increasingly blurred (Barhorst et al., 2021). For instance, the Metaverse is an emerging technology based on virtual worlds (Meta, 2021). Hence, this thesis and has implications for the way that retailers engage consumers via AR, as well as potential implications for how consumers may engage with emerging technologies similarly based on blending real and virtual worlds.
Psychographic variables

Finally, this thesis also reveals that heterogeneity in attitudes toward AR are associated with a range of psychographic variables. Specifically, it was found that innovativeness, time pressure, and shopping enjoyment are strong predictors of the attitudinal segment consumers exist in with respect to AR. This aligns with prior research findings that innovative consumers attach more importance to values such as stimulation, creativity and curiosity (Steenkamp et al., 1996). This is consistent with the findings from this research in that innovativeness was measured as a psychographic variable, and Study 3 found that consumers with high innovativeness also had a more positive attitude toward AR. Therefore, innovativeness can be considered as a key variable in the acceptance of an emerging technology such as AR. This also builds on existing literature that has shown the role that similar psychographic factors have in contexts including multichannel retail (Konuş et al., 2008), product customisation (Pallant et al., 2020), and sharing economy (Sands et al., 2020).

In contrast to psychographic variables, the results of this thesis did not show impacts of traditional demographic variables that have been shown to influence technological adoption (Hubona & Kennick, 1996), such as age and gender. This could imply a societal change that has made demographics no longer a predictor of technological adoption, or more specifically of AR adoption. It is suggested for future research to study the relationship between demographics and AR adoption, and to focus on variables that are more meaningful than demographics.

7.4 Contributions to practice

AR is an emerging technology that has been gaining traction in the retail industry. Major retailers have started implementing it in both online and bricks and mortar settings. This technology has gained increasing presence with the use of the metaverse. AR is an intriguing technology for retailers as it enables consumers to view a 3D representative version of an
item. As the use of AR in retail is still in its infancy, it is important to understand the impact it has on the customer experience. This thesis delivers three primary contributions to practice; (1) demonstrating to retailers that AR can help or hinder the customer experience, (2) providing an understanding of how consumer motivations impact the benefits (or negative impacts) AR can have on customer experience, and (3) identify the heterogeneity in consumer preference and usage intention AR as a shopping tool. Combined, these three primary contributions to practice highlight the importance for retailers to think strategically and carefully about what the role of AR will be for their business and customers.

_How AR can help or hinder the customer experience_

At this stage, where AR is still considered an emerging technology, the results of this thesis suggest AR can benefit retailers in different ways. First, it allows consumers to discover and curate product choices and combination by facilitating visualising it. In fact, this technology allows consumers to achieve this benefit from the comfort of their home. As Study 1 found, this can allow consumers to feel more comfortable in selecting styles that they would not have otherwise chosen should they have been in a store because of social norms. It is therefore recommended for retailers to provide an ‘at-home’ AR option feature on a website or phone, for consumers to use at home. Second, in Study 2, efficiency was identified being a key factor of importance, whereby it should help consumers achieve a goal. This concept was further highlighted by Study 3, where it was found that both ease of use and perceived usefulness play an important role in how consumers form perceptions of AR. The implication of these findings for retailers is that they should focus on ensuring that AR is easy to use and useful for the shopping purpose. Hence, design and messaging should focus on communicating these dimensions to consumers so as not to add to stimulus overload.
How consumer motivations impact AR benefits

However, on the other hand, entertainment value and intrinsic enjoyment were identified as significant variables as far as attitudes toward AR. Study 2 found that when consumers are overloaded, retailers should not focus on making the tool more efficient but rather make it more enjoyable. In fact, AR can drive enjoyment through its component of playfulness. This is important, as hedonic elements, such as enjoyment play a role in the customer experience and can lead to word of mouth and viral sharing (Duarte et al., 2018). This is consistent with the findings from Study 1 where participants mentioned they wanted to tell their friends about their AR shopping experience.

However, the application of AR does not necessarily always lead to positive outcomes. As highlighted in Study 1 the novelty may wear off; therefore, consumers may no longer be drawn to the retailer as a novelty factor. Furthermore, in the future, the use of the technology may decrease. This has already happened with emerging technologies, such as 3D tv. It is therefore important for retailers to provide a service that consumers find valuable. Further, Study 1 highlighted that by broadening consumers’ consideration sets, the value of large established brands may be diminished. Hence, this thesis demonstrates to retailers that despite the potential benefits of AR it must be carefully considered to mitigate potential negative outcomes.

Heterogeneity in consumer preference and usage intention

This thesis also shows that heterogeneity in consumer attitude toward AR exists and is driven by a consumer’s perception of decision confidence (how they see AR enhancing their ability to make choices), information overload (the potential for AR to over-stimulate shoppers), and experiential value (the derived value from engaging with AR). On the other hand, price consciousness was not found to be a significant factor. The reason is that AR is likely to be more effective in purchase situations that have more qualitative evaluations (i.e.,
style, colour, etc) rather than price comparisons. Hence, AR might not be a worthwhile pursuit for brands that rely on consumer evaluations of price. The benefit of AR lies with retailers assisting consumers to ‘try’ products with AR. This helps make the brand more primed in the minds of consumers, who are then more likely to seek that brand for an actual purchase.

Further, from this thesis it emerges the need to educate consumers around the role and benefits of the technology. As AR is an emerging technology, there are some consumers that have never interacted with it on a prior occasion. Further, other consumers may have limited experience with it as a shopping tool. At the same time, the results of Study 2 highlight that previous experience plays a role in consumer decision-making and is an influencing factor of consumer attitudes and perceptions. Hence, retailers may use the results of this thesis to consider encouraging consumers to trial and develop experience with AR.

It is also important to note that attitudes and perceptions towards AR are not fixed. Study 3 found that the attitude can be increased by educating customers, even through simple educational videos. Hence, retailers using AR may consider providing consumers forms of education such as supplementary videos or explanation of how the technology works and how it can benefit them. This recommendation is particularly relevant during the early stages of adoption of the technology, where their attitudes and perceptions are still likely to change based on more experience (Fan et al., 2020).

In summary, while AR may have benefit potential benefits for retailers, caution should be exercised when deciding whether to implement AR for the purpose of virtual try-on. Rather than AR being purely a means of enhancing the customer experience, this thesis has demonstrated that it can equally help or harm it depending on a range of factors.
7.5 Limitations and future directions

Although this thesis followed a structured and thorough research design, it is important to account for limitations. In each study chapter, limitations of each study are acknowledged. The aim of this section is to recognize limitations of the thesis and identify areas of focus for future research. First, AR is an emerging technology. This means that attitudes and perceptions of this technology may change in the future. In fact, research says that the attitudes toward a technology may change the more accepted and mainstream a technology becomes. This is a limitation as the results of this research may change over time as consumers become more experienced with the technology.

A second limitation of this research is that is cross-sectional in nature. This means that the data is collected at one point at time. Based on the previous point, attitudes may change. It is especially true for emerging technologies to have different behaviour. Therefore, it may be interesting for future research to research if attitudes change, and how. A longitudinal study may in fact investigate the change of behaviour, if any, over time. This type of longitudinal study would be particularly beneficial for retailers to determine if they are able to influence consumer attitudes and acceptance of AR after adoption.

A third limitation is that the scenarios presented in this research are hypothetical. As such, consumers did not make an actual purchase. While every effort was made to ensure scenario realism, and potential consumers were included in the sample, it must be acknowledged that actual consumer behaviour may differ from the stated behaviour explored in this thesis. Hence, future studies would benefit from extending these findings to real applications of behaviour in the context of using AR as a shopping tool.

