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Investigating factors that influence online purchase behaviour using Augmented and Virtual reality in the South African furniture industry

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School of Business Sciences

At the

University of the Witwatersrand

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Dr Melissa Zulu

DECLARATION

I, Mulalo Lusani Mankhili, hereby proclaim that this thesis, "Investigating Factors Influencing Online Purchase Behaviour in the South African Furniture Industry Using Augmented andVirtual Reality," is my own original work. It is intended for the MCOM at the University of the Witwatersrand's School of Economic and Business Sciences in Johannesburg, South Africa. It has never been presented in any other university for a degree or examination.



_____ _____

Mulalo Lusani Mankhili

Signed at Rosebank on the ……April… day of ……30 .....2023.

ABSTRACT

In South Africa, the furniture industry plays a significant role in the country's economy, contributing to Growth Domestic Product (GDP) and employment rates. As the trend of online shopping continues to gain popularity, integrating augmented reality (AR) and virtual reality (VR) technologies into the retail sector has become increasingly important. Research has demonstrated that these technologies can offer a competitive edge to brands operating in the furniture sector. Consequently, this study aims to explore the factors influencing the adoption of AR and VR in the South African furniture industry. According to a report from the Department of Trade and Industry (DTIC), the South African furniture industry has experienced a decline in recent years, with consumers shifting towards purchasing furniture online through e-commerce platforms. Given the growing significance of e-commerce, it is imperative for businesses to understand the determinants of consumers' online purchasing behaviour to enhance their online sales performance.

The purpose of this study is to investigate how the utilisation of AR and VR technologies can impact online purchase behaviour by dissecting the various factors influencing AR and VR adoption. To achieve this, the study has incorporated three theoretical frameworks: the Stimulus Organism Response theory (S-O-R), the Uses and Gratification theory (UGT), and the Flow theory. The research has identified several constructs derived from these theories to examine the interrelationships and influences among hedonic and utilitarian benefits, decision comfort, spatial presence, perceived intrusiveness, personal privacy concerns, mental imagery, perceived social presence, brand attitude, VR adoption, online purchase intention, and purchase behaviour. Data was collected from 400 South African online furniture customers, and the study utilised the Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse the relationships between these variables. The study formulated eleven hypotheses, of which nine were supported. The findings revealed that hedonic and utilitarian benefits, decision comfort, spatial presence, mental imagery, perceived social presence, brand attitude, and VR adoption have an influence on online purchase behaviour. However, perceived intrusiveness and personal privacy concerns had no influence on online purchase intentions when using AR apps. This suggests that consumers' concerns about intrusiveness and privacy may not significantly affect their purchase intentions when interacting with AR technology. Additionally, the research highlights the roles of brand attitude and VR adoption as mediators between mental imagery and online behaviour and between

perceived social presence and online purchasing behaviour. These findings offer valuable insights for businesses seeking to refine their online sales strategies and have the potential to contribute to the growth and development of the South African furniture industry.

Key words: Augmented reality, virtual reality, furniture industry, brand attitude, decision comfort, intrusiveness, privacy concerns, mental imagery, social presence.

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LIST OF ANCRONYMS

AR	**Augmented Reality**
AVE	**Average Variance Extracted**
CFA	**Confirmatory Factor Analysis**
CMV	**Common Method Variance**
DTIC	**Department of trade and industry**
PLS-SEM	**Partial Least Squares Structural Equation Modelling**
SEM	**Structural Equation Modelling**
S-O-R	**Stimulus-Organism-Response**
SRMR	**Standardized Root Mean Square Residual**
UGT	**Uses and Gratifications Theory**
VR	**Virtual Reality**
CFI	**Comparative Fit Index**
TLI	**Tucker-Lewis Index**

Chapter 1: Background and Introduction to the study

1 Introduction

The furniture industry plays a significant role in the daily lives of South Africans and is an important economic sector (The Department of Trade, industry, and Corporation (DTIC), 2021). However, over the past decade, the industry has experienced a significant decline, with demand stagnating, several manufacturing companies collapsing, and some retail entities collapsing (The DTIC, 2021). Therefore, the proposed research focuses on the South African furniture industry. Research shows that businesses must change the way they conduct business due to new trends of customers wanting to buy online (Orús et al., 2021). This trend has resulted in brands changing how they interact with customers (Orús et al., 2021). Furthermore, the accelerated extension of e-commerce influences many retailers to change their business strategies and distribution channels and significantly re-engineer their relationship with consumers (Alcañiz et al., 2019). As the retail industry transitions to an online environment, the customer experience changes with different features.

Although there is an increase in the use of AR and VR technologies globally, there is still a need for South African furniture brands to adapt to this trend. AR refers to an improved version of the physical world reached through digital visual elements or other sensory stimuli delivered through technology (Ghuloum & Al-lamki, 2021). VR is the term used to describe a three-dimensional environment that somebody can explore (Ghuloum & Al-lamki, 2021). However, there is very little research investigating the effectiveness of these two technologies (Orús et al., 2021). Therefore, this study examines factors influencing online purchase behaviour using AR and VR in the South African furniture industry. Many factors besides internet access have influenced consumers' online shopping behaviour (Pham et al., 2020). Furthermore, customers' online experience is said to be influenced by different benefits that the customer has not experienced while purchasing offline (Orús et al., 2021). This research aims to investigate the use of AR and VR technologies within

the South African furniture industry, focusing on factors that influence online purchase behaviour. By understanding these factors, businesses can better tailor their online shopping experiences to meet customers' requirements and expectations, resulting in higher customer satisfaction and increased sales.

1.1 Industry Overview

According to recent trends, the global retail industry is experiencing a growing prevalence of AR and VR technology (Alcañiz et al., 2019). AR technology integrates digital elements into the physical world, whereas VR creates an immersive digital environment (Bonetti et al., 2017). Overall, integrating AR and VR technologies is seen as a means for retailers to enhance the shopping experience for their customers (Alcañiz et al., 2019). In South Africa, the furniture industry has a significant economic role. However, the industry has declined recently due to decreased demand and increased imported furniture sales (The DTIC, 2021). The industry has seen a rise in retail sales of household furniture and appliances during the COVID-19 lockdown (The DTIC, 2021). In South Africa, AR is not prevalent in commerce, but some companies such as Sea Monster's @home: Your Space app, which allows customers to place furniture in their homes virtually have started using it (Augmented et al., n.d). In the cosmetic sector, Woolworths debuted a virtual service, Virtual Try-On, in May 2021 that uses AR to allow customers to preview how their makeup will appear on them (Spiller, 2021).

South African furniture has encountered challenges within the industry; this research has identified the top online furniture brands in South Africa that are selling furniture online and offline, namely Cielo, KNUS, Block, Chisel, Coricraft, Mr Price Home, and @home. However, this study will focus more on some of the most popular furniture brands, according to Lange, (2022), which are Coricraft, Cielo, and @home, to name a few. These brands can utilise AR and VR technologies to stimulate their customers' online purchase behaviour. Globally, some brands have successfully implemented AR and VR technologies to elevate their online shopping experience in

the retail industry. For instance, IKEA's "Ikea Place" is an app that empowers customers to virtually place furniture in their homes via AR, while Sephora's "Virtual Artist" app enables users to try on makeup through AR (Joseph, 2017; Yang, 2021). This allows customers to see how a product will look and fit in their space before making a purchase, thus enhancing their shopping experience, and reducing the risk of returns. By identifying these factors, this study can provide insights into how retailers in the furniture industry can effectively use AR and VR. The global retail sector continues to experience a rise in the utilisation of these technologies, enhancing customers' online shopping experience (Alcañiz et al., 2019). While the trend toward online shopping has increased, AR and VR could potentially assist experiential brands in aligning with their online and offline customer experiences (Romano et al., 2020). Studies show that brands still face challenges when selecting and integrating these technologies (Grewal et al., 2021).

1.2 Research gap and Problem statement

1.2.1 Research problem statement

Research has shown that the execution of AR and VR technologies in the retail industry can enhance the shopping experience, increase buyer engagement, and influence buying behaviour (Hilken et al., 2017). However, there needs to be more insights into how furniture brands can effectively integrate VR and AR technologies to create a more compelling online customer experience (Hilken et al., 2021). According to Ramano et al. (2020), AR is more effective than VR in driving purchase intentions because it allows customers to create a more transparent, context-focused mental picture. According to Romano et al. (2020), VR technology successfully increases brand emotion. Globally, AR and VR have gained more popularity in the furniture industry. Research also shows that the global increase on the popularity of online retail, AR and VR have emerged as innovative tools that could potentially revolutionize online purchase behaviour within this industry. The rapid adoption of e-commerce platforms and the surging demand for home decor and furnishing products are propelling market growth (Grand View Research, 2021). The African

furniture has a market limited adoption of modern technologies like AR and VR (Deloitte, 2019).

However, in South Africa, several companies, including @home: Your Space app and Woolworths' Virtual Try-On service demonstrate the potential of AR and VR in the South African retail sector, allowing customers to virtually place items in their homes and preview makeup looks, respectively. The South African furniture industry is facing the challenge of keeping up with the evolving consumer trends and competing with international markets despite experiencing an increase in online shopping (The DTIC, 2021; Huang & Rust, 2018). Based on that this study aims, to investigate the factors influencing online purchase behaviour in the South African furniture industry using augmented and virtual reality (AR/VR) technologies.

The choice of this research topic is driven by the transformative impact of technology on businesses, including the South African furniture sector, which is experiencing changes due to the rise of online shopping. Research shows that local furniture retailers in South Africa face challenges related to innovation and agility to respond to changing consumer behaviour (The DTIC, 2021; Huang & Rust, 2018). There are several challenges faced by the South African furniture industry which are motivating this investigation. Firstly, the limited ability of customers to physically visit furniture stores, exacerbated by factors like distance, time constraints, and underscores the need for immersive online shopping experiences provided by AR and VR. These technologies can simulate in-store experiences, potentially leading to enhanced purchase behaviour (Hassan et al., 2021). Secondly, the challenge of accurately visualising furniture in living spaces when shopping online is a significant obstacle. AR and VR can address this issue by enabling customers to virtually place furniture items in their rooms and assess their aesthetic and spatial compatibility (He et al., 2019).

Overcoming these visualisation challenges can significantly influence purchase decisions. Thirdly, customer engagement and experience are critical for competitiveness in the online retail sector. AR and VR can create interactive and immersive experiences, whereby enhancing customer engagement and satisfaction (Chathoth et al., 2019). Investigating how these technologies impact customer perceptions and emotions during the purchase journey is essential for businesses aiming to improve online conversions. Additionally, understanding the factors that drive or hinder the adoption of AR and VR technologies among South African furniture consumers is crucial. Factors such as technical proficiency, perceived usefulness, and ease of use influence technology adoption (Hsiao & Chen, 2018). Investigating these aspects can provide insights into potential barriers and opportunities for successful integration.

This challenge has created a need for strategic insights on effectively incorporating VR and AR technologies to increase customer online experience and competitiveness (Romano et al., 2020). This research will examine the components influencing online purchase behaviour in the South African furniture business using AR and VR technologies. The theoretical frameworks that ground this study include the Uses and Gratification theory (UGT), the Flow theory, and the Stimulus Organism Response (S-O-R) theory. Other studies have employed approaches to predict consumer behaviour concerning technology and e-commerce. These theories have provided a solid foundation for understanding the factors influencing online purchasing behaviour using AR and VR (Hilken et al., 2021; Anisah & Miswanto, 2021; Rauschnabel, 2018; Colicev et al., 2018).

1.2.2 Research gap

The research gap of this study lies on how South African furniture retailers can effectively integrate and utilise AR and VR technology to influence online purchasing behaviour. Despite the potential of these technologies to transform the customer

experience, practical insights into their specific applications and the factors that determine their effectiveness still need to be improved (Hilken et al., 2021). Previous research supports this gap, emphasising the necessity for further exploration of the use of these technologies in the retail industry and the absence of consensus regarding their fundamental properties in shaping online purchasing behaviour (Romano et al., 2020). Furthermore, studies indicate that South African furniture retailers are struggling to adapt to changing consumer trends and lack the agility to respond to these changes, further emphasising the need for insights on the strategic use of AR and VR technologies to increase customers' online experience (Huang & Rust, 2018; The DTIC, 2021).

1.2.3 Research objectives

- To examine the impact of AR factors on spatial presence and online purchase intention.
- To determine the impact of VR factors on brand attitude and the adoption of VR.

1.2.4 Research question

- To what extent do AR and VR influence online purchase behaviour within the furniture industry?

1.3 Discussion of the theories

The UGT, S-O-R, and Flow theory provides a solid foundation for understanding the factors that influence online purchasing behaviour using AR and VR.

S-O-R theory stemmed from the theory of perception, which is a psychological theory that assumes that the quality of the stimuli determines the reason for behaviour change (Eroglu et al., 2001). The theory posits that customers will perceive the motivation after the five senses have captured it, followed by analysis

(response) (Anisah & Miswanto, 2021). Marketers have frequently employed the theory to determine the interplay between market and customer responses to stimuli via purchasing, eating, and shopping activities (Anisah & Miswanto, 2021). It provides a relevant theoretical ground for understanding how customers respond to AR and VR technology stimuli when purchasing online furniture (Overby & Lee, 2006; Yoo, 2023).

The quality of stimuli determines the reason for behaviour change, and the response results from the organism's perception of the stimuli (Zhang et al., 2021). AR and VR technologies represent the stimuli, while the customers are the organisms, and the response is their online purchasing behaviour. Previous research employed the theory to predict the behaviour of customers using e-commerce. Researchers have utilised this idea to investigate how various sensory cues in retail environments influence consumers' emotional responses and purchase behaviour (Eroglu et al., 2001). People utilise media and technology in an objective-oriented manner, according to the UGT theory (Ruggiero, 2022). In other words, customers inform themselves about their desires and actively seek ideas to fulfil them. Research in marketing and retailing has successfully employed the UGT theory (Ruggiero, 2022). Studies have found that utilitarian and hedonic gratifications are especially relevant in many circumstances (Gatter et al., 2021). Research indicates that online customers view their AR experiences based on utilitarian and hedonic benefits (Rauschnabel, 2018). The theory has been used in studies on VR and AR in the retail industry, which suggests that it can provide valuable insights into the factors that influence online purchasing behaviour using AR and VR in the furniture industry.

The Flow theory defines the state of mind of an engaged and enjoying activity. For example, a customer purchasing online may feel entirely and profoundly engrossed in the purchase activity (Jeon et al., 2017). Many consumers complain that this occurs while surfing websites or conversing online (Bilgihan et al., 2015). Flow experiences improve buyers' intent to return and repurchase from a website (Zhao &

Khan, 2022). VR research studies have employed the Flow theory, suggesting that it can provide valuable insights into the factors influencing online purchasing behaviour using AR and VR in the furniture industry. Jeon et al. (2017) found that flow experiences in online service settings benefit perceptions and attitudes toward websites. Zhao and Khan (2022) found that flow experiences improve buyers' intent to return to and repurchase from a website. The flow construct has been determined by studies based on customer interactions with online services (Teng et al., 2012). Researchers have found that flow experiences in online service settings positively influence perceptions and attitudes toward websites (Jeon et al., 2017). Customers want both utilitarian and hedonic experiential motives when purchasing online.

Hedonic factors influence users' subjective satisfaction and evaluate the appealing aspects of a website (Xu et al., 2012). This research will investigate the influence of the flow theory on online purchasing behaviour using AR and VR in the furniture industry and how flow drivers such as utilitarian and hedonic factors influence the customer. These theories provide a solid foundation for understanding the factors that influence online purchasing behaviour using AR and VR in the furniture industry and can help to develop insights into how to effectively integrate and utilise these technologies to expand customers' online experience.

1.4 Literature review

1.4.1 Hedonic Benefits

Hedonic benefits can be crucial in influencing consumers' online purchase intentions and behaviour by increasing their overall fulfilment with the product or service (Overby & Lee, 2006) and referring to a study by Hudders and Pandelaere (2011), a consumer might choose to purchase a particular sofa because of its unique design, which provides a sense of pleasure and enjoyment while admiring it in their home. According to Battiga et al. (2010), hedonic benefits are "the pleasure or enjoyment that consumers derive from using or consuming a product or service." Therefore, an

essential factor that furniture retailers should consider is understanding the role of hedonic benefits in online purchase behaviour and how to incorporate them into marketing strategies to enhance consumers' purchase intentions.