An additional limitation is in the number of product categories investigated. The studies conducted in this thesis focused on two product categories: footwear and furniture. While these contexts are the ones that have seen significant investment in AR, future research
should consider the applicability of these findings to other categories. In fact, different product categories may lead to different considerations that AR may influence. Finally, the findings presented in this thesis may be prone to social desirability bias and recall bias, whereby respondents tailor the response to be perceived in a certain way. Future research is suggested to use a triangulation methodology comprising self-report data, interviews, and objective observation for each study. For instance, eye-tracking technology could capture consumers’ visual activities during their interaction with AR in retail and provide objective to investigate their decision-making.

7.6 Chapter and thesis summary
The aim of this thesis is to explore the impact and value of AR as a shopping tool on the customer experience in retail along the customer journey. Three research objectives were identified, and a three-study approach was selected to address those objectives. Each study provides unique contributions, summarised as follows. The first study (Study 1) is qualitative and consists of semi-structured interviews regarding consumer experience while using AR. The results identify seven core themes pertinent to the impact of AR on the customer experience throughout the customer journey. Findings suggest that, prior to purchase, AR can broaden consumers’ product consideration set, while simultaneously narrowing the choice set. Moreover, AR can lessen brand value, thereby giving emerging brands the opportunity to connect with consumers. Findings further indicate that, at the point of purchase, AR can help with product curation and drive hedonic value through playfulness. Finally, at the post-purchase stage, findings show that AR can influence consumer choice confidence, and can also amplify cognitive dissonance. Hence, the primary contribution of the Study 1 is that AR can both help or hinder the customer experience and has an impact on decision-making outcomes.
The second study (Study 2) was designed based on the core themes that relate to the AR retail customer experience detected in the first study. Study 2 expands on this knowledge to better understand the relationship that occurs between previous experience with AR, derived experiential value from engaging with AR, with the impact of information overload (the potential for AR to over-stimulate shoppers), on consumer outcomes. This study analyses the interplay between antecedents and boundary conditions of decision-making outcomes of AR as a shopping tool. To achieve this, a statistical model is developed based on survey data, and moderated mediation effects analysed based on motivation theory. The findings indicate that motivations mediate the impact of prior experience with AR on decision-making outcomes. Motivations are measured following the experiential value scale, which considers both hedonic and utilitarian motivations. In this study, the utilitarian value of efficiency proved to be the only consistent mediator throughout all relationships. This means that it is important for consumers to be faced with a technology that provides efficiency. However, the role of efficiency changes when the consumer feels overloaded. In fact, in this case, more hedonic elements, such as escapism and intrinsic enjoyment play a more important role. The primary contribution of Study 2 relates to the importance of providing an AR experience that not only provides efficiency, but also enjoyment. These findings provide retailers with a deeper understand of the influence of motivations on different outcomes when using AR as a shopping tool.

The third study (Study 3) explores how consumers differ in terms of the value they receive from using AR, as well as the trade-offs they experience when using the technology for shopping. Specifically, this study explores the individual characteristics that lead to these differences by segmenting consumers according to their perceptions of, and attitudes toward, AR as a shopping tool. First, consumer segments based on AR attitudes and behaviours in retail are established. Second, the antecedents of these consumer segments are identified,
including innovativeness, time pressure, shopping enjoyment, price consciousness, perceived ease of use, and perceived usefulness. Finally, the change in attitude toward AR based on an educational stimulus are investigated. The method follows a quantitative online survey with a sample of 503 participants. The data is analysed with Latent-Class Cluster Analysis (LCA) using the Latent GOLD software. The analysis yields four distinct segments of consumers who vary in their attitude toward AR as a shopping tool – AR Averse, AR Hesitant, AR Open, and AR Enthusiastic. Hence, the primary contribution of Study 3 is documenting that heterogeneity in attitudes toward AR exists. The heterogeneity of consumer attitudes toward AR is driven by consumers’ perceptions of decision confidence, information overload, and experiential value. Hence, retailers should leverage these dimensions when communicating the value of AR in assisting consumers when shopping.

Taken together, several contributions are made to existing literature and practice. The three-study research design allows a deep investigation around AR and the customer experience, more specifically, providing further understanding of AR technology and the interplay between consumer attitudes, perceptions, and decision-making. As contributions to knowledge, this thesis explores how AR can help or hinder the customer experience, focusing on factors influencing it, such as affective, cognitive and outcome factors. From a practical point of view, this thesis provides retailers with knowledge around customers and their attitude and perceptions around this technology. Recommendations are made around caution to be exercised when implementing AR in retail, as outcomes are not always favourable for all customer segments. As an emerging technology, it is important for retailers to educate consumers around the benefits they could gain from using AR as a shopping tool.

However, this research is subject to limitations. First, this thesis follows a cross-sectional study, whereby behaviour is measured at one point of time; future research could undertake a longitudinal study to investigate the change of behaviour, if any, over time. The
scenarios were hypothetical, whereby consumers did not make an actual purchase; future studies could extend on real applications of behaviour of AR. The studies conducted in this thesis focused on two product categories: footwear and furniture; future research should consider the applicability of these findings to other categories. Lastly, AR is an emerging technology, this means that attitudes and perceptions of this technology may change in the future. Future research could build on this thesis and identify whether, and how, perceptions and attitudes may evolve over time.
References


Appendices

Appendices A – Study 1

Appendix A1. - Information Statement

Information Statement

PROJECT TITLE: How virtual try-on technology impacts the customer journey

PRINCIPAL INVESTIGATOR: Associate Professor Sean Sands (ssands@swin.edu.au or 03 9214 5748)

CO-INVESTIGATORS: Dr Jason Pallant, Lecturer; Beatrice Romano, PhD Candidate

WHAT IS THE RESEARCH ABOUT?

Virtual-try on technologies are increasingly gaining popularity in the retail setting; substantial investment is being made in the industry, nevertheless, it is still considered in its infancy. In order to make the most out of these technologies, it is important to understand their applicability and relevant derived consumer behaviour. This research is about exploring individual experiences utilising virtual try-on technology to identify and understand factors that influence customer experience.

WHAT DOES THE RESEARCH INVOLVE AND WHAT IS THE TIME COMMITMENT?

This research will involve a balance of loosely structured discussion topic areas and more structured questions. First, there will be questions around your shopping behaviour and the use of technology in retail, and the derived customer experience. Second, a demonstration video of virtual try-ons will be shown, and thoughts gathered. Finally, you will have an opportunity to use a virtual try-on tool and describe your actual experience. Your estimated time commitment is 45-60 minutes.

ARE THERE ANY INCENTIVES FOR PARTICIPATING IN THE RESEARCH?

Yes, you will receive a non-alcoholic drink voucher of the value of $5 to thank you for your time and support.

WILL MY DATA BE KEPT PRIVATE AND CONFIDENTIAL?

Yes. Following fieldwork, data will be stored and managed securely onsite at Swinburne University of Technology and its online servers for an indefinite period, and will only be accessible to members of the research team as listed in this Information Statement. All findings will be reported in a de-identified form, ensuring participant confidentiality.

HOW WILL THE DATA BE USED?

The data will be used to inform findings for Beatrice Romano’s Doctor of Philosophy thesis. It will also be reported in a conference presentation, and a publication in an academic journal.

WHAT DO I DO IF I HAVE ANY ISSUES OR QUESTIONS?

If you have any issues, questions or concerns, please contact the Principal Investigator Associate Professor Sean Sands at ssands@swin.edu.au or 03 9214 5748.