1.4.2 Utilitarian benefits

Utilitarian benefits define the functional or practical benefits consumers derive from using or consuming a service offering (Battiga et al., 2010). Consumers' perceptions of how well a product or service meets their needs are classified as Utilitarian benefits (Battiga et al., 2010). Utilitarian benefits include the comfort and durability of a piece of furniture. Utilitarian benefits can impact consumers' online purchase behaviour and intention as they directly correlate to consumers' satisfaction and perceived value with the product or service (Overby & Lee, 2006). For example, a consumer might purchase a particular mattress because of its comfort and support for their back, which meets their utilitarian needs (Wang et al., 2020). Thus, it is significant for online furniture retailers to emphasise their products' utilitarian benefits in their marketing strategies to increase consumers' purchase intentions (Overby & Lee, 2006).

1.4.3 Decision comfort

The ease and confidence that customers feel when purchasing a product or service is called decision comfort (Parker et al., 2016). Factors such as the quality of available data regarding a service and the customer's familiarity with the product category influence decision comfort (Dachyar & Banjarnahor, 2017). Providing detailed product information, customer reviews, and recommendations in the furniture industry could enhance decision comfort (Dacko, 2016). Decision comfort plays a crucial role in shaping consumers' online purchase intentions and behaviour by reducing the perceived risks associated with online shopping and increasing consumers' trust in the retailer (Parker et al., 2016). For instance, consumers might feel more comfortable purchasing online furniture by accessing detailed product information and customer reviews that better comprehend the service's quality and

overall value (Dacko, 2016). Therefore, retailers in the furniture industry need to prioritise decision comfort in their online marketing strategies to enhance consumers' purchase intentions and behaviour (Parker et al., 2016).

1.4.4 Spatial presence

Spatial presence is "the sense of being present in a virtual environment, which is a fundamental aspect of user experience in VR applications" (Schubert, 2009). According to Hilken et al. (2021), realism and immersion in the virtual environment influence spatial presence. In the furniture industry, spatial presence could be relevant to how VR technology allows consumers to visualise furniture in their homes before purchasing (Hilken et al., 2017). A realistic experience and a more immersive, spatial presence can increase consumers' emotional engagement and satisfaction with the product (Smink et al., 2020). For instance, a consumer might feel as if they are physically in their home while using a virtual reality app to visualise furniture placement, which enhances their spatial presence and provides a more realistic and interactive shopping experience (Hilken et al., 2017). Therefore, retailers in the furniture industry need to prioritise spatial presence in their virtual reality marketing strategies to improve consumers' purchase intentions and behaviour.

1.4.5 Perceived Intrusiveness

Perceived intrusiveness describes how buyers perceive an online marketing activity as intrusive or unwanted (Li et al., 2002). Anisha and Miswanto (2021) examined the influence of celebrity preferences on the correlation among perceived intrusiveness, purchase intention, and customer attention and evaluated it. Internet users perceive advertisements unrelated to their search for information as more intrusive, and they tend to ignore commercial messages on social media because they are occupied with other tasks. It was found that viewers may still skip or close the advertisement, even when prompted to watch it. AR technology is still new to customers; it can make them feel inexperienced and uncomfortable during their first usage, increasing their

perception of insensitivity (Tokunaga, 2013; Hopp & Gangadharbatla, 2016). AR software projects how the products will look in their homes, making them feel incredibly close to their environment, further expanding their perception of insensitivity. This can result in customers feeling powerless over their private information, leading to discomfort and increased intrusiveness (Poushneh, 2018). As a result, Anisha and Miswanto (2021) found that an AR app elicits higher perceived intrusiveness. Therefore, retailers must prioritise the perceived intrusiveness of their online marketing strategies to enhance consumers' purchase intentions and behaviour.

1.4.6 Personal privacy concerns

Buyers' apprehension regarding the protection and confidentiality of their data, such as their credit card details, when making online purchases is defined as personal privacy concerns (Fortes et al., 2017). The relevance of personal privacy concerns in this research examines how it can influence buyers' trust in online retailers and their purchase intentions and behaviour (Alzaidi & Agag, 2022). Personal privacy concerns can be critical in promoting consumers' confidence in online furniture purchases (Alzaidi & Agag, 2022). For instance, a consumer might be hesitant to purchase online furniture from a retailer with a history of data breaches or other security issues. This could result in lost customer and retailer trust, reducing purchase intentions (Fortes et al., 2017). Therefore, retailers in the furniture industry need to prioritise personal privacy concerns in their online shopping platforms to improve consumers' trust and encourage their purchase intentions.

1.4.7 Online purchase intention

The degree of willingness of a customer to want to purchase a product from an online retailer" is defined as Online purchase intention (Lim et al., 2016). "Perceived risk," trust, and the benefits and costs of the transaction influence customers' online purchase intention (Lee & Turban, 2001). The relevance of online buying intention in this research is to investigate its relationship with other factors, such as perceived

intrusiveness and personal privacy concerns, and to understand its impact on consumers' online buying behaviour (Peña-García et al., 2020). Buyers might have a high online purchase intention for a particular piece of furniture if they trust the retailer, perceive the benefits as high, and perceive the risks as low (Gan & Wang, 2017). Therefore, understanding the factors influencing online purchase intention can help furniture retailers identify ways to increase consumers' willingness to purchase from their online stores.

1.4.8 Mental imagery

The cognitive process of creating physical representations in the mind's eye without any external input is Mental imagery (Kosslyn et al., 2001). Mental imagery is essential in this study as it can be used in VR technology to help customers visualise how furniture will look in their homes before purchasing (Yan et al., 2021). For example, the Sea Monster's @home: Your Space app lets buyers virtually place products in their homes using mental imagery (Augmented Reality South Africa, n.d). Mental imagery can enhance consumer experience and purchase intention in VR environments (Cowan et al., 2021). For example, Zhao et al. (2017) found that providing users with a mental image of a product in a VR shopping environment increased their purchase intention. Therefore, the use of mental imagery in VR technology is highly relevant in the context of the furniture industry in South Africa, where consumers can use it to visualise how furniture will look in their homes before making a purchase.

1.4.9 Perceived social presence

“The degree to which a person feels the presence of other people in a mediated communication environment, such as a virtual environment" is described as Perceived social presence (Biocca et al., 2003). Perceived social presence is relevant as it can affect consumers' trust and sense of community when shopping online (Farah et al., 2019). Research has shown that perceived social presence in virtual shopping

environments significantly influences consumer trust and purchase intent (Huang & Huang, 2021). Farah et al. (2019) discovered that increasing social presence in a VR shopping environment increased consumers' trust and purchase intention. The study showed that when consumers perceived a positive degree of social presence, customers were more likely to trust the retailer and have a sense of community with other shoppers, leading to higher buying intention (Colicev et al., 2018). Therefore, understanding the responsibility of perceived social presence is crucial for online retailers, as it can affect consumers' trust and willingness to purchase. Retailers can leverage this knowledge to create more engaging and immersive virtual shopping environments that increase consumers' sense of social presence and enhance their purchase intention.

1.4.10 Brand Attitude

A consumer's overall brand evaluation is their beliefs, feelings, and behavioural intentions toward the brand (Fishbein & Ajzen, 2010). Brand attitude is essential in this research because it influences consumers' online purchasing behaviour. According to a study, a positive brand attitude considerably impacts buyers' intent to acquire products online (Nguyen & Nguyen, 2021). Janavi et al. (2021) state that a "positive brand attitude had a substantial positive impact on consumers' desire to purchase products online ."Customers' beliefs and attitudes toward a brand can influence their intent to buy goods online, implying that retailers should prioritise developing a positive brand image. To boost their online revenue (Pea-Garca et al., 2020). Therefore, understanding the role of brand attitude is critical for online retailers, as it can influence consumers' desire to purchase goods online. Retailers can use this information to create effective strategies for improving their brand image and online sales.

1.4.11 VR adoption

“The degree to which consumers adopt and use VR technology" is defined as VR

adoption (Wu & Song, 2019). VR adoption is applicable in this study as it can affect consumers' willingness to use VR technology for online furniture purchases (Gürhan-Canli & Batra, 2021). Research has shown that factors such as ease of use, compatibility with consumers' needs, and perceived usefulness significantly affect consumers' intention to adopt VR technology (Wu & Song, 2019). A study by Erdmann, Mas, and Arilla (2021) found that consumers were more likely to adopt VR technology when they perceived it as helpful and easy to use and when it met their needs. This suggests that retailers should focus on developing user-friendly AR and VR technology that meets consumers' needs and provides a valuable experience to increase VR adoption and enhance online furniture purchases. Therefore, understanding the role of VR adoption is crucial for retailers in the furniture industry in South Africa, as it can affect consumers' willingness to use AR and VR technology for online furniture purchases. Retailers can leverage this knowledge to develop effective strategies for increasing VR adoption and enhancing the shopping experience.

1.4.12 Online purchase behaviour

The rate and nature of buyers' purchases made over the Internet are defined as online purchase behaviour (Garvey Orji, 2017). This research aims to investigate factors that impact online purchase behaviour using AR and VR in the South African furniture industry and to provide insights on how retailers can effectively use these technologies to stimulate online purchase behaviour. VR and AR technologies can improve the shopping experience and increase online purchase behaviour (Lavoye et al., 2021). Understanding online purchase behaviour is crucial for retailers in the furniture industry in South Africa, as it can help them develop effective strategies for increasing their online sales. By investigating the factors influencing online purchase behaviour using AR and VR technology, this study can provide valuable insights for retailers on effectively using these technologies to stimulate online purchase behaviour.

1.5 Conceptual Model and Hypotheses Statement

This study employs the S-O-R theory, Flow, and UGT theory as the theoretical frameworks of this research to examine the impact of the different factors influencing customers' online purchase behaviour purchase furniture.

The proposed conceptual model includes the following factors and relationships:

Stimulus:

- **Hedonic benefits:** consumers derive pleasure and enjoyment from their online furniture shopping experience.
- **Utilitarian benefits:** the practical benefits that consumers derive from their online furniture shopping experience.
- **Decision comfort:** the ease and confidence consumers feel when purchasing online furniture.
- **Spatial presence:** the perception of presence in VR while shopping for furniture online.

Organism:

- **Perceived intrusiveness**: the degree to which consumers feel that their privacy is being invaded during their online furniture shopping experience.
- **Personal privacy concerns**: Consumers' worries regarding the privacy and security of their data during online furniture shopping.
- **Online purchase intention:** consumers' intention to purchase furniture online.

Response:

- **Mental imagery**: consumers' ability to mentally visualise how furniture will look in their homes before making a purchase.
- **Perceived social presence:** the perception of presence in a social setting

while shopping for furniture online.

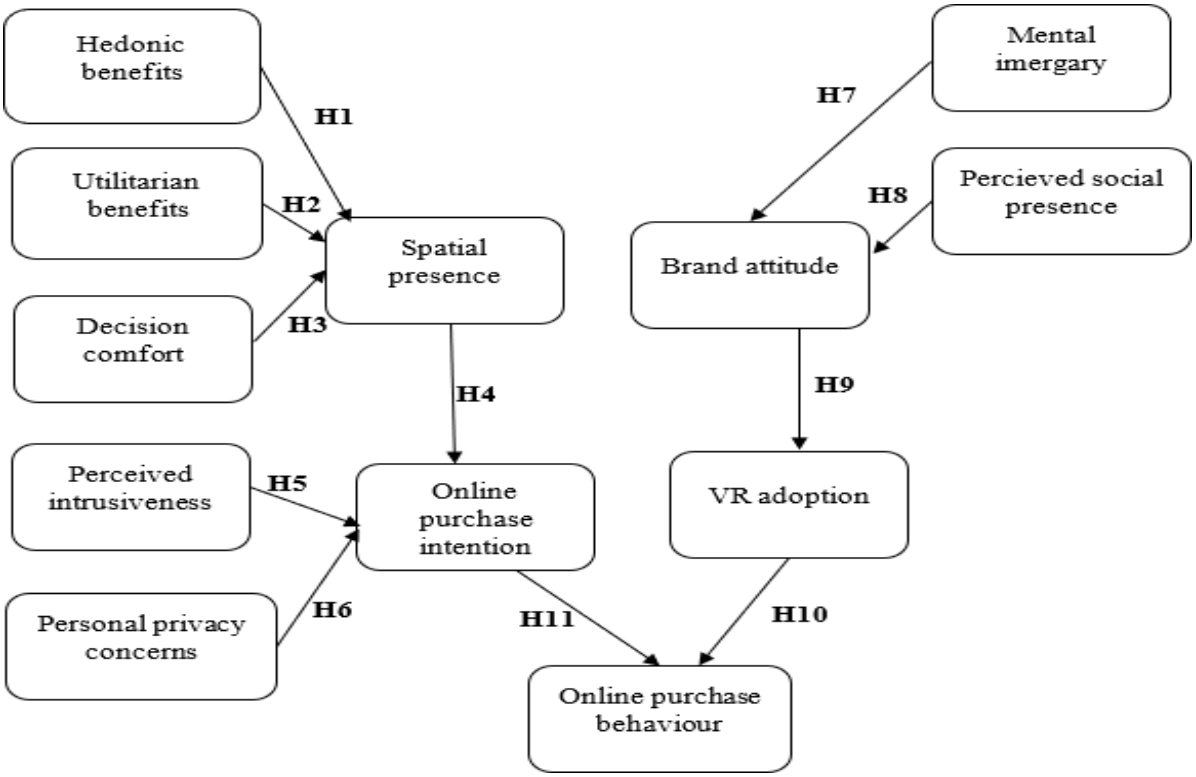
- **Brand attitude:** consumers' overall evaluation based on their beliefs and feelings about the brand.
- **VR adoption:** consumers' willingness to adopt and use VR and AR technology for online furniture purchases.
- **Online purchase behaviour:** consumers' actual behaviour in terms of making purchases for furniture online. In summary, the objective of this research is to investigate the effects of different features, namely: hedonic and utilitarian benefits, decision comfort, spatial presence, perceived intrusiveness, online purchase intention, mental imagery, personal privacy concerns, perceived social presence, brand attitude, and VR adoption, on consumers' online furniture purchase behaviour in the South African context.

Proposed conceptual model

Figure 1.1: Conceptual model

Augmented Reality Virtual Reality

Source: Author



1.5.2 Proposed hypothesis

- H1 Hedonic benefits positively influence spatial presence while using AR apps.
- H2 Utilitarian benefits have a significant influence presence while using AR apps.
- H3 Decision comfort significantly influences spatial presence while using AR apps.
- H4 Spatial presence positively influences online purchase intentions when using AR apps.
- H5 Perceived intrusiveness negatively influences online purchase intention while using AR apps.
- H6 Personal privacy concerns negatively influence online purchase intention using an AR app.
- H7 Mental imagery significantly influences Brand attitude while using a VR app.

- H8 Perceived social presence has a significantly influence attitude while using the VR app.
- H9: Brand attitude has a significant effect on the VR adoption app.
- H10: VR adoption influences online purchase behaviour.
- H11: Online purchase intention has a significant influence on purchase behaviour online.

1.6 Research Methodology

The current research employs quantitative methods to test and confirm the conceptual model's hypotheses in Figure 1.2. This research examines the effect of AR and VR adoption, mental imagery, perceived social presence, and brand attitude on online purchase behaviour in the South African furniture industry. A positive approach has been adopted in this research to understand the connection between variables through empirical observation and testing. This research will use a survey tool to gather information from 400 respondents. A convenience sampling technique was employed to choose participants using a non-probability strategy. The studies adopted a five-point Likert scale to evaluate participants ' responses based on existing AR and VR adoption surveys and internet purchasing behaviour.

The measurement device was developed using research from Kim et al. (2017), Wu et al. (2019), Yan et al. (2015), and Chen et al. (2015). PLS-SEM and SmartPLS4 were used to assess the reliability of the constructs. SPSS was used to obtain descriptive statistics. These models yielded fit metrics such as absolute fit and incremental fit indices. Previous research has used similar methods to assess the relationship between constructs in the context of online shopping and AR and VR technology by Chen et al. (2019), Yoon et al. (2022), and Gürhan-Canli and Batra (2021). The research methodology will be discussed in depth in Chapter 4 of the study.

1.7 The importance and impact of the research findings and the value added by the study.

Theoretical contributions

AR and VR technologies can improve the online customer journey for furniture stores. The study seeks to add to the existing knowledge of how these technologies can enhance the shopping experience. Furniture brands can benefit from practical applications of how AR and VR can improve their online customer experience by focusing on the different constructs that stimulate online customer purchase behaviour. The South African furniture industry can enhance its online presence and attract more customers by using insights from this study to improve and attract customers from their offline-to-online store.

Practical contributions

Marketers and brands can gain insights into how VR and AR can expand buying intention and brand attitude, which can help them effectively use these technologies to enhance the customer experience and stimulate online purchase behaviour.

1.8 Ethical considerations

It is Researchers need to act ethically when gathering information from participants to protect their rights, ensure the accuracy of the data obtained, and follow the proper ethical procedures. Felt (2012) emphasised the importance of considering ethical considerations when conducting research in this study; potential respondents can contribute voluntarily and leave the survey at any time without penalty. The confidentiality of the participants' responses, data, and documents will be strictly supported to ensure their privacy and safety. Before collecting data, the researcher will obtain ethical clearance from the institution where the research will be conducted. Ethical consideration is essential to ensure the research follows ethical principles and guidelines. Ethical approval ensures that the research does not harm participants and that their rights are protected (American Psychological Association, 2010). By obtaining ethical clearance, the researcher demonstrates their commitment

to conducting the study ethically and, in the participants', best interests.

1.9 Structure of the Dissertation

Figure 1.2. Structure of the Dissertation



Source: Author

1.10 Conclusion

The remaining chapters will discuss the industry overview, literature review, research methodology, data analysis, and findings.

Chapter 2: The Furniture industry: A Global and South African perspective

2.1 Introduction

The objective of this research, as highlighted in the previous chapter, is to examine the elements that impact e-commerce buying patterns in the furniture sector of South Africa, utilising AR, and VR. This chapter will outline a comprehensive summary of the furniture industry, encompassing all enterprises and activities involved in designing, producing, distributing, and selling valuable and decorative home equipment (Sabilalo et al., 2021). A detailed introduction to the furniture industry will be presented to establish the chapter's context, followed by a global overview covering the industry's growth and challenges worldwide. Additionally, the chapter will provide a detailed overview of the African furniture industry, focusing on its growth, population, and challenges. Moreover, this chapter will examine trends and their relevance to this study, along with some insights from the South African furniture industry regarding its growth, performance, population, and challenges.

2.2 Introduction of the industry to be studied

The furniture industry has experienced significant growth and has become a prominent player in the global manufacturing sector. Factors such as rising disposable income and urbanisation have expanded the industry, resulting in a substantial foothold worldwide (Grand View Research, 2021). In addition, the industry's adoption of modern innovation, such as VR and AR, has led to even more favourable market growth. Furthermore, the furniture industry has grown tremendously on e-commerce platforms, driving the sector forward (Grand View Research, 2021). AR and VR have revolutionised the furniture market, providing consumers a new and immersive shopping experience (Cipresso et al., 2018). AR technology is becoming increasingly popular in the global furniture market, changing how consumers make significant online purchases. According to Cipresso et al. (2018), with AR, consumers can visualise how the furniture will fit in their homes and change its colour or design per their preferences. VR technology enables customers to interact with products and explore online shopping options.

These technologies offer customers numerous options when adding products to the basket and

purchasing them online, providing a competitive edge to furniture brands that adopt them in their business segments (Cipresso et al., 2018). VR has become a popular technology in the furniture industry due to its ability to create interactive virtual work environments (Oh et al., 2004). VR employs digital assets or 3D models to represent product specifications and showcase product features, enabling customers to interact with the product virtually. This technology also allows brands to display their complete manufacturing collections without needing a large. These technologies have revolutionised global warehouse furniture marketing and sales (Oh et al., 2004). With the continual advancements and technological improvements, VR is becoming even more appealing and effective in the furniture industry, resulting in its expansion globally. Furthermore, Cippreso et al. (2018) outlined that utilising VR technology in the furniture industry can enhance customer experience and satisfaction, increasing sales and business growth.

The furniture industry is being reshaped using virtual and augmented reality technologies, with many leading brands adopting these technologies to enhance their customer experience. For example, Apple, SERVEX US, and Sayduck are some global brands using VR and AR in the furniture industry (Lee & Hong, 2021). North America has emerged as the leading market for AR furniture, accounting for the highest market share globally. The region is also making significant advancements in VR technology to gain a fair market share in the VR furniture industry (Oh et al., 2004). Several significant firms, including Kudan, Imaginate Technologies, and Marxent Labs, are actively making the furniture industry more competitive by developing more efficient and advanced VR and AR technologies (Oh et al., 2004); Lee & Hong, 2021). The furniture industry in South Africa has experienced significant growth and development in recent years, with increasing consumer demand and technological advancements. The adoption of AR and VR technologies has become a popular trend in the furniture industry, providing consumers with an enhanced shopping experience by allowing them to visualise furniture in their homes virtually. According to a report by Deloitte (2021), the South African furniture market has experienced steady growth over the past five years, with a projected increase of 2.7% in 2021. Furthermore, the report suggests that advancements in technology, such as AR and VR, have played an essential role in increasing growth and improving the overall customer experience in the furniture industry. This highlights the importance of examining the impact of AR and VR adoption on the customers buying behaviour in the South African furniture industry.

The pandemic has significantly influenced the global furniture sector in 2020 through the rise in e-commerce due to consumers' desire to avoid exposure to the virus (Research and Markets, 2021). Many non-essential businesses had to shut down in the early phases of the pandemic, and people turned to online merchants like Wayfair and Amazon to make furniture purchases (Research & Markets, 2021; Lamotte, 2017). This led to significant furniture makers establishing an online presence through internal efforts or acquisitions. However, even before the pandemic, the furniture industry had been experiencing a boom in e-commerce, a trend often referred to as the "Amazon effect." Major sites like Overstock.com and Joss & Main have led this trend (Research & Markets, 2021; Lamotte, 2017). The convenience of online shopping, particularly for younger consumers like millennials, has contributed to the rise in online shopping in the furniture sector, even if they see or feel the objects beforehand (Lamotte, 2017).

2.3 An overview of the global state of industry studied

2.3.1 Global market performances

The global furniture industry has consistently grown, attributed to rising consumer demand and technological advancements. Research and Markets (2021) reported that the global furniture market grew steadily, with a value of USD 534.7 billion in 2020 and a projected value of USD 724.9 billion by 2026, representing a 5.2% Compound Annual Growth Rate (CAGR) during the forecast period. The report suggests that the increasing adoption of e-commerce platforms and the rising demand for home decor and furnishing products are driving market growth. Furthermore, the report highlights the growing trend of using VR and AR in the furniture industry to enhance the customer experience, which is expected to drive market growth further.

The furniture industry, among other sectors, has been significantly affected by the pandemic, with a change towards customers buying online due to social distancing measures (Grand View Research, 2021). The pandemic has influenced the trend toward online shopping in the furniture industry, with many retailers now offering online shopping options (Oh et al., 2004). Furthermore, the pandemic has increased the demand for home furniture as more people spend time at home due to remote work and social distancing measures. The global furniture industry is expected to sustain its growth in the upcoming years despite the challenges posed by the pandemic. Various factors fuel this growth, including rising consumer demand, technological advancements, and the

increasing popularity of e-commerce(Grand View Research, 2021).

2.3.2 Global market challenges

The growth and profitability of the global furniture industry are hindered by various challenges, with one of the most significant being the increasing competition from low-cost manufacturers, particularly those in Asia (Research & Markets, 2021). These manufacturers can produce furniture at lower costs due to cheaper labour and fewer regulations, leading to price competition in the global market. Another challenge is the rising cost of raw materials used in furniture production, such as wood, metal, and textiles. The fluctuation in the prices of these materials affects the industry's profitability as manufacturers try to balance the quality of materials with their costs (Research & Markets, 2021). The furniture industry is also experiencing a scarcity of raw materials resulting from the COVID-19 pandemic's supply chain disruptions (Research & Markets, 2021).

The furniture industry also faces sustainability and environmental challenges. The industry's high consumption of resources and energy and the use of non-renewable materials have raised concerns about the industry's impact on the environment (Deloitte, 2021). Furthermore, the increasing demand for sustainable and eco-friendly furniture has pressured the industry to adopt sustainable production and supply chain management practices. The furniture industry is encountering difficulties associated with evolving consumer preferences and behaviour, particularly in the aftermath of the pandemic in 2020. Consumers are increasingly turning to online shopping, which has accelerated the trend of online shopping in the furniture industry. This shift in consumer behaviour requires furniture companies to adapt their business models and strategies to meet changing consumer preferences and expectations (Grand View Research, 2021). Overall, the furniture industry faces several challenges that require companies to adopt innovative strategies and sustainable practices to remain competitive in the global market.

Despite the possible benefits of adopting VR and AR technologies in the furniture industry, the industry must overcome several challenges. One of the biggest challenges is the high AR and VR technology cost, which can be a significant barrier for small and medium-sized businesses (Deloitte, 2019). Additionally, the lack of skilled labour and technical expertise needed to develop

and implement AR and VR technologies can further hinder adoption by SMBs. Another challenge is the limited availability of AR and VR devices and software compatible with existing e-commerce platforms, which can limit the reach of these technologies to a broader audience (Shin et al., 2020). Furthermore, the potential for technical difficulties and glitches in AR and VR experiences can create a negative customer experience and reduce consumer trust and confidence in the technology (Oh et al., 2004). Despite these challenges, the possible benefits of VR and AR technologies in the furniture industry, such as enhancing the customer experience and increasing sales, make it imperative for furniture companies to overcome and embrace these obstacles.

2.4 An overview of the state of industry performance in Africa

2.4.1 The African market performances

The African furniture market is rapidly growing, with increased disposable income, urbanisation, and population growth as major drivers (Furniture Africa, 2020). The furniture industry in Africa is fragmented, with most production carried out by small-scale and informal businesses. However, the industry is gradually moving towards formalization, with governments and private sector players supporting local manufacturers and investing in the sector (Deloitte, 2019). The furniture market in South Africa is the most extensive on the African continent., accounting for more than 50% of the continent's furniture consumption (Deloitte, 2019). The furniture sector in South Africa is characterised by local and international brands, with significant competition from imported furniture (Furniture Africa, 2020).

Despite this, the local industry is growing, and the government has implemented policies promoting local production and manufacturing (Deloitte, 2019). It has been predicted that the African furniture market will experience substantial growth in the future, influenced by factors such as rising urbanisation, increasing disposable incomes, and the growing trend of e-commerce this is according to (Research & Markets, 2021). The report suggests that the market will be driven by the demand for home and office furniture, with South Africa, Nigeria, and Egypt being the most significant furniture markets in the region. According to the report, it projects the need to reach USD 13.8 billion by 2027, demonstrating a CAGR of 6.3% throughout the forecast period. Additionally, the report suggests that advancements in technology, such as AR and VR, have played an essential role in increasing growth and improving the overall customer experience in the

furniture industry (Deloitte, 2019). The furniture industry in Africa presents significant opportunities for growth and expansion, particularly with the adoption of modern technologies like AR and VR. The rising trend of e-commerce in the region offers an opportunity for furniture companies to broaden their market coverage and target untapped customer segments. Overall, the African furniture industry has significant potential for growth, and companies that adopt innovative strategies and sustainable practices can gain a competitive edge in the market.

2.4.2 The African market challenges

The growth and progress of the African furniture market are impeded by various challenges, with one of the most significant being the need for more skilled labour, a common issue across Africa's manufacturing sector (The DTIC, 2021). To produce quality furniture products, the furniture industry requires specialised skills, including carpentry, upholstery, and finishing. However, a shortage of skilled labour affects the quality of furniture produced and hinders the industry's growth. Another challenge facing the African furniture market is the high cost of raw materials. They are importing the most essential materials for furniture production, resulting in increased production costs and non-competitive pricing (The DTIC, 2021). Additionally, the high import duties on these raw materials further drive production costs, making it challenging for local manufacturers to compete with imported furniture. Inadequate infrastructure is also a significant challenge facing the African furniture market. Poor roads, insufficient power supply, and limited access to finance and technology hinder the industry's growth and development (Jide et al., 2014). The inadequate road infrastructure challenges furniture manufacturers in transporting raw materials and finished products, causing delays, and raising expenses. Limited access to finance and technology hinders innovation and modernisation in the industry, making it difficult for local manufacturers to compete with imported furniture (Deloitte, 2019).

Another challenge facing the African furniture market is the limited domestic demand. The African furniture market relies heavily on export markets, with little domestic demand for furniture products (World Bank, 2016). The domestic demand limits the industry's growth and development and makes it vulnerable to external market shocks and changes in direction. Furthermore, the need for more supportive government policies and regulations is a significant challenge facing the African furniture market. The absence of policies and regulations that support local manufacturers,

such as tax incentives, import duty waivers, and subsidies, makes it difficult for them to compete with imported furniture (The DTIC, 2021). The need for policies and regulations also hinders innovation and modernisation in the industry, limiting its growth and development.

The growth and profitability of the African furniture market are threatened by various challenges, with one of the significant obstacles being the restricted uptake of modern technologies, such as AR and VR, owing to their high costs and limited technical expertise (Deloitte, 2019). Additionally, the need for compatibility with existing e-commerce platforms limits the reach of these technologies to a broader audience, which can negatively impact the industry's growth (Shin et al., 2020). Overall, the African furniture industry faces several challenges that require companies to adopt innovative strategies and sustainable practices to remain competitive in the global market. In particular, companies in the industry must overcome the challenges of adopting AR and VR technologies to enhance customer experience and reach a wider audience. Additionally, the industry must address high production costs, improve supply chain management, and adopt sustainable practices to meet changing consumer preferences and expectations.

2.5 The state of the south African industry studied

2.5.1 The performance of the industry

In February 2021, there was a year-on-year increase of 9.9% in retail sales of household furnishings and appliances in South Africa. This increase in sales included the sale of hardware, paint, and glass, along with specific kitchen components. At the same time, most other retail segments saw a decline (excluding pharmaceuticals and personal care) (The DTIC, 2021). Although it is uncertain if this level of demand will continue, many industry players have been surprised. Additionally, furniture consumption has historically decreased following the Christmas season in 2020 (The DTIC, 2021). The South African furniture industry has grown substantially over the past few years, attributed to growing consumer demand, increased disposable income, and technological advancements. According to a report by Deloitte (2021), the South African furniture market has experienced steady growth throughout the past five years, with a projected increase of 2.7% in 2021. Furthermore, the report suggests that advancements in technology, such as AR, had an essential role in influencing growth and improving the overall customer experience in the furniture industry. The industry has faced numerous challenges over the years, including

increased competition from imported furniture, a struggling economy, and limited access to finance (The DTI, 2016). Despite these challenges, the industry has shown resilience and continued growing. According to a report by the DTI (2016), the South African furniture industry contributes around R22 billion to the country's GDP and employs over 130,000 people. The report also highlights the industry's potential for growth, stating that it can produce more careers and play a significant part in the country's economy if the right policies and strategies are implemented. The South African furniture industry has also grown considerably in e-commerce.

According to a report by South African furniture retailer Decofurn (2020), the pandemic in 2020 has increased the change to online shopping in the furniture industry. The report states that Decofurn's online sales increased 350% during the pandemic. This trend will continue as consumers become more comfortable purchasing furniture online. In addition to e-commerce, the South African furniture industry has grown in the export market. According to a report by the South African Furniture Initiative (SAFI) (2021), the industry's export market grew by 20% in 2020 despite the challenges posed by the pandemic. The report attributes this growth to increased demand for South African-made furniture in international markets. However, the industry still faces challenges, including the high cost of raw materials, limited access to finance, and the effect of COVID-19 on buyer spending. The heightened competition from imported furniture, mainly from countries such as China and Vietnam, directly results from these challenges (The DTI, 2016).

The furniture industry in South Africa is made up of a mix of local and international and local brands, with significant competition from imported furniture. However, the industry is gradually moving towards formalisation, with the government implementing policies promoting local production and manufacturing. The global furniture sector has been significantly influenced by the pandemic, with a surge in e-commerce resulting from consumers' inclination to minimize their exposure to the virus. Many non-essential businesses had to shut down in the early phases of the pandemic, and people turned to online merchants like Wayfair and Amazon to make their furniture purchases. This led to significant furniture makers establishing an online presence through internal efforts or acquisitions. Despite the challenges posed by the pandemic, the South African furniture industry has remained resilient and continues to expand. The industry

increasingly adopts AR and VR technologies to improve online customer experience and grow sales. Furthermore, the industry is becoming more sustainable, with companies adopting sustainable production and supply chain management practices. The sector also invests in training and developing skilled labour, which fosters the industry's expansion and progress. The South African government has implemented various policies and initiatives to support the sector to address some of the challenges that the industry is facing.