This project has been approved by or on behalf of Swinburne’s Human Research Ethics Committee (SUHREC) in line with the National Statement on Ethical Conduct in Human Research. If you have any concern or complaints about the conduct of this project, you can contact:

Research Ethics Officer, Swinburne Research (HEC)
Swinburne University of Technology, PO Box 218, HAWTHORN VIC 3122
Tel: (03) 9214 5218 or +61 3 9214 5218 or Email: researchethics@swin.edu.au
Appendix A2. – Consent form

Consent Form

PROJECT TITLE: How virtual try-on technology impacts the customer journey

PRINCIPAL INVESTIGATOR: Associate Professor Sean Sands (ssands@swin.edu.au or 03 9214 5748)

CO-INVESTIGATORS: Dr Jason Pallant, Lecturer; Beatrice Romano, PhD Candidate

1. I consent to participate in the project named above. I have been provided a copy of the project consent Information Statement to which this consent form relates and any questions I have asked have been answered to my satisfaction.

2. In relation to this project, please circle your response to the following:
   a. I agree to participate in an interview facilitated by the researcher(s). Yes No
   b. I agree to allow the interview to be audio recorded by electronic device. Yes No

3. I acknowledge that:
   a. my participation is voluntary and that I am free to withdraw from the project at any time without explanation;
   b. any identifiable information about me which is gathered in the course of and as the result of my participating in this project will be (i) collected and retained for the purpose of this project and (ii) accessed and analysed by the researcher(s) for the purpose of conducting this project;
   c. I understand the length of time researcher/s will have access to this information;
   d. my anonymity will be preserved and I will not be identified in publications or otherwise without my express written consent.

By signing this document, I agree to participate in this project.

Name of Participant: ...........................................................................................................................................

Signature & Date: ...............................................................................................................................................
### Appendix A3. – Interview discussion guide

Table 8.1 Interview discussion guide

<table>
<thead>
<tr>
<th>Interview section</th>
<th>Guiding interview questions</th>
</tr>
</thead>
</table>
| General background                     | • Can you tell me your shopping behaviour for clothing and accessories?  
• Thinking about making a clothes and accessory purchase, could you talk me through your typical experience, from the point at which you recognise you need the product, to the point at which you make the purchase.                                                                                                           |
| General experience with technology in  | • Have you heard of retail technology? / What retail technology have you heard? Beyond online shopping, have you used technology in store?  
• Could you tell me about the kinds of technology you have used for shopping to make a purchase?                                                                                                                                |
| retail                                  |                                                                                                                                                                                                                                                                                                                                                            |
| Experience with AR as a virtual try-on  | • Have you heard of virtual try on technology?  
• If no experience/knowledge – provide a brief explanation and show demo video https://www.youtube.com/watch?v=HoSjmiVLsLU  
• Tell me, what you think about this kind of technology?                                                                                                                                                                                                                                         |
| tool                                   |                                                                                                                                                                                                                                                                                                                                                            |
| AR Virtual Try-On trial                | • I’ll get you to use an AR for virtual try-on tool from an online retailer. You can browse through all the sneakers and choose the ones you would like to virtually try on and then tell me what you think.                                                                                       |
| AR Virtual Try-On experience           | • Tell me about your experience  
• How do you feel about this AR virtual try-on technology in comparison to online shopping? And in comparison to an in-store experience? What do you see as the main benefits?  
• What do you see as the main negatives? When would AR as a virtual try-on technology be most useful?  
• If you could describe the kind of person that would use this technology, what would they be like?  
• What kind of brands would benefit most for this kind of technology?  
  • How do you feel as a result of using this technology? If you were buying these shoes, how would you feel like owning them?  
  • Do you feel like these shoes are yours already?                                                                                                                                                                                                                                              |
### Appendix A4. Help themes from interviews

#### Table 8.2 Help themes from interviews

<table>
<thead>
<tr>
<th>Theme</th>
<th>Consideration set expansion</th>
<th>Benefits early decision-making stages</th>
<th>AR as a ‘style’ curation tool</th>
<th>Enhances the hedonic customer experience</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is it?</strong></td>
<td>Consumers’ consideration set options are widened</td>
<td>Helps preliminary stages decision-making</td>
<td>More opportunities to test outfits</td>
<td>How the item looks more important than how it fits</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Due to the presence of AR-VTO, consumers wish to try on items and styles that they normally would not consider.</td>
<td>The usefulness of AR-VTO seemed to be more prominent in the early stages of the decision-making process. The more options available, the more useful it seemed to be</td>
<td>Consumers found AR-VTO being useful in combining different items together</td>
<td>Consumers were drawn to the aesthetical appeal, rather than the functional benefit of ‘fit’</td>
</tr>
<tr>
<td><strong>Codes</strong></td>
<td>Try on something new; Unusual; It opens up things you wouldn’t normally consider; You try on things that you normally wouldn’t go for; Different style</td>
<td>Narrow down the options; Useful before going in-store; Select a few styles; Before deciding</td>
<td>Overall, how it fits with the outfit; If they match with an outfit I have in mind</td>
<td>Visual element</td>
</tr>
<tr>
<td><strong>Passages</strong></td>
<td>“... I was changing from a very square [glasses] frame to a round frame and I think it was interesting to see how that style looked on my face” (Josh, 29, moderate)</td>
<td>“It could be a cool way to narrow down what style you choose. It is quite overwhelming when you’re looking at all the glasses in a store in front of you. And so, I think then it would maybe be cool to kind of have an idea of what brands and what styles you liked before you went into the store” (Ben, 25, limited).</td>
<td>“[It would be useful] to see if it's something that would look good with my outfit” (Peter, 23, no experience).</td>
<td>“The main benefit is that you can see whether or not it just suits you from a visual point of view. […] so, from a visual thing, I think you care about how the glasses look on you, and it's less dependent on fit. I think for clothes too it's more important to look good” (Christine, 24, moderate).</td>
</tr>
</tbody>
</table>
### Appendix A5. Hinder themes from interviews

#### Table 8.3 Hinder themes from interviews

<table>
<thead>
<tr>
<th>Theme</th>
<th>Mitigating the value of brand</th>
<th>Amplification of cognitive dissonance</th>
<th>Consumers’ creative capacity</th>
<th>Short-term gain in customer experience</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is it?</strong></td>
<td>The importance of the brand name is reduced</td>
<td>Post purchase, should the item not meet the expectations consumers would experience higher cognitive dissonance</td>
<td>• Imaging what the item looks like when you have that on</td>
<td>AR-VTO has a ‘fun’ component, which would develop in word-of-mouth</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>When wanting to try an item on with AR-VTO, the style seemed to be more important than the brand</td>
<td>AR-VTO provides confidence as to what the item looks like. Hence, should the physical item not reflect the expectations, increased cognitive dissonance would develop.</td>
<td>• Consumers’ creative capacity has an impact on the attitudes toward the technology.</td>
<td>Since AR-VTO provides a fun and game component, initial reactions would be positive WOM as to the new technology. However, when the technology will not be considered innovative anymore, this might decrease</td>
</tr>
<tr>
<td><strong>Codes</strong></td>
<td>I don’t remember what I tried on; I didn’t pay attention to what I tried on; Cared about the style</td>
<td>Higher expectations; Informed decision; Involvement</td>
<td>• I don’t know what it’ll look like on me</td>
<td>Gimmick; Fun; Game; Play; Extra step</td>
</tr>
<tr>
<td><strong>Passages</strong></td>
<td>“What was the brand I tried on? I don’t know. I didn’t notice. But that didn’t come into my decision making at all because when I was scrolling through looking at the shoes, I was just looking for the ones that I liked the best, I was just too excited to try them on.” (Karen, 51, no experience).</td>
<td>“I feel it gives the reassurance of how it is going to look. Especially for a product that I haven’t tried before. Like a first-time customer” (Emily, 29, limited).</td>
<td>• I can imagine/tell</td>
<td>“I mean, for me, it’s like ‘whoa, new, new!’, I would use this just to check it out. But I don’t think it would help me make a decision to buy them” (Max, 25, no experience).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Sometimes they’ll give the measurement of the garments itself. But it’s just still different to actually being able to see it. You need to use your spatial reasoning, or whatever, to try and imagine. I feel like I’m pretty good at that. But still, sometimes it just doesn’t quite work.” (Leah, 31, no experience).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix A6. Summary theme coding

Figure 8.1 Summary theme coding from interviews
Appendices B – Study 2

Appendix B1. – Survey questions

Project title: Customer segmentation of augmented reality users in retail

This survey is about shopping, and we’ll ask you a series of questions about your shopping behaviour and experiences. Therefore, your thoughts and opinions are very important to this research project. There are no right or wrong answers. This survey will take approximately 15 minutes to complete. Participation in this research study is entirely voluntary and you may choose not to accept or fill in this survey. No information that could lead to the identification of any individual will be asked in this survey. Information acquired in this study will be kept private and confidential. The collected information will not be disclosed to any other research studies or outside parties.

If you have any issues, questions or concerns, please contact the Principal Investigator A/Prof Sean Sands at ssands@swin.edu.au or 03 9214 5748.

Please confirm that you:

• Agree to participate in this study, with the understanding that participation is voluntary and anonymous
• I am over 18 years of age.
• I understand that the data collected for the study will form part of a thesis and will also be reported in a publication in an academic journal and conference presentation.

By clicking on the “I agree” button below I am agreeing to the above and also to participate in this study. If you do not wish to participate in the research study, please decline participation by clicking on the "I disagree" button.

Thank you in advance for your assistance in this research.

• I agree (1)
• I disagree (2)

In this survey we will be discussing Augmented Reality (AR) in retail.

AR is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory. The following image is an example of an AR tool used to virtually try-on shoes.

Retailers are increasingly developing AR tools to enable consumers to try on and experience product prior to purchase. It is not essential that you have used an AR tool in order to complete this survey.

Have you ever used/ experienced an AR tool? (either on an app or another technology)

• Yes (1)
• No (0)
• Do not know (2)

AudioCheckY1N0

Next, you will be shown a short video of how this AR tool works. Please read the information and instructions below before proceeding to the next steps.

As this is a video with sound, please make sure your screen’s brightness is turned up and your speakers are
set to an acceptable audible level
Were you able to hear the audio in the video?

- Yes (1)
- No (2)

The video on the next page will show you this AR tool.

Please click play to watch this video that shows how the technology works. When you have watched the video, you will be able to continue.

**Attitude Toward AR** Please rate your overall view of the IKEA AR tool

*Note that 1 = Strongly disagree and 7 = strongly agree*

- I would be positive about the AR tool on the IKEA app (1)
- The AR tool on the IKEA app would be so interesting that you just would want to learn more about it (2)
- It would just make sense to use the AR tool on the IKEA app (3)
- The use of the AR tool on the IKEA app would be a good idea (4)
- Other people should also use the AR tool on the IKEA app (5)
- I would feel familiar with the IKEA app (6)

**Perceived Information Overload** To what extent do you agree or disagree with the following statements?

*Note that 1 = Strongly disagree and 7 = strongly agree*

- I feel that it would be difficult to view every piece of furniture on this AR tool (1)
- There would be too much information on this AR tool; I would feel burdened by it (2)
- I would be uncertain that the information on this AR tool would fit my needs for making a buying decision (3)
- I would have no idea where to find the information I need on this AR tool (4)
- There would be more information than I could interpret immediately on this AR tool (5)

**Decision Confidence** Imagine that you use the IKEA AR tool and you add some furniture to the cart.

To what extent do you agree or disagree with the following statements?

*Note that 1 = Strongly disagree and 7 = strongly agree*

- I would be 100% confident that my choice with the AR tool would objectively be better than other choices (1)
- I would be sure my choice made with the AR tool would objectively better than other choices (6)
- I would be certain that my choice with the AR tool would be the best choice I could make (7)
- Regardless of my personal feelings about my choice, it would be clear that my choice with the AR tool would be objectively superior to other choice available on the app (8)
- Even if my friends might not agree, my choice would be the best option (9)
- Please select agree (10 – attn check)
Willingness to purchase using AR
Given what you know about AR, please select the following statements
Note that 1 = Strongly disagree and 7 = strongly agree

- I am interested in using an AR tool to shop (1)
- I would like to use an AR tool to shop (5)
- I would recommend an AR tool to others to use to shop (6)
- I would use an AR tool to shop (7)
- It is very likely that I would buy a product using an AR tool (8)
- I would purchase a product with an AR tool next time I need a product (9)
- I would definitely try an AR tool to buy a product (10)

EVS
Please indicate the extent you agree or disagree with the following statements
Note that 1 = Strongly disagree and 7 = strongly agree

- The way IKEA displays its products with the AR tool seems attractive. (4)
- IKEA's app seems aesthetically appealing. (5)
- I like the way IKEA's AR tool looks. (6)
- I think the IKEA AR tool seems very entertaining. (8)
- The enthusiasm of the IKEA AR tool is catching, it would pick me up. (9)
- The IKEA AR tool doesn’t just sell products—it would entertain me. (10)
- Shopping from the IKEA AR tool would “get me away from it all.” (12)
- Shopping from the IKEA AR tool would make me feel like I am in another world. (13)
- I would get so involved if I shopped with the IKEA AR tool that I'd forget everything else. (14)
- I would enjoy shopping from the IKEA AR tool for its own sake, not just for the items I may purchase (16)
- I would shop from the IKEA AR tool for the pure enjoyment of it. (17)
- Please select 'Disagree' (29 – attn check)
- Shopping from the IKEA AR tool would be an efficient way to manage my time. (19)
- Shopping from the IKEA AR tool would make my life easier. (20)
- Shopping from the IKEA AR tool would fit with my schedule. (21)
- IKEA products are a good economic value. (23)
- Overall, I am happy with IKEA’s prices. (24)
- The prices of the products I’d purchase from the IKEA AR tool are not too high, given the quality of the merchandise. (25)
- When I think of the IKEA AR tool, I think of excellence. (27)
- I think of IKEA as an expert in the merchandise it offers. (28)
**Attention Checks** The video you saw illustrated how augmented reality works in the setting of...
(select the one that applies)

- Makeup (0)
- Hats (0)
- Furniture (1)
- Glasses (0)

**Val1** Had you seen the video presented in this survey before?
- Yes (1)
- No (2)

**Val2** What was the brand that developed the AR tool in the video?

---

**ARExp** Finally, we would like to ask you a few questions about yourself

How many times have you used augmented reality?
- (1)
- 1-2 (2)
- 3-5 (3)
- More than 6 (4)

**Smartphone** What operating system is your current smartphone?
- Android (1)
- iOS (2)
Table 8.4 Study 2 measurement items, factor loadings, and construct reliabilities