These include the Furniture Industry Masterplan, which aims to promote local procurement of furniture and increase exports, and the Black Industrialists Programme, which aims to promote black-owned businesses in the sector (The DTI, 2016). Lastly, the industry has shown resilience and continued expanding despite numerous challenges. The industry's potential for growth, particularly in the e-commerce and export sectors, presents an opportunity for further development and job creation in the country. However, the industry must continue to address its challenges, and the government must continue implementing policies and initiatives to support its growth. Overall, the South African furniture industry presents significant opportunities for growth and expansion. The industry's increasing adoption of AR and VR technologies and sustainable practices can help companies gain a competitive edge in the market. Furthermore, the growing e-commerce trend in the region provides prospects for furniture companies to grow their market and reach new customer segments. The government's commitment to promoting local production and manufacturing further supports the growth and development of the industry.

2.5.2 Growth factors of the industry

The South African furniture industry has experienced growth due to several factors. Firstly, the country's rapid urbanisation and the subsequent increase in demand for housing and furniture have created growth opportunities in the industry (Furniture Industry in SA, 2021). Furthermore, the increase in the middle class, which has led to increased purchasing power, has also resulted in growth in the furniture sector (Business Tech, 2022). Incorporating AR and VR technology in the furniture industry has expanded the South African furniture market. The upsurge in online shopping due to the COVID-19 pandemic has led numerous furniture retailers in South Africa to adopt AR and VR technologies to provide customers with an immersive online shopping experience (Furniture Industry in SA, 2021). Through AR and VR, customers can see how

furniture pieces will look in their homes, increasing their confidence in online purchases. This, in turn, has resulted in increased sales and growth in the industry. Another factor contributing to the development the furniture sector in South Africa is the government's commitment to supporting local manufacturing.

The South African government has implemented several policies to promote local manufacturing and has provided financial support to the industry through programmes such as the Black Industrialist Scheme (The Furniture Industry: 4IR and Resilience Post-COVID, 2020). The government's support has led to increased investment in the industry and the development of new and innovative products, driving the growth in the industry. The furniture industry has grown due to adopting sustainable and eco-friendly practices. With increasing environmental concerns, many furniture manufacturers in South Africa have shifted towards sustainable and eco-friendly production methods. This has grown the industry's reputation for ethical and responsible manufacturing practices (The Furniture Industry: 4IR and Resilience Post-COVID, 2020). The South African furniture sector is anticipated to substantially expand, with an estimated revenue of $1,452.00 million expected in 2022 and a yearly progression rate of 18.48% (CAGR 2022-2025). This would result in a market size of US$2,415.00m by 2025 (Furniture - South Africa | Statista Market Forecast, 2022). The South African AR and VR industry is predicted to rapidly increase, with revenue anticipated to rise to US$63.46 million in 2022. A yearly increase of 15.97% (CAGR 2022-2027), leading to a market volume of US$133.10m by 2027 (AR & VR - South Africa | Statista Market Forecast, 2022).

The South African furniture industry is also expected to benefit from increasing urbanisation and a growing middle class, leading to increased demand for furniture (Furniture - South Africa | Statista Market Forecast, 2022). The increasing availability of low-cost furniture from Vietnam and China may generate prospects for growth for the industry, particularly for price-sensitive customers (The Worldwide Furniture Industry, 2022). In conclusion, the South African furniture industry has a significant potential for growth, with increasing revenue and expanding AR and VR technologies playing a crucial role. With the growing demand for furniture and the increasing availability of innovative technologies, the industry is expected to grow significantly in the coming years.

2.5.3 Challenges of the studied industry in South Africa

The furniture industry faces numerous challenges that hinder its growth and development, including economic challenges, competition from low-cost imports, inadequate government support, and a lack of investment in technology and innovation in South Africa. A report by the South African Furniture Initiative (SAFI) highlights the industry's struggle with economic challenges, such as inadequate access to affordable financing and elevated input costs, including energy and raw materials (SAFI, 2020). Additionally, the industry faces intense competition from low-cost imports, particularly from China, which has made it difficult for local producers to compete in price (SAFI, 2020). The need for more investment in technology and innovation is another major challenge faced by the South African furniture industry. This lack of investment has hindered the ability of local producers to develop new products and processes that can help them become more competitive in the industry (SAFI, 2020). This is particularly concerning considering the growing importance of technology in the furniture industry, especially with the expansion of AR and VR applications and e-commerce. The South African furniture industry also needs more adequate government support. The SAFI report highlights that the industry needs to receive more government support, especially for small and medium-sized enterprises and trade policy (SAFI, 2020). This has limited the ability of local producers to access export markets and competes with imported goods.

Furthermore, the South African furniture industry needs more skilled workers and training programs. The industry requires a highly skilled workforce to design and manufacture high-quality furniture. Still, it has struggled to attract and retain skilled workers due to low wages and poor working conditions (Wesgro, 2022). This shortage of skilled labour has resulted in low productivity levels and poor-quality products. Most furniture manufacturers in South Africa are SMEs that need help accessing finance from traditional lenders due to the perceived high risk and lack of collateral (Wesgro, 2022). This lack of access to finance has limited their ability to expand their businesses, invest in new technologies and equipment, and compete effectively in the market. Lastly, the potential for growth and development exists within the South African furniture industry, but it must address numerous challenges. These challenges include economic challenges, competition from low-cost imports, inadequate government support, and a need for more investment in technology and innovation. Addressing these challenges will be critical to

unlocking the full potential of the South African furniture industry.

2.5.4 The population of the study in South Africa

According to the DTIC (2021), South Africa has around 1,147 furniture companies. However, the exact population of the furniture industry in South Africa may need to be determined due to the informal sector's significant presence. Many furniture manufacturers and retailers operate informally, making obtaining accurate data on the number of companies and the industry's size challenging. It is estimated that the informal sector makes up a substantial portion of the furniture industry in South Africa, with some estimates suggesting that it could account for as much as 70% of the market (The Citizen, 2018). The South African furniture industry is diverse, with a mix of large-scale formal manufacturers, small-scale, informal producers, and retailers. The South African furniture industry comprises corporate companies and independent, niche merchants with an elevated level of creativity, market understanding, and adaptability to serve the premium market successfully. Retailers in this sector have shown a desire to collaborate closely with South African suppliers (The DTIC, 2021). The largest sector is the mid-level market, with high-street merchants well covered with national footprints and significant competition. Imports in this sector are restricted, primarily for non-South African items such as glass and metal furnishings (The DTIC, 2021). The major retailers interact directly with suppliers, and several have made significant efforts to aid and support their manufacturing suppliers.

This is a highly competitive and complex market niche. The market at the lower end has increased dramatically over the last decade, with a profusion of small businesses with local or regional rather than national footprints. Some of these stores have been quite imaginative in serving their markets, and there is fierce rivalry for imported items (The DTIC, 2021). The number of individuals in the furniture industry market will reach 8.4 million by 2025. In 2022, user penetration is estimated to be 10.1%, with an expected increase to 13.3% by 2025 (Statista Market Forecast, 2022). Additionally, the number of users in the AR and VR industry is expected to reach 22.9 million by 2027, with a user penetration rate of 27.8% in 2022 that is forecasted to rise to 35.7% by 2027 (AR & VR - South Africa | Statista Market Forecast).

2.1 Any other important aspect related to the context of the study

AR and VR technologies can help build trust by providing customers with a more realistic and immersive product experience before purchasing. For example, companies can use AR to display a virtual representation of the furniture in the customer's living space, enabling them to visualize how it will look and fit in their home (Riantini & Tjhin, 2021). This can help reduce the risk of disappointment and increase the customer's confidence in their purchase decision (Riantini & Tjhin, 2021). Customers can refer to reviews and ratings by other buyers who have purchased the same product, enabling them to make well-informed buying choices (Gefen, Karahanna & Straub, 2003). This can boost customers' assurance in their purchase and diminish the likelihood of dissatisfaction (Gefen, Karahanna & Straub, 2003). Furthermore, retailers can help build customer trust by providing customers with a more personalised experience using AR and VR technologies. For example, companies can use AR to offer customers customised recommendations based on their preferences and past purchasing behaviour (Riantini & Tjhin, 2021). This can help increase the customer's perception of value and improve their overall satisfaction with the purchasing experience (Riantini & Tjhin, 2021). In conclusion, trust is crucial in customers' willingness to purchase furniture online. AR and VR technologies can be essential in building trust and making the buyer's overall fulfilment with the purchasing experience.

2.2 Conclusion

Based on the industry trends and the overview presented in this chapter, the study holds relevance, and the analysis provided herein has established a foundation and significance for this research in the context of the global and South African retail furniture industry. Chapter 3, the Literature Review, will furnish a more comprehensive overview of the interplay among the factors that impact consumers' online purchase intention when employing AR and AR applications in the furniture industry.

Chapter 3: Literature review

3.1 Introduction

This chapter will provide a detailed summary of existing studies on this research topic. The review draws upon prior studies conducted on AR and VR and their impact on online customer behaviour to confirm the connections among the constructs. An overview of the theoretical foundations of the research will be outlined. After that, a comprehensive review of prior studies that have studied the use of VR and AR in online buying behaviour will be.

3.1.2 Theoretical grounding

Furniture industry is an integral part of daily life in South Africa. Despite its long and rich history, the industry experienced significant decline over the past decade (The DTIC, 2021). E-commerce extension has influenced many retailers to change their business strategies and distribution channels. This has significantly re-engineered their relationship with consumers (The DTIC, 2021). The theoretical foundation for choosing furniture industry for investigation within a VR and AR framework stems from consumer challenges in visualising online furniture purchases, a key concern supported by Smith et al. (2020). With a strong grounding in this research based on the challenges that the South African furniture industry faced when it comes to keeping up with the rapid demand on online furniture purchases (The DTIC, 2021). AR and VR theoretical premise lies in its ability to provide immersive, true-to-scale experiences, addressing these challenges and aligning with Johnson et al. (2019) findings on VR-based customisation enhancing consumer satisfaction. Furthermore, the adoption of VR and AR in the furniture industry is theoretically grounded in its potential to disrupt traditional retail practices, especially considering the accelerated shift to virtual shopping experiences driven by the COVID-19 pandemic, as reported by Deloitte (2021). These theoretical underpinnings underscore the transformative potential of AR and VR in elevating the online furniture shopping experience.

The Several research studies have adopted the combination of S-O-R, UGT, and Flow theory to examine the influence of VR and AR on customers' online purchase behaviour in the furniture industry. From the S-O-R theory this study has adapted the following factors such as perceived intrusiveness, consumer attention, and intent to purchase can be determined during this process

(Anisah & Miswanto, 2021). The factors adopted from the UGT theory are hedonic benefits and utilitarian benefits. From the Flow theory the factors adopted from the theory for this study are Imagery, presences. It is also important to look at previous research who have use same theories to study AR and VR technologies. According to a study by Lavoye et al. (2021), a combination of S-O-R theory, Flow Theory, and UGT theory is the theoretical grounding of the study focusing on consumer behaviour. The research found that a more captivating and immersive shopping experience through AR can positively impact consumer behaviour, elevating their online purchase intention. The study found that AR can enhance consumer engagement and increase purchase intention by presenting a more interactive and personalised shopping experience.

S-O-R theory posits that the behaviour of the consumers results from the interaction between the stimuli in the environment and the individual's characteristics and motivations (Zhang et al., 2021). Brands can apply the S-O-R theory to understand how the interactive and immersive experience provided by AR and VR technologies can influence customers' online purchase intention. UGT theory states that consumers utilise media to fulfil specific desires (Islam & Rahman 2017). Marketers can apply this theory to understand how customers use AR and VR technologies to fulfil their needs and desires related to furniture shopping, such as convenience, a more immersive shopping experience, and customisation. According to the Flow theory formulated by Mihaly Csikszentmihalyi (1990), individuals attain a flow state when they become wholly engrossed in an activity, concentrating entirely on the task. The flow theory can be applied in VR and AR technology in the furniture sector to understand how the immersive and interactive experience provided by VR and AR technologies can result in a state of flow that enhances customers' online purchase intention. Studies have adopted the combination of these theories to study the effect of VR and AR on buyers' online buying intention in the furniture industry. Previous studies applied UGT theory, Flow theory, and S-O-R theory to observe the influence of VR and AR technologies on e-commerce purchase behaviour and purchase intention (Rauschnabel, 2018; Javornik, 2016; Eroglu et al., 2001; Colicev et al., 2018). The principles thoroughly overview how VR and AR technologies impact customer behaviour.

This study chose to employ the Uses and Gratifications theory (UGT), Stimulus-Organism-Response (S-O-R) framework, and Flow theory because they align well with the study's focus on understanding the user experience in the context of AR and VR technologies. These theories

emphasise the experiential and psychological aspects of user interactions with technology, offering a robust foundation for investigating the impact of AR and VR on consumer behaviour, brand connections, and technology acceptance. The technology acceptance model with an experiential value, which focuses on technology acceptance and experiential value variables (Huang & Hsu Liu, 2014), was not used in this study due to the unique and immersive nature of AR and VR technologies. Existing theories were found insufficient to explain the full impact of these technologies on customer brand connections in AR scenarios, necessitating the adoption of more suitable frameworks such as UGT, SOR, and flow theory. Additionally, the study incorporated the "EPI Cube" to provide a comprehensive taxonomy of reality-virtual reality technologies and enhance the analysis of their impact on the user experience (Flavián et al., 2019; Nijholt, 2022), aligning with the study's focus on customer experience and technology adoption.

3.1.3 Theory of Stimulus organism response (S-O-R)

Woodworth (1929) put forward the S-O-R model, which extends the conventional Stimulus-Response (S-R) theory proposed by Pavlov (1927). The S-R theory only focuses on the stimulus and response, whereas the S-O-R theory adds to the importance of the organism responding to the stimulus (Zhang et al., 2021). Mehrabian and Russel (1974) further developed the S-O-R theory, stating that the outside environment influences an individual's behavioural responses. The theory implies that one's feelings and behaviours are influenced by their environment, and the quality of the stimuli determines the reason for behavioural change (Zhang et al., 2021; Lent & Brown, 2013). The theory stemmed from the psychological perception theory (Kim, Lee & Jung, 2018a), and it has been previously used in studies of AR and VR to measure customer intention and behaviour (Scholz & Duffy, 2018). The S-O-R theory has undergone significant expansion and development since it was first introduced by Mehrabian and Russell in 1974. Over the years, various researchers have added to the original theory by incorporating new elements and modifying them to better fit their research objectives. In 1976, Wohlwill emphasised the emotional qualities of surroundings as aesthetic incitement within the theory.

Bitner (1992) expanded the scope of the approach by including cognition and physiology, making it applicable to the retail sector. Jacoby (2002) presented an integrated S-O-R framework that included cognitive and affective systems, encompassing all prior experiences involving long-term

memory. Jang and Namkung (2009) further expanded the theory to include restaurant-specific measures of emotion and stimuli to evaluate restaurant quality in the tourism industry comprehensively. Kim and Lennon (2013) developed the S-O-R theory by having external (reputation) and internal (website quality) causes of data as motivations that influence consumers' buying intention (response). Chen & Yao. (2018) applied the theory to investigate the correlation between authentic physical environments and perceived value, utilitarian benefits, behavioural intention, and hedonic benefits to return to theme parks. S-O-R theory has been applied to various fields such as marketing, tourism, and service management, and researchers continue to adapt and modify the model to suit their research objectives better.

S-O-R is a psychological model that explores the association among three components: the external stimulus, the internal process (organism), and the behavioural response. The quality of the external stimulus is believed to cause any behaviour change (Eroglu et al., 2001). Skinner (1935) explained response and stimulus as "parts of behaviour and environment," and unexpected changes in the surroundings can influence customers' emotional and psychological state, leading to shifts in behaviour (Donovan & Rossiter, 1982; Han et al., 2022). The stimulus is the external force that influences a buyer's mental state (Fu et al., 2021). For example, if the trigger (e.g., advertisement) is not received in marketing, it is no longer effective in influencing the individual. On the other hand, if the stimulus is received, it can effectively control the individual. According to Zhang et al. (2021) and Zhai et al. (2020), "the internal mechanisms and structures that mediate the association between the external motivation" and the resulting response is defined as organism. In other words, the organism serves as an intermediary between the response and stimulus and can include cognitive, emotional, and physiological factors. The internal state of the organism, including thoughts and emotions, affects the individual's behavioural response and physiological responses (Zhai et al., 2020; Fu et al., 2021). The theory explains how exterior components can impact an individual's inner state and result in a behavioural response. Mehrabian and Russel (1974) have been widely used to describe how information is processed, but some researchers have argued that it does not accurately reflect reality (Jing, 2011). According to Jing (2011), cognitive processing begins before the presence of stimuli is required to conduct a response, suggesting that stimuli are not the start of cognitive processing. Some studies have also explored the limitations of the theory in explaining human behaviour.

Previous studies found that the S-O-R model could not fully explain how customer satisfaction influences brand loyalty in online shopping (Wang et al., 2021). Similarly, another study found that the S-O-R theory could not fully explain how trust affects online buying intention in e-commerce (Yang et al., 2019).

Despite these limitations, the S-O-R theory remains helpful in understanding how external stimuli can influence internal states and behavioural responses in many contexts. Previous research has successfully applied the theory to predict customer behaviour in various information and communication technology contexts, including impulsive purchasing behaviour in mobile auctions and customer loyalty in online social commerce (Islam & Rahman, 2017; Chen & Yao, 2018; Wu & Li, 2018). The theory assumes the quality of motivation determines the reason for behavioural change, making it an appropriate approach to investigating factors that influence online behaviour toward a purchase (Eroglu et al., 2001; Han et al., 2022). Studies have employed the theory to research various topics, including customer loyalty in online shopping, consumer behaviour, and VR. Anisah and Miswanto (2021) use the perceived intrusiveness factor derived from the theory to assess online purchase intentions.

3.1.4 The UGT theory

Katz and Blumler (1974) introduced the UGT theory in the early 1940s. The UGT theory focuses on examining the motivations behind why individuals use certain media, the needs they have for these media, and the satisfaction they obtain from utilising them. UGT was presented to explain why individuals select different forms of media available (Kasirye, 2021). It aims to understand why individuals choose a particular type of medium and the gratifications they seek from interacting with media. Cheung et al. (2011) applied UGT to explain why individuals utilise other media and identify the requirements that drive individuals to use a specific medium. The theory suggests that people use technologies and media deliberately (Kujur & Singh, 2020). UGT has evolved to accommodate the altering media model and the emergence of innovative communication technologies. Initially, the theory was introduced by Katz and Blumler (1974), focusing on recognising why individuals utilise different forms of media to satisfy their needs. Peirce (2007) highlighted that this theory marked a shift from media content to media audiences, as it recognised

that media audiences are active and interpret information based on their context. Over the years, the UGT has been expanded and modified to reflect better the shifting communication landscape and the emergence of modern communication innovation. The theory has introduced new elements, such as mobile devices, social media, and the internet, to understand better how these new technologies are used and how they fulfil the needs and desires of users (Kujur & Singh, 2020).

Additionally, researchers have modified the theory to improve the transforming desires of media audiences, such as the need for greater interactivity, personalisation, and accessibility (Cheung et al., 2011). Today, UGT remains a critical theory for understanding why people consume specific media types, and it continues to inform the development of new communication platforms (Peirce, 2007). The theory continues to evolve to accommodate the changing media landscape and the development of innovative communication technologies (Peirce, 2008). The evolution of the theory reflects the evolving needs and desires of media audiences (Peirce, 2008). UGT has faced criticism from scholars over the years. One criticism is that the theory focuses more on the media audience's behaviours than the content itself (Kasirye, 2022). Critics argue that the UGT theory tends to be highly personalised, emphasising the psychological satisfaction gained by individual media consumption and frequently disregards the social environment in which media is consumed (Diddi & LaRose, 2006). Furthermore, the theory is accused of ignoring the reality that some media consumption may be imposed on individuals and have nothing to do with enjoyment (Diddi & LaRose, 2006). Critics also point out that there needs to be more emphasis on media content, with scholars focusing more on why individuals use the media rather than what meanings they derive from it (Diddi & LaRose, 2006).

Moreover, the theory has been accused of indirectly justifying how the media is currently constituted by assuming that the media is always helpful to people (Diddi & LaRose, 2006). While the theory has limitations, it remains a valuable framework for understanding media audiences' motivations and behaviours. Another criticism of UGT is that it needs to meet the criteria for a theory and is more of a research approach or method (Ruggiero, 2013). Critics criticize the theory for its excessive individualism and failure to consider media consumption's social context (Ruggiero, 2013). Furthermore, the gratifications of the theory are determined by the researcher's input rather than the participants' responses, which raises concerns about the dependability and

legitimacy of the results (Ruggiero, 2013). Another criticism is that the theory assumes that the media is always helpful to people, which may only be accurate for some media consumers (Diddi & LaRose, 2006).

The UGT theory, proposed by Katz and Blumler (1973), posits that people consume specific media types for various reasons, including diversion or escapism, personal identity exploration, and cognitive and affective needs. The UGT theory has been used in various fields, such as public relations, to help practitioners target their audience more effectively (Kasirye, 2022). Utilitarian and hedonic gratifications are relevant in many studies in marketing and retailing (Ruggiero, 2022). Furthermore, the theory posits that individuals use technology and media with a specific purpose and that consumers are aware of their demands, which can differ among individuals and media (Rauschnabel, 2018). The UGT theory posits that individuals are conscious of their wants and actively pursue methods to fulfil them through the media they consume (Katz, Blumler & Gurevitch, 1973; Yim, 2017). Utilitarian benefits are purposeful and practical and aim to improve a customer's effectiveness or efficiency, contributing to a more efficient lifestyle (Rauschnabel, 2018). Hedonic benefits, conversely, are characterized by pleasure and amusement and represent a primary motivation for purchasing activities (Rauschnabel, 2018). Research indicates that online customers evaluate their AR experiences based on utilitarian and hedonic benefits. These evaluations act as negotiators between AR properties, such as the influence on customer behaviour and spatial presence (Yim, 2017; Rauschnabel et al., 2019).

UGT is relevant to the study investigating factors that influence online purchase behaviour using augmented and virtual reality in the furniture industry because it considers the gratifications that consumers seek from using media and how these gratifications influence their behaviour (Yim, 2017; Rubin, 2002). Additionally, the theory distinguishes between desired gratifications and those attained, which may help understand consumers' expectations and subsequent evaluations of AR apps (Gatter, Hüttl-Maack & Rauschnabel, 2021). The theory also acknowledges that consumers' hedonic benefits, such as pleasure and amusement, are primary motivators for engaging in purchasing activities, which may be particularly relevant in AR and VR (Rauschnabel, 2018). Therefore, factors adopted from this theory, such as hedonic and utilitarian benefits, may help to explain consumers' attitudes and behaviours towards AR and VR in the furniture industry.

3.1.5 The Flow theory

According to Csikszentmihalyi (1975), Flow theory, also known as the "psychology of optimal experience," was first proposed in the 1970s. The theory proposes that when individuals are completely immersed in the action and focus entirely on the activity, they can “arrive at a state of flow.” “The loss of self-consciousness characterises the flow state, a sense of deep enjoyment, and control” (Csikszentmihalyi, 1975). Csikszentmihalyi articulated the earliest form of flow theory in a book published in 1975. Researchers developed the theory to explain the experience of athletes. Still, it has since been applied to various other domains such as work (Csikszentmihalyi & LeFevre, 1989), creative activities (Csikszentmihalyi, 1988), and even video games (Lazzaro, 2004). Csikszentmihalyi developed his ideas in several subsequent publications in the 1990s. Other researchers who have expanded and refined the flow theory include (Jackson & Csikszentmihalyi, 1999; Nakamura & Csikszentmihalyi, 2002). Since its inception, the flow theory has been extended and refined in several ways. From the 1980s to the 1990s, researchers examined the flow of experience beyond leisure activities to everyday tasks, work, and education (Csikszentmihalyi & LeFevre, 1989).

The researchers found that flow experiences are wider than athletes or artists. These experiences can manifest in any context where individuals engage fully in an activity that aligns with their skills and challenges them. In the 1990s and 2000s, researchers began to examine the association between the flow and outcomes, such as happiness, well-being, and creativity (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2002). The researchers also discovered a correlation between the flow experience and these outcomes, leading them to propose that the experience significantly impacts the promotion of well-being and personal growth (Nakamura & Csikszentmihalyi, 2002). Researchers have also explored the influence of technology in facilitating flow experience (Lazzaro, 2004). As video games and other digital technologies have gained popularity, researchers have explored ways to use these technologies to promote flow experiences and improve well-being (Lazzaro, 2004). Some studies have found that video games can provide a flow experience by offering challenging and engaging gameplay that matches the player's skills (Lazzaro, 2004). The flow theory has been extended and refined in several ways since its introduction in 1975 (Csikszentmihalyi, 1975).

It has been applied to various domains, including work (Csikszentmihalyi & LeFevre, 1989), education, and video games (Lazzaro, 2004); it has been linked to positive outcomes such as happiness and well-being (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2002). The continued evolution of flow theory reflects its versatility and relevance in understanding the human experience of optimal challenge and enjoyment.

Flow theory is one of the two theories of intrinsic motivation, with the other being the "Self-determination theory" developed by Deci and Ryan in 1985 (Seligman & Csikszentmihalyi, 2000). The concept of the flow experience regards a cognitive construct that emphasises the depiction of comprehensive individual growth (Csikszentmihalyi, 1975, 1978). In 1995, Ghani proposed a flow model for human-computer interaction, which considers factors such as perceived control, fitness of work, and cognitive spontaneity or "playfulness" (Obadă, 2013). Quantifying the flow state can use enjoyment and focus, resulting in increased attention to the process, improved learning, and heightened creativity. According to the flow theory, a person's abilities, and the required effort to perform a task determine the flow state (Csikszentmihalyi, 1977; Obadă, 2013). Flow theory, developed by Csikszentmihalyi in the 1970s, has been criticised for focusing more on the absorption dimension of the flow experience than its fluency dimension (Lavoie, Main & Stuart-Edwards, 2021). The flow experience in digital media contexts, such as video gaming, has been found to create a sense of occurrence in a computer-generated world (Sheridan, 1992), and this attention-based experience is believed to support a state of high engagement in work (Weibel et al., 2008). Furthermore, researchers have associated flow with future-oriented effects, such as increasing an individual's inclination to engage with the product or event that initiated the flow state (Lavoie & Main, 2019a).

It is noted that fluency alone does not guarantee increased engagement, as an individual's desire to re-engage with a product or experience is more closely tied to their original interest and passion. (Lavoie, Main & Stuart-Edwards, 2021). Additionally, the level of perceived fluency may result from a task being too simple. As such, the fluency factor alone may not be a valuable predictor of participation intentions when using this theory (Lavoie, Main & Stuart-Edwards, 2021). Previous research has also demonstrated that more than fluency alone is needed to produce the same enjoyment as flow experiences (Lavoie & Main, 2019a). Flow theory is relevant to this study as it

defines the state of mind of an individual engaged and enjoying an activity. For instance, when making an online purchase, a customer may experience a state of mind that is entirely engrossed in the action (Jeon, Lee, & Jeong, 2017). This is a common experience reported by many online consumers while surfing websites or conversing online (Bilgihan et al., 2015). Previous studies determined the flow construct based on customer interactions with online services (Teng et al., 2012). It has been discovered that flow experiences in online service settings have a positive impact on perceptions and attitudes towards websites (Jeon et al., 2017).

The flow experiences improve customers' intention to repurchase from the internet site, and it is essential to identify the flow drivers to enhance the online consumer experience (Zhao & Khan, 2022). When purchasing online, customers seek both utilitarian and hedonic experiential motives. The hedonic factors influence users' subjective satisfaction and evaluate the appealing aspects of a website (Xu et al., 2012). Therefore, understanding flow theory and its implications for online customer experiences can be beneficial for businesses to create engaging and satisfying online shopping experiences that lead to increased customer loyalty and repurchasing. The theory is a relevant framework for understanding customer behaviour in online shopping, particularly regarding VR and AR experiences in the furniture industry (Wang et al., 2020; Ozmutaf & Demirbas, 2020). The theory creates an engaging and immersive customer experience, increasing satisfaction and purchase intention (Ozmutaf & Demirbas, 2020; Wang et al., 2020). In addition, the flow construct is characterised by different influences such as mental imagery, Presence, and spatial presence, which have been found to influence customer behaviour in online settings (Wang et al., 2020; Li et al., 2019; Hsiao & Chen, 2018).

3.2 Empirical Literature

3.2.1 Hedonic benefits

The advancement of information technologies has significantly transformed the daily economic activities of people, leading to changes in consumer behaviours and shopping habits (Tao et al., 2022). The increasing quality of social life and widespread Internet use have further contributed to these changes, resulting in a shift in consumers' preferences towards online shopping (Tao et al., 2022; Tuan & Ngoc, 2020). In response to these changes, brands must adapt and provide consumers

with the best possible experience. One way to achieve this is by offering customers hedonic benefits in their service offerings, which can improve customer satisfaction and loyalty (Tuan & Ngoc, 2020; Rauschnabel & Ahuvia, 2014). By doing so, brands can stay ahead of their competitors and remain relevant in a rapidly changing market. The emotional satisfaction consumers gain from purchasing services and goods is defined as Hedonic benefits (Hirschman & Holbrook, 1982). Shopping for luxury goods and services is often called hedonic, providing individuals various emotional benefits (Chitturi, Raghunathan & Mahajan, 2008). Self-expression is considered a basic human need and plays a crucial role in the hedonic benefits of consumption (Morgan & Townsend, 2022). The notion of self-expression as a driving force behind consumption is supported by recent research, which suggests that individuals desire to express themselves through their purchases (Norton et al., 2015; Morgan & Townsend, 2022).

This study will examine the role of hedonic benefits in the customer journey when purchasing furniture online using augmented reality. The definition of hedonic benefits used in this research will be based on the work of Himschman & Holbrook (1982), who defined hedonic benefits as the emotional association's individuals have with their purchasing experiences. This study aims to understand better the emotions experienced during the online furniture purchase journey and how augmented reality can enhance this experience. According to recent studies, hedonic shopping experiences provide customers a more enjoyable and subjective experience (Lee & Tsai, 2020; Yang et al., 2019). Customers seek hedonic benefits, such as the opportunity to explore, use, and express their value, to satisfy their desire for pleasure, self-esteem, and satisfaction (Chandon, Wansink, & Laurent, 2000; Yang et al., 2019). The importance of hedonic motivations in online shopping is also widely acknowledged, as it helps address the emotional needs of consumers (Lee & Tsai, 2020).

Factors like fun, fantasy fulfilment, and enjoyment are critical to hedonic benefits (Arnold & Reynolds, 2003). Therefore, brands must offer customers hedonic benefits in their service offerings to enhance their online shopping experience. Yim, Chu, and Sauer (2017) discovered that consumers' assessments of AR experiences are more subjective than utilitarian benefits. These findings imply that brands can utilize AR to offer consumers enjoyable and fulfilling experiences beyond practical benefits (Hilken et al., 2017). Hilken and Holbrook (1982) propose that using

imagery and sensory input in AR can result in hedonic benefits. Yim et al. (2017) determined that the intensity of interactions between imagery and sensory input can influence the hedonic benefits of AR. Individuals with an increased need for touch are likely to seek out the hedonic benefits that AR offers.

This idea is consistent with the association between the "hot" and "cold" governing systems, first introduced by Kross and Metcalfe in 2004. The study found that higher immersion in AR activates the "hot" system related to emotions. In contrast, the "cold" method, associated with cognitive responses, is triggered by less immersive AR experiences (Gatter, Maack & Rauschnabel, 2022). Researchers Gatter et al. (2022) have found that AR's interactivity and vividness significantly impact the technology's hedonic benefits, establishing it as a pertinent construct in this study. This heightened interaction with AR is anticipated to hold more excellent positive emotional value for individuals with an augmented desire for tactile experiences. The preceding studies support the significance of hedonic benefits in this research, which aims to explore factors influencing online purchase intention through AR and VR technologies.