<table>
<thead>
<tr>
<th>Scale items</th>
<th>Factor Loadings</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual appeal (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td>The way IKEA displays its products with the AR tool seems attractive</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>IKEA’s app seems aesthetically appealing</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>I like the way IKEA’s AR tool looks</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>Entertainment value (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>I think the IKEA AR tool seems very entertaining</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>The enthusiasm of the IKEA AR tool is catching, it would pick me up</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>The IKEA AR tool doesn’t just sell products—it would entertain me</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Escapism (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.82</td>
</tr>
<tr>
<td>Shopping from the IKEA AR tool would “get me away from it all.”</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Shopping from the IKEA AR tool would make me feel like I am in another world</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>I would get so involved if I shopped with the IKEA AR tool that I’d forget everything else</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Intrinsic enjoyment (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.86</td>
</tr>
<tr>
<td>I would enjoy shopping from the IKEA AR tool for its own sake, not just for the items I may purchase</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>I would shop from the IKEA AR tool for the pure enjoyment of it</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td>Efficiency (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.83</td>
</tr>
<tr>
<td>Shopping from the IKEA AR tool would be an efficient way to manage my time</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Shopping from the IKEA AR tool would make my life easier</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Shopping from the IKEA AR tool would fit with my schedule</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Economic value (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.81</td>
</tr>
<tr>
<td>IKEA products are a good economic value</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Overall, I am happy with IKEA’s prices</td>
<td>.78</td>
<td></td>
</tr>
<tr>
<td>The prices of the products I’d purchase from the IKEA AR tool are not too high, given the quality of the merchandise</td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>Service Excellence (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td>When I think of the IKEA AR tool, I think of excellence</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>I think of IKEA as an expert in the merchandise it offers</td>
<td>.66</td>
<td></td>
</tr>
<tr>
<td>Information overload (adapted from Li, 2017)</td>
<td></td>
<td>0.88</td>
</tr>
<tr>
<td>I feel that it would be difficult to view every piece of furniture on this AR tool</td>
<td>.78</td>
<td></td>
</tr>
<tr>
<td>There would be too much information on this AR tool; I would feel burdened by it</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>I would be uncertain that the information on this AR tool would fit my needs for making a buying decision</td>
<td>.76</td>
<td></td>
</tr>
<tr>
<td>I would have no idea where to find the information I need on this AR tool</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>There would be more information than I could interpret immediately on this AR tool</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>Attitude towards AR (adapted from Rese et al., 2014)</td>
<td></td>
<td>0.94</td>
</tr>
<tr>
<td>Statement</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>I would be positive about the AR tool on the IKEA app</td>
<td>.91</td>
<td></td>
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<td>The AR tool on the IKEA app would be so interesting that you just would want to learn more about it</td>
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<td>The use of the AR tool on the IKEA app would be a good idea</td>
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<tr>
<td>Other people should also use the AR tool on the IKEA app</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td><strong>Decision Confidence (adapted from Guillet et al., 2020)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be 100% confident that my choice with the AR tool would objectively be better than other choices</td>
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<td></td>
</tr>
<tr>
<td>I would be certain that my choice with the AR tool would be the best choice I could make</td>
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<td></td>
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<tr>
<td>I would be sure my choice made with the AR tool would objectively better than other choices</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>Regardless of my personal feelings about my choice, it would be clear that my choice with the AR tool would be objectively superior to other choice available on the app</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td><strong>Willingness to purchase using AR (adapted from Vahdat et al., 2020; Xu et al, 2020)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am interested in using an AR tool to shop</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>I would like to use an AR tool to shop</td>
<td>.94</td>
<td></td>
</tr>
<tr>
<td>I would recommend an AR tool to others to use to shop</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>I would use an AR tool to shop</td>
<td>.93</td>
<td></td>
</tr>
<tr>
<td>It is very likely that I would buy a product using an AR tool</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>I would purchase a product with an AR tool next time I need a product</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>I would definitely try an AR tool to buy a product</td>
<td>.92</td>
<td></td>
</tr>
</tbody>
</table>

1 sub-dimensions of the Experiential Value Scale
Appendices C – Study 3

Appendix C1. – Survey questions

Project title: Customer segmentation of augmented reality users in retail

This survey is about shopping and we’ll ask you a series of questions about your shopping behaviour and experiences. Therefore, your thoughts and opinions are very important to this research project. There are no right or wrong answers. This survey will take approximately 15 minutes to complete. Participation in this research study is entirely voluntary and you may choose not to accept or fill in this survey. No information that could lead to the identification of any individual will be asked in this survey. Information acquired in this study will be kept private and confidential. The collected information will not be disclosed to any other research studies or outside parties. If you have any issues, questions or concerns, please contact the Principal Investigator A/Prof Sean Sands at ssands@swin.edu.au or 03 9214 5748.

Please confirm that you:

- Agree to participate in this study, with the understanding that participation is voluntary and anonymous
- I am over 18 years of age.
- I understand that the data collected for the study will form part of a thesis and will also be reported in a publication in an academic journal and conference presentation.

By clicking on the “I agree” button below I am agreeing to the above and also to participate in this study. If you do not wish to participate in the research study, please decline participation by clicking on the "I disagree" button.

Thank you in advance for your assistance in this research.

- I agree (1)
- I disagree (2)

In this survey we will be discussing Augmented Reality (AR) in retail.

AR is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory. The following image is an example of an AR tool used to virtually try-on shoes.

Retailers are increasingly developing AR tools to enable consumers to try on and experience product prior to purchase. It is not essential that you have used an AR tool in order to complete this survey.

Have you ever used/experienced an AR tool? (either on an app or another technology)

- Yes (1)
- No (0)
- Do not know (2)

Attitude toward AR Regardless of whether you have already used an AR tool or not, please indicate the extent to which you agree or disagree with the following

*Note that 1 = Strongly disagree and 7 = strongly agree*

- I have positive perceptions about AR tools (1)
• AR tools are so interesting that I just want to learn more about them (2)
• It just makes sense to use an AR tool (3)
• The use of AR tools is a good idea (4)
• Other people should also use AR tools (5)
• I am familiar with AR tools (6)

Easy-Task
On the next page, you will be presented with a scenario. We would like you to carefully read the scenario and then answer some questions.

Imagine that you have moved into a new house. The new house has a slightly larger lounge room than your last house and you need to purchase a new piece of furniture. You need to decide what furniture to purchase for that room and where to place it. We would like you to use your imagination and visualize yourself buying a piece of furniture for this room. Please imagine how you might decide what item to buy for this room.

Hard-Task
On the next page, you will be presented with a scenario. We would like you to carefully read the scenario and then answer some questions.

Imagine that you have moved into a new house. The new house is significantly larger than your last house and you now need to furnish a large proportion of the whole house from scratch. You need to decide what furniture to purchase for each room and where to place it all. We would like you to use your imagination and visualize yourself buying furniture for this house. Please imagine how you might decide what items to buy for the house.

AudioCheck
Next, you will be shown a short video of how this AR tool works. Please read the information and instructions below before proceeding to the next steps.

As this is a video with sound, please make sure your screen’s brightness is turned up and your speakers are set to an acceptable audible level.
Were you able to hear the audio in the video?
• Yes (1)
• No (2)

Video Easy-Task
Imagine that you have moved into a new house. The new house has a slightly larger lounge room than your last house and you need to purchase a new piece of furniture. You need to decide what furniture to purchase for that room and where to place it. We would like you to use your imagination and visualize yourself buying a piece of furniture for this room. Please imagine how you might decide what item to buy for this room.

Based on the scenario described above, we would like you to imagine that you go to the IKEA app to browse furniture.

You find that IKEA has an online AR tool that can help you with your task. The video on the next page will show you this AR tool.
Please click play to watch this video that shows how the technology works. When you have watched the video, you will be able to continue.

Display This Question:

Video Hard-Task
Imagine that you have moved into a new house. The new house is significantly larger than your last house and you now need to furnish a large proportion of the whole house from scratch. You need to decide what furniture to purchase for each room and where to place it all. We would like you to use your imagination and visualize yourself buying furniture for this house. Please imagine how you might decide what items to buy for the house.

Based on the scenario described above, we would like you to imagine that you go to the IKEA app to browse furniture.

You find that IKEA has an online AR tool that can help you with your task. The video on the next page will show you this AR tool.

Please click play to watch this video that shows how the technology works. When you have watched the video, you will be able to continue.

Attitude toward AR Post video Please rate your overall view of the IKEA AR tool

Note that 1 = Strongly disagree and 7 = strongly agree

- I would be positive about the AR tool on the IKEA app (1)
- The AR tool on the IKEA app would be so interesting that you just would want to learn more about it (2)
- It would just make sense to use the AR tool on the IKEA app (3)
- The use of the AR tool on the IKEA app would be a good idea (4)
- Other people should also use the AR tool on the IKEA app (5)
- I would feel familiar with the IKEA app (6)

Perceived Ease of Use Imagine you decide to use this IKEA AR tool to help you with your shopping task. Please indicate the extent to which you agree or disagree with the following statements.

Note that 1 = Strongly disagree and 7 = strongly agree

- Learning to use the AR tool on the IKEA app would be easy for me (1)
- I would find it easy to get the AR tool on the IKEA app to do what I want it to do (2)
- My interaction with the AR tool on the IKEA app would be clear and understandable (3)
- I would find the AR tool on the IKEA app to be flexible to interact with (4)
- It would be easy for me to become skilful at using the AR tool on the IKEA app (5)
- I would find the AR tool on the IKEA app easy to use (6)

Perceived Information Overload To what extent do you agree or disagree with the following statements?

Note that 1 = Strongly disagree and 7 = strongly agree

- I feel that it would be difficult to view every piece of furniture on this AR tool (1)
• There would be too much information on this AR tool; I would feel burdened by it (2)
• I would be uncertain that the information on this AR tool would fit my needs for making a buying decision (3)
• I would have no idea where to find the information I need on this AR tool (4)
• There would be more information than I could interpret immediately on this AR tool (5)

**Decision Confidence** Imagine that you use the IKEA AR tool and you add some furniture to the cart. To what extent do you agree or disagree with the following statements?
*Note that 1 = Strongly disagree and 7 = strongly agree*

• I would be 100% confident that my choice with the AR tool would objectively be better than other choices (1)
• I would be sure my choice made with the AR tool would objectively better than other choices (6)
• I would be certain that my choice with the AR tool would be the best choice I could make (7)
• Regardless of my personal feelings about my choice, it would be clear that my choice with the AR tool would be objectively superior to other choice available on the app (8)
• Even if my friends might not agree, my choice would be the best option (9)
• Please select agree (10 – attn check)

**Perceived Usefulness**
To what degree do you feel using an AR tool like the one you saw would...
*Note that 1 = Strongly disagree and 7 = strongly agree*

• Enable me to accomplish shopping tasks more quickly (1)
• Enhance my shopping performance (2)
• Increase my shopping productivity (3)
• Enhance my shopping effectiveness (4)
• Make it easier to shop (5)
• Be useful (6)

**EVS** Please indicate the extent you agree or disagree with the following statements
*Note that 1 = Strongly disagree and 7 = strongly agree*

• The way IKEA displays its products with the AR tool seems attractive. (4)
• IKEA's app seems aesthetically appealing. (5)
• I like the way IKEA's AR tool looks. (6)
• I think the IKEA AR tool seems very entertaining. (8)
• The enthusiasm of the IKEA AR tool is catching, it would pick me up. (9)
• The IKEA AR tool doesn’t just sell products—it would entertain me. (10)
• Shopping from the IKEA AR tool would “get me away from it all.” (12)
• Shopping from the IKEA AR tool would make me feel like I am in another world. (13)
• I would get so involved if I shopped with the IKEA AR tool that I'd forget everything else. (14)
• I would enjoy shopping from the IKEA AR tool for its own sake, not just for the items I may purchase (16)
• I would shop from the IKEA AR tool for the pure enjoyment of it. (17)
• Please select 'Disagree' (29 – attn check)
• Shopping from the IKEA AR tool would be an efficient way to manage my time. (19)
• Shopping from the IKEA AR tool would make my life easier. (20)
• Shopping from the IKEA AR tool would fit with my schedule. (21)
• IKEA products are a good economic value. (23)
• Overall, I am happy with IKEA’s prices. (24)
• The prices of the products I’d purchase from the IKEA AR tool are not too high, given the quality of the merchandise. (25)
• When I think of the IKEA AR tool, I think of excellence. (27)
• I think of IKEA as an expert in the merchandise it offers. (28)

**Scenario Realism** Thinking about the scenario you previously read, to what extent do you believe that

*Note that 1 = Strongly disagree and 7 = strongly agree*

• It is easy to imagine being in the situation described in this study (1)
• The scenario is realistic (4)

**Attention Checks** The video you saw illustrated how augmented reality works in the setting of...

(select the one that applies)

• Makeup (0)
• Hats (0)
• Furniture (1)
• Glasses (0)

**Val1** Had you seen the video presented in this survey before?

• Yes (1)
• No (2)

**Val2** What was the brand that developed the AR tool in the video?

______________________________

**Shopping Behaviour**

Now we would like you to think about your **general shopping behaviour**, not related to AR or furniture. Think general. Please indicate the extent to which you agree or disagree with the following statements

*Note that 1 = Strongly disagree and 7 = strongly agree*

• I regularly purchase different variants of a product just for a change (1)
• I am one of those people who try a new product firstly just after the launch (2)
- I find it boring to use the same product (or brand) repetitively (3)
- I like to try new and different products (4)
- I always have the newest gadgets (5)
- Being accepted by other people is very important to me (6)
- I find it very boring when other people criticize my behaviours (7)
- I like to have some problems that I can solve without much thinking (8)
- I am always busy (9)
- I usually find myself pressed for time (10)
- I like shopping (11)
- I take my time when I shop (12)
- It is important for me to have the best price for the product (13)
- I compare the prices of various products before I make a choice (14)

**AR Experience** Finally, we would like to ask you a few questions about yourself

How many times have you used augmented reality?
- (1)
- 1-2 (2)
- 3-5 (3)
- More than 6 (4)

**Age** What is your current age in years?

____________________________

**Gender** To which gender identity do you most identify?
- Female (1)
- Male (2)
- Other (5) ________________________________
- Prefer not to answer (3)
Education  What is the highest level of education you have completed?
- High School  (1)
- College degree  (2)
- Master’s degree  (3)
- Doctorate  (4)
- Other (please specify)  (5) ________________________________________________

Income  Which bracket best represents your annual income (before tax)?
- Less than $20,000  (1)
- $20,000 - $40,000  (2)
- $40,001 - $60,000  (3)
- $60,001 – $90,000  (4)
- $90,001 – $120,000  (5)
- $120,001 - $150,000  (6)
- More than $150,000  (7)

Comments  Thank you for your time. Feel free to leave any comments about the survey.________________________________________________________________
### Appendix C2. – Confirmatory factor analysis