3.2.2 Utilitarian Benefits

According to the consumption theory, customers buy goods and services based on their needs and responsibilities and select products within their budget when a deficiency occurs (Morgan & Townsend, 2022). This scenario is known in economic theory as the utility hypothesis, in which customers seek the most significant benefit among their limitless requirements while keeping their limited budget in mind (Hopkins & Davashish, 1999). This process occurs in marketing during the customer journey, where utilitarian benefits are task-driven and cognitive, and customers perceive these benefits by buying products out of necessity (Irani & Hanzaee, 2011; Vieira, Rafael & Agnihotri, 2022). Utilitarian benefits are a product's practical and rational advantages, such as size, dimensions, colours, and features, and are pertinent for task-specific online buying (Stienmetz, Ferrer-Rosell & Massimo, 2022). Consumers describe these benefits as the outcomes of self-expressions driven by cognitive processes, which they undertake to fulfil their desire for personal development and self-sustainability. (Morgan & Townsend, 2022; Norton et al., 2015). The practical benefits of a deal, as viewed by the customer, such as convenience and ease of use, are

defined as utilitarian benefits (Akdim, Casaló & Flavián, 2022). This study will use the definition by Akdim, Casaló, and Flavián (2022), which outlines how customers view the practical benefits of an offer. Within the scope of this study, customers will be offered functional advantages through the proposal of the ease and practicality associated with utilising AR and VR. According to recent research by Steinmetz, Ferrer-Rosell, and Massimo (2022), valuable benefits significantly impact customers' intentions to purchase online. The study also emphasised that utilitarian benefits enhance customers' shopping experiences by equipping them with the information they require to make informed decisions. Ultimately, customers prioritise utilitarian benefits in their online purchasing decisions as they seek practical advantages that cater to their needs (Gatter, Hüttl-Maack & Rauschnabel, 2022).

Through AR and VR technology, this research aims to provide customers with utilitarian benefits that enhance their shopping experiences. Utilitarian benefits, convenience, and cost influence consumers' online purchase behaviour. Kim and Lennon (2020) state that consumers choose online shopping for convenience and time-saving benefits. The ability to compare prices and products from different sellers and receive products directly to their homes is also a significant convenience factor for online shopping (Kim & Lennon, 2020). In addition, the cost of goods and services is also an important factor in consumer online purchase behaviour. Consumers choose online shopping due to online retailers' lower prices than regular stores (Li et al., 2020). Online retailers often have lower overhead costs and can offer discounts, coupons, and free shipping, which can further reduce the overall cost for consumers (Kim & Lennon, 2020). Despite the advantages of online shopping, several challenges exist, such as consumers' hesitancy to adopt new habits and purchase online. Algür and Cengiz (2011) argued that the availability of a wide range of products, reliable information, and price-matching mechanisms offered by online retailers can overcome these challenges and increase the appeal of online shopping to consumers. However, potential risks, such as privacy concerns and security issues, should also be considered to ensure consumers' safety and trust in online shopping (Cesur & Tayfur, 2015).

Overall, utilitarian benefits, mainly convenience, and cost, play a crucial role in consumers' online purchase behaviour, and online retailers must focus on providing these benefits to remain competitive. Recent studies have also supported the idea that AR significantly affects both hedonic

and utilitarian benefits (Gatter, Hüttl-Maack & Rauschnabel, 2022; Rauschnabel et al., 2019). The immersive and interactive nature of AR experiences can enhance the emotional and functional benefits customers derive from using the technology (Gatter, Hüttl-Maack & Rauschnabel, 2022). In addition, AR can enhance utilitarian benefits by providing customers with a more accurate representation of products, allowing customers to make an educated purchase decision (Rauschnabel et al., 2019; Zainurrafiqi et al., 2021). Utilitarian benefits for customers using AR technology are also supported by research on consumer behaviour, which suggests that consumers are motivated by cognitive activities and purposeful tasks when making purchases (Hamzah, 2013; Zainurrafiqi et al., 2021). This purchasing behaviour is more logical, rational, and planned, often associated with utilitarian benefits like cost savings, ease of use, and convenience (Zainurrafiqi et al., 2021). AR can provide these benefits by simplifying the shopping experience and reducing the effort required to make educated purchase decisions (Rauschnabel et al., 2019).

Overall, while hedonic benefits may be the primary motivation for using AR, the technology can also provide significant utilitarian benefits for customers. By simplifying the shopping experience and providing more accurate product information, AR can enhance the emotional and functional benefits customers derive from using the technology. Utilitarian benefits are still highly relevant in today's online purchasing behaviour, with consumers weighing convenience, cost, and time savings (Mo et al., 2021; Liu et al., 2021). Furthermore, introducing innovative technologies like AR and VR in online shopping can improve the customers' overall shopping experience and enhance their hedonic benefits. VR has improved utilitarian outcomes such as product evaluation and purchase intention (Li et al., 2019; Stienmetz, Ferrer-Rosell & Massimo, 2022). Research has found that AR positively influences utilitarian factors such as product search, decision-making, and evaluation (Zainurrafiqi et al., 2021). Furthermore, Colicev et al. (2018) stated the significance of valuable benefits in online settings, where customers seek practical and rational benefits such as convenience. In the tourism industry, Stienmetz, Ferrer-Rosell, and Massimo (2022) emphasised that VR technology usability is a critical utilitarian benefit that improves the overall customer experience. Stienmetz, Ferrer-Rosell, and Massimo (2022) examined the influence of VR on tourism and highlighted the importance of utilitarian benefits such as usability, attention, and knowledge gained from experience. Another study by Zainurrafiqi et al. (2021) explored the correlation between AR and utilitarian benefits in e-commerce, finding that AR can increase the

likelihood of making the correct purchasing decision. These studies suggest that utilitarian benefits can be a key influence in the acceptance and effectiveness of AR and VR technologies.

3.2.3 Decision comfort

Recent studies have shown that virtual try-on AR experiences can significantly impact consumers' purchase intentions and behaviours (Heller et al., 2019; Lim & Park, 2021). The ease of interpretation of product information, combined with the immersive and intuitive nature of AR experiences, can enhance consumers' decision-making processes, and improve their decision comfort (Heller et al., 2019). Decision comfort has been recognised as a crucial feature in individuals' attitudes and behaviours toward AR try-on experiences, as it affects their satisfaction and confidence in their purchase decisions (Heller et al., 2019; Lim and Park, 2021). Moreover, previous research has also highlighted the significance of personalised experiences in enhancing decision comfort and improving customers' purchase intentions (Parker et al., 2016). AR try-on experiences offer highly personalised and interactive experiences, allowing customers to visualise and try on products in real-time, significantly impacting their perceived value and satisfaction (Heller et al., 2019; Lim and Park, 2021). Customers' positive emotional reactions during decision-making that go beyond the general effect in their decision-making abilities are defined as decision comfort (Hilken et al., 2017). "The ease and comfort perceived by a consumer during the decision-making process" is considered decision comfort (Parker et al., 2016).

Furthermore, considering cognitive and affective variables, decision comfort measures a consumer's satisfaction and confidence in their decision (Broniarczyk & Griffin, 2014). The definition of decision comfort adopted in this study is by Hilken et al. (2017), emphasising the significance of emotional reactions in shaping consumers' decision-making process. AR technology experiences decision comfort by enhancing consumers' soft and pleasant emotional responses when making decisions. According to Parker et al. (2016), decision comfort encompasses consumers' emotional reactions to their options and significantly shapes their overall evaluation of their buying experience. The research outlined the importance of decision comfort in influencing the consumer's affective state and confidence. This means that customers who have advanced levels of decision comfort are more prone to be happy with their choices and have more faith in the outcomes of those

choices (Parker et al., 2016). Dacko (2017) stated that by increasing the realism of the buying experience and decreasing cognitive costs, the application of AR try-on tools for e-commerce can improve decision comfort. Schubert and Koole (2009) support this finding by highlighting the significance of decision comfort in shaping consumers' overall evaluation of their purchase experience. Merchants strive to enhance their customers' shopping experience and boost customer satisfaction by integrating AR try-on technology while recognising the importance of decision comfort in online shopping.

Studies found that decision comfort is more impacted by affective factors, such as immersion, rather than objective and cognition-based criteria like decision confidence (Parker et al., 2016; Broniarczyk & Griffin, 2014). This makes decision comfort a more appropriate variable to measure in virtual try-on situations, where most augmented reality experiences are affect-driven, particularly presence. Additionally, feeling a sense of ownership can enhance decision comfort by increasing emotional satisfaction and assurance (Hilken et al., 2017). Prioritising decision comfort can assist merchants in improving customer satisfaction and building trust in their services and goods, which is crucial in AR technology. Virtual try-on experiences can reduce cognitive costs and create a more realistic shopping experience, leading to increased decision comfort for consumers.

3.2.4 Spatial presence

According to previous research, the degree of presence a customer feels in an AR experience is determined by the extent to which they engage their senses and how they manage their involvement with AR technology (Steuer, 1992; Ahn et al., 2016). Users can interact with virtual elements in their physical surroundings as if they were real, adding, changing, and controlling them using AR technology (Scholz & Smith, 2015). Allowing consumers to have a direct product experience and control their experience can be highly effective (Hilken et al., 2017; Verhagen et al.,2014). The subjective perception that VR objects or surroundings are natural, physical objects or settings is called spatial presence in this context (Lee, 2004; Schubert, 2009).

The subjective experience of "being there" within a virtual world, often characterised as a sense of

immersion or absorption, is referred to as spatial presence (Witmer & Singer, 1998). Recent research has observed the role of spatial company in the creation and evaluation of VR environments, particularly in educational and entertainment settings (Riva et al., 2021; Slater, 2021). Increasing spatial presence in educational virtual environments has been shown in studies to enhance learning outcomes and engagement (Cavalcante et al., 2022; Lee & Chen, 2022). Spatial presence has improved immersive media experiences, such as virtual reality gaming and movie encounters, in the entertainment industry (Riva et al., 2021). Spatial presence is a widely recognised vital aspect of the virtual reality experience since it allows users to feel like they exist within the simulated environment.

The overall user experience of VR can be significantly influenced by spatial presence (Rodríguez-Ardura & Meseguer-Artola, 2016; Kim & Ko, 2019; Yang et al., 2021). "The degree to which users perceive the VR environment as a realistic and immersive experience, where they feel as though they are physically present in that environment" is defined as spatial presence (Lee, 2004; Schubert, 2009). This perception is often achieved using sensory feedback, including visual and auditory cues, and haptic feedback in some cases (Kim & Ko, 2019). Spatial presence has been studied extensively in VR, with researchers investigating its impact on various aspects of the user experience, such as enjoyment, engagement, and even physiological responses (Slater & Wilbur, 1997; Tamborini & Skalski, 2006). This study will adopt the definition of spatial presence proposed by Lee (2004) and Schubert (2009), which defines it as the independent experience to the extent that it is perceived as an actual physical space.

In the context of the furniture industry, these technologies can provide customers with a sense of spatial presence, enabling them to interact with virtual furniture and experience it as if it were physically present in their environment. Wei et al. (2019) observed a positive impact of VR spatial presence on users' happiness and behavioural intention in their study of user experiences in VR amusement parks. In research on VR applications for sports media, Kim and Ko (2019) also found that spatial presence enhances user experience flow. In their research on online learning, Rodríguez-Ardura and Meseguer-Artola (2016) demonstrated that spatial presence impacts users' flow of experience. Therefore, this study suggests that the spatial presence feature provided by VR technology enables users to perceive the type of service offered by new information, thereby

increasing users' satisfaction and sense of flow. The significance of spatial presence in VR technology for enhancing users' perceptual experience (Kim & Ko, 2019; Yang et al., 2021). Considering these findings, this research examines the factors influencing online purchase behaviour. Spatial presence is a significant concept in this study because it has been shown to favourably affect attitudes toward the employment of AR applications and can enhance the likelihood of re-utilisation or recommendation and has been supported by Huang and Hsu Liu (2014) as well as Javornik (2016). Furthermore, it can help reduce perceived risk in buying a product by strengthening attitudes toward product quality, leading to increased purchase intentions (Lee, Li, & Edwards, 2012). Studies on AR have also demonstrated that spatial presence can increase purchase intent and product appeal (Hilken et al., 2017; Verhagen et al., 2014).

Compared to alternative product presentation methods like 360-degree rotations, AR technology empowers consumers to interact and manipulate virtual objects within their physical surroundings, leading to a more pronounced sense of spatial presence (Javornik, 2016; Verhagen et al., 2014; Hilken et al., 2017). The degree of presence experienced by consumers is dependent on the extent to which their senses are engaged and the level of control they have over the experience, as suggested by Steuer (1992) and Ahn et al. (2016). AR software promises to provide users with a more direct, sensory-rich, and vivid product experience, resulting in a greater sense of spatial presence and an improved user experience (Scholz & Smith, 2015). Finally, spatial presence is a significant component in improving the user experience of VR. AR technology can improve the overall user experience by increasing the feeling of spatial presence, resulting in higher degrees of engagement, enjoyment, and empathy.

3.2.5 Perceived intrusiveness

Studies have shown that perceived intrusiveness can significantly reduce users' intention to click on an advertisement (Deng et al., 2020; Liu et al., 2021). Users may develop negative attitudes towards the brand or website due to an intrusive advertisement (Chen & Yen, 2014; Riedel, Weeks, & Beatson, 2018). To mitigate this issue, researchers have explored different ad formats and placements that are less intrusive, such as native advertising (Yoo et al., 2021; Huan et al., 2019) and contextual advertising (Zhao et al., 2021; Liu et al., 2021). Furthermore, the level of

personalisation in advertisements has been found to affect users' perceptions of intrusiveness. Highly personalised ads may be less invasive than non-personalised ads (Liu et al., 2021; Huan et al., 2019). Nonetheless, a fine line exists between personalisation and invasion of privacy, and users may respond negatively if they perceive their privacy is being violated. (Deng et al., 2020; Yoo et al., 2021). Overall, perceived intrusiveness is crucial when designing online advertisements, as it can significantly impact users' attitudes and behaviours towards the brand and website. According to Li et al. (2002), perceived intrusiveness is the individual subjective observation of the degree to which an advertisement disrupts their cognitive processes.

This disruption can lead to negative attitudes and avoidance behaviours towards the advertisement. Riechmann and Castañeda (2018) defined perceived intrusiveness as the level of discomfort or annoyance that consumers experience when they encounter an ad that they did not expect or that interrupts their online activity. Madhavan et al. (2019) described perceived intrusiveness as the degree to which an advertisement is seen as an unwelcome interruption in a user's online experience, resulting in unfavourable attitudes toward the brand. This study will adapt the definition of perceived intrusiveness from Riechmann and Castañeda (2018), who defined it as the level of discomfort or annoyance that consumers experience when they encounter an advertisement that they did not expect or that interrupts their online activity. This study adapted this definition because it explicitly highlights the advertisement's unexpected and disruptive nature, a crucial aspect to consider when studying perceived intrusiveness in online advertisements. Over the years, a consistent and unified brand image has been essential in directing consumer knowledge and expectations of a brand's market position (Erdem & Swait, 1998; Lange & Dahle'n, 2003).

Kim et al. (2013) noted that websites providing video, movie, and television streaming services risk heightened perceived ad intrusiveness, leading to ad avoidance and negative attitudes toward advertising. In the growth of electronic commerce or the sale of goods and services through the internet, marketers are focused on tailoring advertisements to consumer preferences and maximising purchase intent while minimising perceived ad intrusiveness (Doorn & Hoekstra, 2013). To minimise the negative consequences of intrusive advertisements, it is crucial to understand perceived ad intrusiveness and take appropriate measures (Madhavan, George & Kidiyoor, 2019). The relevance of perceived intrusiveness in this study is that it can impact

consumers' attitudes toward advertisements and their willingness to engage with specific adverts. By understanding how consumers perceive ads as intrusive, advertisers can tailor their ad placement and content to minimise perceived intrusiveness and increase the likelihood of engagement. When it comes to online shopping, consumers may seek specific information and be more sensitive to interruptions in their browsing experience.

Perceived intrusiveness is essential in understanding online shoppers' actions in augmented and virtual reality settings. For example, Madhavan and George (2020) argued that intrusiveness could have an unfavourable impact on the product image, which can result in reduced site traffic. Riedel et al. (2018) identified temporal, visual, and flow disruptions as the main drivers of intrusiveness, which could lead to negative emotional, behavioural, and cognitive responses. Truong and Simmons (2010) suggested that perceived intrusiveness is significant in tactical marketing, especially online push or pull marketing. Wang oh, and Wang (2009) found that the availability of information in mobile advertising can lower the perceived intrusiveness. Thus, perceived intrusiveness is relevant to this study as it helps to examine the features that affect online purchase behaviour in AR and VR environments in the furniture industry.