Table 8.5 Measurement items, factor loadings, and construct reliabilities

<table>
<thead>
<tr>
<th>Scale items</th>
<th>Factor Loadings</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitude towards AR (time 1) (adapted from Rese et al., 2014)</strong></td>
<td></td>
<td>0.92</td>
</tr>
<tr>
<td>The use of AR tools is a good idea</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td>I have positive perceptions about AR tools</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>Other people should also use AR tools</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>It just makes sense to use an AR tool</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>AR tools are so interesting that I just want to learn more about them</td>
<td>.76</td>
<td></td>
</tr>
<tr>
<td><strong>Attitude towards AR (time 2) (adapted from Rese et al., 2014)</strong></td>
<td></td>
<td>0.94</td>
</tr>
<tr>
<td>I would be positive about the AR tool on the IKEA app</td>
<td>.91</td>
<td></td>
</tr>
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<td>The use of the AR tool on the IKEA app would be a good idea</td>
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</tr>
<tr>
<td>Other people should also use the AR tool on the IKEA app</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td><strong>Visual appeal</strong> (adapted from Mathwick et al., 2001)</td>
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<td>0.87</td>
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<tr>
<td>The way IKEA displays its products with the AR tool seems attractive</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>IKEA's app seems aesthetically appealing</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>I like the way IKEA's AR tool looks</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td><strong>Entertainment value</strong> (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>I think the IKEA AR tool seems very entertaining</td>
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<td></td>
</tr>
<tr>
<td>The enthusiasm of the IKEA AR tool is catching, it would pick me up</td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>The IKEA AR tool doesn’t just sell products—it would entertain me</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td><strong>Escapism</strong> (adapted from Mathwick et al., 2001)</td>
<td></td>
<td>0.82</td>
</tr>
<tr>
<td>Shopping from the IKEA AR tool would “get me away from it all.”</td>
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<td></td>
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<td>I would get so involved if I shopped with the IKEA AR tool that I'd forget everything else</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td><strong>Intrinsic enjoyment</strong> (adapted from Mathwick et al., 2001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would enjoy shopping from the IKEA AR tool for its own sake, not just for the items I may purchase</td>
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<td></td>
</tr>
<tr>
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<td></td>
</tr>
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<td><strong>Efficiency</strong> (adapted from Mathwick et al., 2001)</td>
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<td></td>
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<td><strong>Economic value</strong> (adapted from Mathwick et al., 2001)</td>
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<td>IKEA products are a good economic value</td>
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</table>
Overall, I am happy with IKEA’s prices.  

The prices of the products I'd purchase from the IKEA AR tool are not too high, given the quality of the merchandise.

<table>
<thead>
<tr>
<th>Service Excellence' (adapted from Mathwick et al., 2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I think of the IKEA AR tool, I think of excellence</td>
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<tr>
<td>I think of IKEA as an expert in the merchandise it offers</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived ease of use (adapted from McLean &amp; Wilson, 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning to use the AR tool on the IKEA app would be easy for me</td>
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<td>I would find it easy to get the AR tool on the IKEA app to do what I want it to do</td>
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<td>I would find the AR tool on the IKEA app to be flexible to interact with</td>
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<td>I would find the AR tool on the IKEA app easy to use</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision Confidence (adapted from Guillet et al., 2020)</th>
</tr>
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<tbody>
<tr>
<td>I would be 100% confident that my choice with the AR tool would objectively be better than other choices</td>
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<td>I would be sure my choice made with the AR tool would objectively better than other choices</td>
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<tr>
<td>Regardless of my personal feelings about my choice, it would be clear that my choice with the AR tool would be objectively superior to other choice available on the app</td>
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</table>

<table>
<thead>
<tr>
<th>Information overload (adapted from Li, 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel that it would be difficult to view every piece of furniture on this AR tool</td>
</tr>
<tr>
<td>There would be too much information on this AR tool; I would feel burdened by it</td>
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<tr>
<td>I would be uncertain that the information on this AR tool would fit my needs for making a buying decision</td>
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<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived usefulness (adapted from McLean &amp; Wilson, 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what degree do you feel using an AR tool like the one you saw would...</td>
</tr>
<tr>
<td>Enable me to accomplish shopping tasks more quickly</td>
</tr>
<tr>
<td>Enhance my shopping performance</td>
</tr>
<tr>
<td>Increase my shopping productivity</td>
</tr>
<tr>
<td>Enhance my shopping effectiveness</td>
</tr>
<tr>
<td>Make it easier to shop</td>
</tr>
<tr>
<td>Be useful</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Innovativeness' (adapted from Konuş et al., 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am one of those people who try a new product firstly just after the launch</td>
</tr>
<tr>
<td>I always have the newest gadgets</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Pressure' (adapted from Konuş et al., 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am always busy</td>
</tr>
<tr>
<td>Item</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>I usually find myself pressed for time</td>
</tr>
<tr>
<td>Shopping Enjoyment (adapted from Konuș et al. (2008); Construct Reliability = .59)</td>
</tr>
<tr>
<td>I like shopping</td>
</tr>
<tr>
<td>I take my time when I shop</td>
</tr>
<tr>
<td>Price Consciousness (adapted from Konuș et al. (2008); Construct Reliability = .68)</td>
</tr>
<tr>
<td>It is important for me to have the best price for the product</td>
</tr>
<tr>
<td>I compare the prices of various products before I make a choice</td>
</tr>
</tbody>
</table>

1 sub-dimensions of the Experiential Value Scale; 2 sub-dimensions of Konuș et al. (2008)
Authorship Indication Form

For HDR students

NOTE
This Authorship Indication form is a statement detailing the percentage of the contribution of each author in each submitted/published ‘paper’. This form must be signed by each co-author and the Principal Supervisor. This form must be added to the publication of your final thesis as an appendix. Please fill out a separate form for each published paper to be included in your thesis.

DECLARATION
We hereby declare our contribution to the publication of the ‘paper’ entitled:

Augmented reality and the customer journey: An exploratory study

First Author
Name: Beatrice Romano
Signature: Beatrice Romano
Percentage of contribution: 80 % Date: 13/12/2022

Brief description of contribution to the ‘paper’ and your central responsibilities/role on project:
Project-managed the realisation of this paper. Conducted the literature review, and workshoped research design. Conducted data collection, preparation and analysis, and worked on the first manuscript for this paper.

Second Author
Name: Sean Sands
Signature: Sean Sands
Percentage of contribution: 10 % Date: 13/12/2022

Brief description of your contribution to the ‘paper’:
Support in research design and methodology. Standard supervision expectations support.

Third Author
Name: Jason I. Pallant
Signature: 
Percentage of contribution: 10 % Date: 13/12/2022

Brief description of your contribution to the ‘paper’:
Support in data analysis and editing. Standard supervision expectations support.
### Fourth Author

**Name:** N/A  
**Signature:**

**Percentage of contribution:** __%  
**Date:** __/__/____

**Brief description of your contribution to the 'paper':**

---

### Principal Supervisor:

**Name:** Sean Sands  
**Signature:** *Sean Sands*

**Date:** 13/12/2022

*In the case of more than four authors please attach another sheet with the names, signatures and contribution of the authors.*

**Authors’ Declaration Form**
Authorship Indication Form

For HDR students

NOTE
This Authorship Indication form is a statement detailing the percentage of the contribution of each author in each submitted/published 'paper'. This form must be signed by each co-author and the Principal Supervisor. This form must be added to the publication of your final thesis as an appendix. Please fill out a separate form for each published paper to be included in your thesis.

DECLARATION
We hereby declare our contribution to the publication of the 'paper' entitled:

The impact of AR as a shopping tool on decision-making outcomes

First Author
Name: Beatrice Romano
Signature: Beatrice Romano
Percentage of contribution: 80 %
Date: 13/12/2022

Brief description of contribution to the 'paper' and your central responsibilities/role on project:
Project-managed the realisation of this paper. Conducted the literature review, and worked on the first manuscript for this paper.