3.2.6 Personal privacy concerns

With the growing importance of customer privacy, organisations face the challenge of developing effective information technology systems to address these demands (Greenaway et al., 2015). Tucker (2014) has demonstrated that internet users' perceptions of control over their personal information can impact their likelihood of clicking on online advertising on social networking websites. The significance of information privacy has become increasingly relevant in the e-commerce sector (Li, 2021; Wei et al., 2020; Cho et al., 2021). Privacy concern affects users' trust in online shopping and their willingness to disclose personal information (Huang, Lin, & Wu, 2021; Xu, Wang, & Liu, 2021). The importance of perceived privacy concerns in understanding users' attitudes and behaviours towards AR and VR technology in the furniture industry. This study will adopt the definition of perceived privacy concerns from Beldad and Hegner (2017), who defined it as the discomfort individuals experience when sharing or collecting personal information. This study adapted this definition because it highlights the independent nature of privacy concerns and

the extent to which they can impact user behaviour and attitudes. The study will investigate the impact of perceived privacy concerns on users' attitudes and behaviours toward AR and VR technology in the furniture industry. The importance of privacy concerns and trust in shaping individuals' perceived privacy in the online context has been confirmed by recent studies (Huang et al., 2020). Scholars have highlighted various types of privacy, including accessibility, decisional, and informational privacy, suggesting that understanding the complex interplay between privacy concerns, trust, and different kinds of privacy is critical in developing effective privacy protection strategies in the online environment (Huang et al., 2020).

The study by Rath and Kumar (2021) utilised a framework presented by Malhotra et al. (2004) to understand users' privacy concerns and their impact on attitudes and behaviour towards AR and VR technology in the furniture industry. Trust and privacy control are essential constructs in assessing consumers' confidence in a company's privacy practices, with consumers feeling more in control of their data when organisations are transparent about their privacy policies. Privacy risk and concern are personal preferences, with privacy risk referring to the possibility of loss assumed by an individual and privacy concern referring to the anxiety an individual feels about losing privacy (Guo, Wang, & Wang, 2021). Harborth and Pape (2021) investigated the impact of mobile ecosystem factors on users' privacy concerns and download intentions. They found that communicating privacy policies and transparency in data handling can alleviate users' problems. Hence, reliance, confidentiality management, privacy hazard, and privacy apprehension hold significant significance in evaluating customers' internet privacy worries and beliefs in the reliability of internet-based enterprises. Comprehending these elements can assist corporations in devising productive tactics to amplify customers' confidence, diminish their privacy anxieties, and, consequently, heighten their inclination to participate in online activities.

3.2.7 Online purchase intention

The rise of e-commerce has become a topic of interest for scholars and marketers worldwide, focusing on understanding the nature of online shopping based on location (Statista, 2019a, 2019b, 2019c). Through the use of information technology, online shopping has provided consumers with various benefits, including time savings, discounted prices, a vast selection of products, and

competitive pricing, leading to an increase in the intention to buy online (Pahnila et al., 2011; Yang & Forney, 2013). Purchase intention refers to the process in which customers engage in specific activity and their readiness to use or promote technological systems (Yueh et al., 2015; Pahnila et al., 2011). It is an essential factor that determines individuals' behaviour regarding technology use. Many research studies have employed buying intention as a primary dependent variable when explaining the adoption of innovative technology, particularly in online shopping (Chang et al., 2015; Bashir & Madhavaiah, 2015). This research adopted Pahnila et al. (2011) definition of online purchase intention.

According to Lee and Lee (2015), understanding online buying intentions is crucial for marketers as it strongly predicts online purchases. Online purchasing intention is an essential factor in achieving the goal of actual buying behaviour, which is binary and can either result in an asset or no purchase (Lee & Lee, 2015). As a result, recent research has delved deeper into understanding online purchasing behaviour in various contexts, such as highlighted by Chang et al. (2016) in the context of online shopping and intention to use digital marketing (Tan et al., 2013). The concept of online purchase intention has become increasingly important in online shopping, as it can help businesses understand consumers' motivations for online purchases and develop effective marketing strategies. It is considered a key predictor of online purchasing behaviour, which is the actual act of purchasing online (Lee & Lee, 2015). Several research studies have investigated the features that affect online buying intention, including perceived risk, value, convenience, social influence, and trust (Chen & Chang, 2013; Kim & Lee, 2011; Liao et al., 2019; Yang et al., 2018). Understanding these factors can help businesses to address consumers' concerns and enhance their perceived value, thus increasing the likelihood of purchase intention and actual behaviour. Moreover, research has shown that online buying intention can be impacted by various contextual factors, such as product type, website design, and promotion strategies (Chen et al., 2019; Huang & Chang, 2021). Huang and Chang (2021) found that promotional strategies, such as discount offers and gifts, exerted a favourable influence on the customers' intent to buy online within the tourism sector. Online purchase intention is relevant in this study as it is a crucial factor to consider when developing an online buying experience for customers.

3.2.8 Mental imagery

The popularity of online shopping has resulted in a rise in the number of brands promoting their products or services on social media platforms, attracting potential customers through eye-catching displays and virtual reality (Bogicevic et al., 2019; Derbaix & Gombault, 2016). This process of visualising oneself using the product or service is known as mental imagery (Derbaix & Gombault, 2016), which involves encoding nonverbal information in working memory (MacInnis & Price, 1987). Mental imagery can create a sensory experience similar to the original stimulus or a combination of stimuli, with representations recalled from memory (Pearson et al., 2015). For instance, Derbaix and Gombault (2016) found that mental imagery significantly influenced consumers' attitudes toward online shopping. In another study, Bogicevic et al. (2019) demonstrated that mental imagery can increase consumers' perceived control over the online shopping experience. Pearson et al. (2015) also found that mental imagery can influence consumers to buy a product. The relevance of mental imagery in this study is that it can improve the e-commerce experience by encouraging customers to visualise the products in a more realistic and personalised way through VR and AR technologies. Mental imagery can potentially increase customers' willingness to purchase furniture online.

Therefore, adopting the definition of mental imagery as "the process through which non-verbal information is encoded in working memory" (MacInnis & Price, 1987) is more suitable for this study as it highlights the importance of visualisation in the buyer's online behaviour. In advertising, various stimuli have been identified as enhancers of mental imagery to develop "effective imagery-evoking strategies" (Gavilan & Avello, 2020). Mental imagery represents all sensory modalities, including visual, aural, and gustatory (Adaval, Saluja & Jiang, 2018). It entails creating quasi-perceptual mental images that individuals can use to manipulate visual information (Adaval, Saluja & Jiang, 2018). The "self-aware quasi-sensory experience that arises without the stimulus circumstances that trigger their true sensory or perceptual counterparts" is imagery (Adaval et al., 2018). Customers frequently use imagery to assist them in purchase decision-making (Huh et al., 2016). For example, people visualise what a product would taste like while dining out to determine their preference from the menu. When a mental picture of the aroma is available, imagery stimulates physiological reactions such as salivation (Krishna et al., 2014). Different stimuli, such as vividness and picture modification, can influence visual mental images that encourage mental simulations (Gavilan et al., 2020). Using AR and VR has led to new forms of imagery-evoking tools and virtual

products (Gavilan & Avello, 2020; Ha et al., 2019). When consumers cannot physically experience a consequence, they often rely on mental representations of themselves using the brand or product based on past encounters (Argyriou, 2012). Thus, according to consumer behaviour experts, the mechanism through which sensory information is encoded in working memory is called mental imagery (MacInnis & Price, 1987). Mental imagery has also been used in VR and AR studies to measure customer online buying intentions (Hilken et al., 2017).

3.2.9 Perceived Social Presence

“The degree to which individuals perceive others as real and physically present during a communication event" is defined as perceived social presence (Kreijns et al., 2010). Research has shown facial expressions, posture, and nonverbal clues (Short et al., 1976; Pongpaew, Speece & Tiangsoongern, 2014). Certain media, such as video, have more social presence than others, such as audio (Pongpaew, Speece & Tiangsoongern, 2014). Social presence has been linked to positive affective responses, as warm media that evoke feelings of human interaction and friendliness tend to increase social presence (Hassanein & Head, 2007), how individuals perceive others as physical beings in a communication event, whether synchronous or asynchronous, is defined as perceived social presence (Kreijns et al., 2010). Studies in VR and AR have used perceived social presence to create a sense of presence for consumers, which can influence their purchase behaviour (Kumar & Nanda, 2021; So et al., 2021). Over the years, social presence has been a significant concept for researchers, particularly in communication. Short, Williams, and Christie's (1976) social presence theory describes how interpersonal effects arise when individuals communicate using any media. Researchers classified various media based on their capacity to convey nonverbal and verbal cues in a way that makes the other person appear "physically" present. Recent studies have also shown that social presence influences consumers' attitudes toward online shopping and purchase behaviour (Kim & Lennon, 2013).The presence is still a critical aspect of communication media in the digital age (Chen & Cai, 2018; Jung, Lee, & Song, 2020). Closeness and immediacy remain the two critical aspects of social presence (Gunawardena & Zittle, 1997), and both are influenced by verbal and nonverbal cues (Jung et al., 2020; Wang & Chen, 2019).

The theory has been applied to various digital communication contexts, such as online learning

(Gunawardena et al., 2001) and social media (Kim & Lee, 2011). Research has found that social media can generate social presence by giving users various cues, such as profile pictures, emoticons, and virtual gifts (Chen & Cai, 2018; Kim & Lee, 2011). Moreover, research indicates that a high social presence can enhance trust, which is crucial for online consumer behaviour (Zhou, Chen, & Liu, 2020). Thus, social presence is highly relevant to investigating factors influencing online purchase behaviour using augmented and virtual reality in the furniture industry. This study has adapted the definition by Kreijns et al. (2010). Research has discovered that social presence is affected by individual and contextual aspects that influence observations of psychological gaps between interacting individuals in communication (Verhagen et al., 2014; Siriaraya & Ang, 2012; Kang & Gratch, 2014).

Self-presence is the degree to which an individual experiences their virtual self as their actual self, encompassing the virtual body, emotions, or identity (Aymerich-Franch et al., 2012). Telepresence focuses on how vividly one senses the virtual environment and the social presence, which necessitates the presence of a co-present sentient being (Ratan & Hasler, 2009). Researchers initially developed the concept of social presence to comprehend interactions across various media types (Short et al., 1976), and it remains a crucial component in virtual environments that facilitate human interactions. The relevance of social presence is that it connects to using virtual environments to influence online purchase behaviour. Social presence is significant in VR environments (Oh, Bailenson & Welch, 2018). Research has also discovered that social presence is linked to perceived usefulness, trust, and enjoyment of online shopping websites, resulting in higher purchase intentions (Hassanein & Head, 2007). Understanding the influence of social presence in VR environments can provide insights into designing compelling online shopping experiences that promote positive consumer behaviours.

3.2.10 Brand attitude

Brand attitude is a critical factor that shapes consumer behaviour and influences their decisions (Keller, 1993). It refers to an individual's consistently favourable or unfavourable reaction or learned tendency towards a particular object (Fishbein et al., 1975). Brand attitude is a personal evaluation, sensitive feeling, and behavioural movement towards a brand (Kotler et al., 1999). The

total or overall evaluation of consumers on a product or brand is defined as brand attitude (Shin et al., 2014; Mitchell & Olson, 2000; Keller, 2002). Business (2021) describes brand attitude as the classification of customers' opinions about a product or service, as revealed through market research. Recent studies have demonstrated the importance of brand attitude in predicting consumer behaviour, including purchase intentions and loyalty (Balaji & Khong, 2019; Hussain et al., 2021). Brand attitude is crucial in determining customers' behaviour towards a brand (Keller, 1993). This is because brand attitude is a buyer's overall assessment of a brand, including their evaluation, emotional feeling, and behavioural tendencies toward the brand (Kotler et al., 1999; Shin et al., 2014). Several factors can influence brand attitude, including brand traits, attachment, and congruence (Aaker, 1996).

A strong emotional connection between the brand and the customer, known as brand attachment, is vital in influencing brand attitude (Bahri-Ammari et al., 2016). Additionally, brand traits and characteristics can influence the customers' perception of the brand, shaping their attitude toward it (Bowden, 2009). Moreover, brand congruence is also essential in developing brand attitude, reflecting the brand's reliability and consistency (O'Cass & Weerawardena, 2010). Studies in various industries, such as the restaurant industry, have shown the importance of brand unity in influencing brand attitude (Bahri-Ammari et al., 2016; Aureliano-Silva et al., 2019), highlighting the relevance of this construct in understanding customers' attitudes toward brands. Brand attitude is essential in increasing brand awareness and generating a favourable impression (Zhang et al., 2018). Effective brand management requires providing customers with comprehensive information about the brand and creating key features that encourage their return (Zhang et al., 2018). The benefits of brand attitude in terms of brand loyalty among customers, including those in the restaurant industry (Lee et al., 2009; Hussein, 2018). These findings emphasise the importance of brand attitude in building a solid and loyal customer base, which can ultimately lead to increased revenue and long-term success for a business.

The importance of brand attitude refers to the overall view or evaluation consumers hold about a brand (Chatzopoulou & Tsogas, 2017; Liu et al., 2017). Brand attachment is positively related to brand attitude in different sectors, such as the food sector. Bahri-Ammari et al. (2016) studied the associations linking brand attachment and behavioural loyalty, satisfaction, unity, nostalgic

associations, and trust. Similarly, Foroudi, Palazzo, and Sultana (2021) investigated the desire of customers to maintain their relationship with premium restaurants to explore behavioural loyalty. Brand attitude is a crucial construct in this study because it influences consumers' perception of and behaviour towards a brand (Keller, 1993). Research has found that positive brand attitudes lead to higher purchase intentions (Kim & Park, 2013) and greater loyalty towards a brand (Kuo et al., 2012). Brand attitude is essential in building trust and reducing perceived risk among consumers (Chang & Wang, 2011). In a study on online purchase behaviour, Lin and Wang (2012) found that brand attitude influenced consumers' willingness to purchase products online. Similarly, Kim and Kim (2017) found that brand attitude positively influenced consumers' intention to utilise AR technologies in online shopping experience.

3.2.11 VR adoption

AR and VR technologies have been envisioned in science fiction since the 1930s and have existed in some form since the 1960s (Witmer & Singer, 1998). However, these technologies have only become commercially available and affordable for ordinary consumers. In the 2020s, brands and consumers will witness an improving number of recreational applications of VR and AR technology. VR refers to using computer modelling and simulation to create an artificial three-dimensional (3-D) sensory world that humans can interact with. At the same time, AR enhances the real world with computer-generated information (Lowood, 2022). Users can immerse themselves in a computer-generated world that resembles reality using interactive devices such as goggles, headsets, gloves, or body suits. Jaron Lanier coined the word "virtual reality" in 1987, and his contributions to the VR industry have been significant, according to Lowood (2022). Previous research on the diffusion of VR has primarily focused on specific social domains, such as tourism and healthcare (Vishwakarma et al., 2020; Standen et al., 2015). In addition, research has outlined the importance of investigating specific differences, including psychological factors such as personality, cognitive ability, and domain knowledge, in studies on the use and impact of immersive technologies (Chen et al., 2000; Chuah, 2020).

While generic market research is available on user demographics (Clement, 2021), empirical investigation into the individual factors that may best predict mainstream acceptance and usage of

VR among the general population is limited. In recent research by Herz and Rauschnabel (2019), user demands, such as utilitarian and hedonic benefits, comfort, and perceived mental and physical health concerns, have been identified as factors that can impact views of VR.

Furthermore, Mütterlein and Hess (2017) proposed that personality traits might also influence individual adoption and usage of VR, but they have not yet identified specific aspects of personality. Cummings et al. (2022) argue that identifying psychological predictors of VR device acceptance and usage can provide valuable insights into the potential of VR as a mainstream media technology and the specific benefits that are most likely to drive or hinder widespread adoption. The relevance of this construct in this study is significant as VR has been used across various industries, including the retail sector, where its effectiveness has been demonstrated. By exploring individual variations in sensation-seeking or personal innovativeness, for example, researchers can identify novelty as a driving element in the spread of VR. Alternatively, studying users' degrees of immersive inclinations or absorption can indicate that immersion has the potential to be a driver of long-term adoption (Cummings et al., 2022).