Second Author
Name: Sean Sands
Signature: Sean Sands
Percentage of contribution: 10 %
Date: 13/12/2022

Brief description of your contribution to the 'paper':
Support in research design and methodology. Standard supervision expectations support.

Third Author
Name: Jason I. Pallant
Signature: 
Percentage of contribution: 10 %
Date: 13/12/2022

Brief description of your contribution to the 'paper':
Support in data analysis and editing. Standard supervision expectations support.
Fourth Author
Name: N/A
Signature: 
Percentage of contribution: ____
Date: ___/___/____

Brief description of your contribution to the "paper":

Principal Supervisor:
Name: Sean Sands
Signature: Sean Sands
Date: 13/12/2022

In the case of more than four authors please attach another sheet with the names, signatures and contribution of the authors.

Authors' Declaration Form
Authorship Indication Form
For HDR students

NOTE
This Authorship Indication form is a statement detailing the percentage of the contribution of each author in each submitted/published 'paper'. This form must be signed by each co-author and the Principal Supervisor. This form must be added to the publication of your final thesis as an appendix. Please fill out a separate form for each published paper to be included in your thesis.

DECLARATION
We hereby declare our contribution to the publication of the 'paper' entitled:

Virtual shopping: segmenting consumer attitudes towards augmented reality as a shopping tool

First Author
Name: Beatrice Romano
Signature: Beatrice Romano
Percentage of contribution: 80.0%
Date: 13/12/2022

Brief description of contribution to the 'paper' and your central responsibilities/role on project:
Project-managed the realisation of this paper. Conducted the literature review, and workshoped research design. Conducted data collection, preparation and analysis, and worked on the first manuscript for this paper.

Second Author
Name: Sean Sands
Signature: Sean Sands
Percentage of contribution: 10.0%
Date: 13/12/2022

Brief description of your contribution to the 'paper':
Support in research design and methodology. Standard supervision expectations support.

Third Author
Name: Jason L. Pallant
Signature: Jason L. Pallant
Percentage of contribution: 10.0%
Date: 13/12/2022

Brief description of your contribution to the 'paper':
Support in data analysis and editing. Standard supervision expectations support.
Fourth Author
Name: N/A ________________________________ Signature: ________________________________
Percentage of contribution: ___% Date: __/__/____
Brief description of your contribution to the paper:

Principal Supervisor:
Name: Sean Sands Signature: Sean Sands
Date: 13/12/2022

In the case of more than four authors please attach another sheet with the names, signatures and contribution of the authors.

Authors' Indication Form
Appendices E – Ethics Approvals

Swinburne University of Technology Human Research Ethics Committee
Approval certificate

The ethics application for your project ‘How virtual try-on technology impacts the customer journey’ has been approved.

Chief Investigator: Associate Professor Sean Sands
Ref: 2020/158/3348
Approved Duration: 9 January 2020 to 9 January 2021

I refer to the ethical review of the above project protocol by Swinburne’s Human Research Ethics Committee (SUHREC) or its sub-committees.

I am pleased to advise that, as submitted to date, the project may proceed in line with standard on-going ethics clearance conditions outlined below:

- The approved duration is as shown above unless an extension request is subsequently approved.
- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the National Statement on Ethical Conduct in Human Research (2018) and with respect to secure data use, retention and disposal.
- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in Chief Investigator/Supervisor, or addition or removal of other personnel/students from the project, requires timely notification and SUHREC endorsement.
- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/clearance from SUHREC for approval. SUHREC must be notified immediately or as soon as possible thereof of (a) any serious or unexpected adverse effects on participants and any redress measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.
- A duly authorised external or internal audit of the project may be undertaken at any time.
- Please forward this approval certificate to relevant members of the project team.

The following investigators have been approved to work on the project:

Chief Investigator
Sean Sands

Associate Investigators
Jason Pellant

Student Investigators
Beatrice Romano

Please contact the Swinburne Research Ethics Office if you have any queries.

Regards,

Ms Sally Fray

on behalf of SHESC2

Research Ethics Office

Swinburne University of Technology

P: 9214 8145 | E: research.ethics@swin.edu.au

09/01/2020
The ethics application for your project Customer segmentation of augmented reality users in retail has been approved.

Chief Investigator: Sean Sands

Ref. 2020-160-4940

Approved Duration: 09/09/2020 to 09/09/2022

I refer to the ethical review of the above project protocol by Swinburne’s Human Research Ethics Committee (SUHREC) or its sub-committees.

I am pleased to advise that, as submitted to date, the project may proceed in line with standard on-going ethics clearance conditions outlined below:

- The approved duration is as shown above unless an extension request is subsequently approved.
- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the National Statement on Ethical Conduct in Human Research (2018) and with respect to secure data use, retention and disposal.
- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in Chief Investigator/Supervisor, and addition or removal of other personnel/students from the project, requires timely notification and SUHREC endorsement.
- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical approval/acceptance from SUHREC for approval. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any remedial measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.
- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.
- A duty-authorized external or internal audit of the project may be undertaken at any time.
- Please forward this approval certificate to relevant members of the project team.

This research project was approved during COVID-19 restrictions. The conduct of the research during this period should reflect any changes in relation to university and government COVID-19 mandates in the relevant jurisdictions. To ensure you have accommodated these mandates please refer to the Swinburne Ethics COVID-19 website here.

The following investigators have been approved to work on the project:

Chief Investigator
Sean Sands

Associate Investigators
Jason Pallant

Student Investigators
Rasho Romano

Please contact the Swinburne Research Ethics Office if you have any queries.

Regards,
Dr Astrid Nordmann

on behalf of

Research Ethics Office
Swinburne University of Technology

P: +61 3 9214 3845 | E: reo@swin.edu.au
Appendices F – Final Ethics Reports

Beatrice Romano

From: Astrid Nordmann on behalf of RES Ethics
Sent: Sunday, 27 November 2022 8:37 AM
To: Beatrice Romano
Subject: Fw: Acknowledgement of Final Report for 20221585-10129

From: donotreply@infonica.net <donotreply@infonica.net>
Sent: Thursday, 16 June 2022 9:59 PM
To: Sean Sands <ssands@swin.edu.au>
Cc: RES Ethics <resethics@swin.edu.au>
Subject: Acknowledgement of Final Report for 20221585-10129

Dear Sean,
The Final Report for project 20221585-10129: How virtual try-on technology impacts the customer journey has been processed and satisfies the reporting requirements set under the terms of ethics clearance.

Regards,
Ms Leah Barham
Research Ethics Office
Swinburne University of Technology
P: +61 3 9214 8145 | E: resethics@swin.edu.au

Beatrice Romano

From: Astrid Nordmann on behalf of RES Ethics
Sent: Sunday, 27 November 2022 8:38 AM
To: Beatrice Romano
Subject: Fw: Acknowledgement of Final Report for 20224160-10130

From: donotreply@infonica.net <donotreply@infonica.net>
Sent: Thursday, 16 June 2022 10:03 PM
To: Sean Sands <ssands@swin.edu.au>
Cc: RES Ethics <resethics@swin.edu.au>
Subject: Acknowledgement of Final Report for 20224160-10130

Dear Sean,
The Final Report for project 20224160-10130: Customer segmentation of augmented reality users in retail has been processed and satisfies the reporting requirements set under the terms of ethics clearance.

Regards,
Ms Leah Barham
Research Ethics Office
Swinburne University of Technology
P: +61 3 9214 8145 | E: resethics@swin.edu.au