3.2.12 Online purchase behaviour

The fashion industry has witnessed a surge in digital commerce, providing marketers with numerous opportunities to target different age cohorts, such as Generation (Pentecost & Andrews, 2010). Generational cohorts are collections of individuals who have shared related cultural, social, economic, and political experiences while growing up (Fernández-Durán, 2016). Gen X, Y, and Z are the most widely recognised generational classifications (Sima, 2016). Marketers must understand the distinct behaviour, attitudes, reality perceptions, and purchasing habits of each group from a marketing perspective (Mahmoud et al., 2021; Fernández-Durán, 2016; Liang & Xu, 201; Sima, 2016; Tan et al., 2019) to better cater to their needs and preferences in the digital marketplace. Recent research found the importance of understanding online consumers' constantly evolving expectations and requirements in shaping their purchasing decisions (Wenzl, 2021). Online consumer behaviour refers to the unique process of purchasing from the shopper's point of view, which is distinct from traditional stores.

The study of online consumer behaviour encompasses various trends, such as the impact of online advertising, consumer readiness to click on links, and the popularity of comparison shopping (Singh & Verma, 2021). With the increasing prevalence of e-commerce, companies are placing greater emphasis on online consumer behaviour and research to tailor their marketing and sales strategies to be more appealing to their online customers (Mitchell, 2023). Understanding online consumer behaviour has become essential in today's competitive business environment. It can help companies identify critical trends and patterns in customer behaviour to drive sales and increase customer satisfaction (Liu et al., 2020). The result of the research is particularly relevant as it suggests that the ability of online fashion retail organisations to communicate value to customers impacts their purchasing intentions (Kautish & Sharma, 2018). Furthermore, the study highlights the significant impact of customers' values on their fashion consciousness and purchasing intentions. Therefore, this research underscores the significance of understanding customers' values and fashion consciousness in predicting their behavioural choices. This is consistent with the expanding body of investigations that emphasises the importance of understanding the factors that influence online purchase behaviour in the fashion sector (Adeola et al., 2021; Park et al., 2020).

3.3 Hypotheses development and conceptual model

3.3.1 Relationship between Hedonic benefits and spatial presence

The association between spatial presence and hedonic benefits in online shopping environments, such as enjoyment and excitement, positively influenced spatial presence in a virtual try-on room for cosmetics (Lee et al., 2020). Koo et al. (2021) discovered that spatial presence positively affected hedonic shopping value, which was further mediated by emotional experiences such as enjoyment and excitement. This suggests that the immersive and engaging nature of spatial presence can contribute to consumers' emotional experiences and enhance their perceived value of the shopping experience. Furthermore, recent studies have shown that spatial presence can positively impact consumer perception of online shopping (Wang et al., 2020).

Spatial presence positively influenced hedonic benefits, such as pleasure and enjoyment, which in turn positively influenced online shopping intention. Creating a sense of presence within online

shopping can result in more enjoyable and pleasurable consumer experiences, ultimately increasing their intention to purchase. Research suggests a significant connection between hedonic benefits and spatial presence in online shopping environments. By creating immersive and engaging experiences that evoke positive emotions, businesses can enhance consumers' perceived value of the shopping experience and increase their motivation to purchase. Hedonic benefits and spatial presence are two constructs that have gained significant attention in VR research. Hedonic benefits refer to the pleasure and enjoyment individuals experience when engaging with a product or service. At the same time, spatial presence "is the extent to which customers experience presence within a virtual environment" (Wu & Wang, 2018).

In a study by Wu and Wang (2018), participants who experienced a greater sense of spatial presence while interacting with a VR game reported higher hedonic benefits. Another study discovered that the degree of spatial presence experienced by individuals using VR technology was positively correlated with their hedonic value (Liu et al., 2020). Reflections on the use of VR in marketing further support the connection between hedonic benefits and spatial presence. VR technology in retail settings increased consumers' hedonic benefits of the shopping experience and their sense of spatial presence within the store (Lee et al., 2021). Furthermore, the research discovered that the utilisation of VR technology in the lodging sector raised patrons' discernment of gratifying advantages and spatial immersion, resulting in elevated contentment and allegiance (Chen et al., 2019). Furthermore, the relationship between hedonic benefits and spatial presence has been explored in various applications of VR, including entertainment, education, and healthcare. Similarly, a study by Bae and Kim (2020) examined the use of VR in healthcare and found that the degree of spatial presence experienced by patients during medical procedures was positively associated with their perceived hedonic benefits, such as reduced anxiety and increased satisfaction with the process. Overall, the relationship between hedonic benefits and spatial presence in VR has significant implications for businesses and organisations seeking to incorporate VR technology into their operations. By focusing on creating immersive and enjoyable experiences that enhance users' sense of spatial presence, companies may be able to increase consumers' perceptions of hedonic benefits, leading to increased satisfaction, loyalty, and engagement. Therefore, the following hypothesis can be made:

H1: Hedonic benefits positively influence spatial presence.

3.3.2 Relationship between Utilitarian benefits and Spatial presence

The connection between spatial presence and utilitarian benefits in VR environments has been a subject of attention in recent research (Park & Kim, 2021; Wang & Sun, 2020). Utilitarian benefits refer to the practical advantages individuals can gain from using a virtual environment, such as efficiency, convenience, and cost-effectiveness (Koo et al., 2021). Similarly, Park and Kim (2021) found that utilitarian benefits, such as price and product information, positively influenced spatial presence in a virtual supermarket. These findings suggest that utilitarian benefits can enhance users' experience of spatial presence in virtual environments, leading to increased engagement and satisfaction with the virtual environment. Lee and Kim (2021) examined the relationship between utilitarian benefits and spatial presence in a virtual reality-based tourism context. Their findings suggest that utilitarian uses, such as information accuracy and usefulness, significantly influence spatial presence. The authors propose that when users perceive practical benefits from a virtual tourism experience, it enhances their sense of presence and engagement (Lee & Kim, 2021).

Another study by Wang and Sun (2021) examined the connection between utilitarian benefits and spatial presence in a virtual learning environment. The study found that utilitarian benefits, such as learning effectiveness and efficiency, positively predicted spatial presence. The authors suggest that when users perceive practical benefits in a virtual learning environment, it enhances their sense of being present and engaged in the learning process. When users perceive practical advantages in a VR environment, it enhances their experience of presence and engagement, resulting in more favourable consequences such as heightened satisfaction, enhanced learning efficacy, and purchase intention. Utilitarian benefits have been found to enhance spatial presence in virtual environments, emphasising the importance of designing virtual environments that offer practical advantages to users (Park & Kim, 2021; Koo et al., 2021). However, the underlying mechanisms that explain this relationship are not fully understood and warrant further investigation. Overall, understanding the relationship between utilitarian benefits and spatial presence in virtual environments can inform the development of more effective and engaging virtual experiences in various domains. Kim and Biocca (2015) studied the association between utilitarian benefits and spatial presence in a virtual museum environment. The study found that utilitarian benefits, such as ease of navigation and information accessibility, were positively related to spatial presence. The authors suggest the

practical benefits of the virtual museum environment, such as quickly finding and accessing information about exhibits and immersion in the background (Kim & Biocca, 2015). Further research has also established a favourable correlation between utilitarian benefits and spatial presence. For example, a study by Lee and Kim (2021) explored the impact of utilitarian benefits on spatial presence using VR.

Recent studies suggest that utilitarian benefits are positively related to spatial presence in virtual environments. Utilitarian benefits, such as enjoyment and excitement, positively influenced spatial presence in a virtual try-on room for cosmetics (Lee et al., 2020). The research discovered that users showing increased levels of spatial presence could engage in purchase behaviour, indicating the potential of utilitarian benefits to increase consumer motivation in online shopping. The study discovered that utilitarian benefits had a considerable and favourable influence on spatial presence, and emotional experiences like enjoyment and excitement moderated this effect (Koo et al., 202). This suggests that utilitarian features' practical and functional benefits can contribute to users' emotional experiences and enhance their perception of presence and immersion. The practical and functional benefits of utilitarian features can result in an elevated sense of presence and immersion in the environment, which has important implications for developing simulated environments. Incorporating utilitarian features into virtual environments can enhance users' understanding of presence and ultimately improve the effectiveness of the technology. For example, a study by Wang and Sun (2020) found that functional features, such as information quality and reliability, positively influenced spatial presence in a virtual reality e-commerce setting. Researchers have suggested that incorporating utilitarian features into e-commerce platforms can improve the user experience and increase consumer satisfaction. Therefore, the following hypothesis can be made:

H2: Utilitarian benefits have a positive influence on spatial presence.

3.3.3 Relationship between Decision comfort and Spatial presence

Spatial presence has been found to have a significant relationship with decision comfort (Lee & Kwon, 2011). Several studies have examined this relationship in different contexts, including online shopping, education, and VR environments. Spatial presence has been found to enhance decision comfort, leading to increased purchase intentions in online shopping (Chang et al., 2014). Spatial

presence certainly influences decision comfort in online shopping, leading to greater purchase intentions (Kim & Lennon, 2013). Spatial presence had a significant influence on decision comfort based on research about virtual shopping malls (Lee and Kwon, 2011). Inthe context of education, spatial presence has also been found to impact decision comfort. A study by Lee and Kwon (2015) found that spatial presence positively influenced decision comfort in a virtual learning environment, leading to greater learner satisfaction and engagement. Previous studies demonstrated that decision ease in a collaborative virtual learning environment was augmented by a positive influence of spatial immersion (Hou et al, 2015). Spatial presence has been discovered to have an important impact on decision comfort. A study by Won and Lee (2019) found that spatial presence had a significant influence on decision comfort in a VR-based shopping environment, leading to increased purchase intentions. Spatial presence positivelyinfluenced decision comfort in a VR-based museum exhibit, leading to greater engagement and satisfaction (So et al., 2019).

Overall, the connection between decision comfort and spatial presence has been found to be significant in various contexts, including online shopping, education, and VR environments. Spatial presence has been found to enhance decision comfort, leading to increased engagement, satisfaction, and purchase intentions. These findings suggest that incorporating spatial presence into various applications may lead to improved decision-making outcomes and user experiences. Research has shown that spatial presence can influence decision comfort in various contexts. For example, in a study based on the utilisation of VR for career guidance, researchers found that spatial presence positively affected decision comfort and led to more informed career choices (Chang et al., 2021). Researchers found that spatial presence enhanced decision comfort and increased willingness to visit the destination (Lee & Kim, 2021). Spatial presence can enhance decision comfort and increase the effectiveness of mediated environments, while decision comfort can impact the sense of presence in those environments. Thus, the following hypothesis can be made:

H3: Decision comfort has a positive influence on spatial Presence..

3.3.4 Relationship between Spatial presence and online purchase intention

Spatial presence positively impacts decision comfort (Kim & Lennon, 2013). Won and Lee (2019) explored the correlation between spatial presence and purchase intention in a VR shopping environment and found that spatial presence had a significant favourable influence on purchase

intention. Spatial presence positively influences decision comfort, which, according to previous studies, results in an increase in purchase intention in an online shopping context (Lee & Kwon, 2011). These results suggest that creating virtual environments that enhance users' sense of presence and immersion is essential in shaping online purchase intention. These studies indicate that spatial presence is vital in designing immersive online environments that can influence consumers' purchase intentions. Moreover, previous research has highlighted the significance of spatial presence in predicting online purchase intention. Spatial presence can improve users' sense of immersion and involvement in the online shopping experience, leading to a rise in purchase intention. This relationship has been observed in various settings, including social commerce, mobile commerce, virtual reality shopping, and online travel booking. However, some studies have shown mixed or negative results regarding the correlation between online buying intention and spatial presence. Various individual and contextual factors influence the connection between spatial presence and online purchase intention and should be examined thoroughly. Therefore, the following hypothesis can be made:

H4: Spatial presence positively influences online purchase intentions.

3.3.5 Relationship between Perceived intrusiveness and online purchase intention

The discomfort or annoyance that arises when marketing communications are perceived as disruptive or invasive is defined as perceived intrusiveness (Dahlén & Lange, 2017). It is a crucial factor influencing online purchase intention, as customers may choose not to purchase if they perceive the communication as intrusive (Malthouse et al., 2016). For example, Lian and colleagues (2019) examined how individualised mobile advertising affects perceived intrusiveness and the intention to buy over the Internet. It was discovered that personalised advertising increased online purchase intention but also led to increased perceived intrusiveness. This indicates marketers must balance personalisation with perceived intrusiveness to prevent adverse outcomes. However, Wang et al. (2021) found that the observed relevance of the advertising moderated the negative effect on buying intention. This indicates that marketers should aim to provide valuable and relevant advertising that does not interfere with the consumer's online experience. Similarly, Guo et al. (2019) examined the influence of pop-up ads on perceived intrusiveness and online buying intention and discovered that pop-up ads had an unfavourable impact on both. However, the negative effect on buying intention was moderated by perceived control, such as the ability to close the pop-up ad.

This suggests that marketers should allow consumers to control advertising to reduce perceived intrusiveness and increase online purchase intention.

Social media marketing positively affected online buying intention but also increased perceived intrusiveness (Al-Emran et al., 2021). However, the negative effect on buying intention was somewhat mediated by the perceived trustworthiness of the marketing communication. This indicates that marketers should establish trust with consumers to reduce perceived intrusiveness and increase online purchase intention. Recent studies have examined how perceived intrusiveness affects online purchase intention, and the results have been mixed. Lim and Kim (2021) discovered that the perception of intrusion has an unfavourable effect on the choice to buy online, particularly for customers who place importance on safeguarding their privacy. Furthermore, the type of advertising or marketing effort may also play a role in this relationship. For instance, Lee et al. (2021) discovered that the negative association of perceived intrusiveness on online purchase intention was weaker for sponsored content perceived as informative or interesting. Overall, these studies suggest that perceived intrusiveness can influence buyers' online buying intentions. Online marketers and advertisers should be aware of the potential adverse effects of intrusive advertising and strive to balance the need for effective advertising with consumers' desire for privacy and non-intrusive online experiences. Therefore, the following hypothesis can be made:

H5: Perceived intrusiveness significantly affects online purchase intentions.

3.3.6 Relationship between Personal privacy concerns and online purchase intention

Overall, the correlation between individual worries about privacy and the intention to buy over the internet is intricate and affected by various elements. While specific investigations have established an adverse association between these variables, others have pinpointed mitigating aspects that can attenuate or enhance this relationship. Several recent studies have investigated the connection between personal privacy concerns and online purchase intentions. For instance, Jiang and Benbasat (2007) found that privacy concerns negatively impact online purchase intentions. Similarly, Yang and Jun (2002) reported that privacy concerns significantly affect their trust, perceived risk, and online buying intentions. In contrast, Lee and Kwon (2011) found that privacy concerns do not substantially impact online purchase intentions but affect trust in online transactions. Moreover, personal privacy concerns can also vary among different demographic groups. For instance,

research by Xu and Liang (2017) Indicates that demographic profiles influence the correlation between individual apprehensions about privacy and the intent to buy online. Similarly, Cheung et al. (2014) reported that education level, income level, and experience with online transactions also influence the association between concerns regarding privacy and the intention to buy over the internet.

Research has observed the impact of privacy policies and seals on consumers' privacy concerns and online purchase intentions. For instance, Kim et al. (2020) discovered that privacy policies and privacy seals favourably impact customers' trust and online purchase intention. Tsai and Egelman (2019) noted that the presence of privacy policies and privacy seals can alleviate consumers' privacy concerns and enhance their intention to make online purchases. In conclusion, individual concerns regarding privacy significantly influence the choice to buy over the internet. Privacy policies and seals can also positively affect consumers' trust and will to purchase online. Hence, online retailers must prioritize addressing privacy concerns to foster consumer trust and facilitate online transactions. Therefore, the following hypothesis can be made:

H6: Personal privacy concerns significantly influence online purchase behaviour.

3.3.7 Relationship between Mental imagery and Brand attitude

"The cognitive process of creating sensory experiences, such as visual or auditory, in one's mind" is called mental imagery (Pearson et al., 2019). In marketing, mental imagery has been suggested to influence brand attitude by creating a vivid and memorable brand image that resonates with consumers (Choi & Choi, 2018). Brand attitude is the overall evaluation of a consumer towards a brand, including their emotional response and behavioural tendencies (Keller, 1993). A positive brand attitude is crucial for creating brand loyalty and driving purchase behaviour. Previous research has discovered the mechanisms underlying the connection between mental imagery and brand attitude. For instance, Pearson et al. (2019) proposed that mental imagery enhances brand attitude by activating the sensory and affective processes associated with the brand. It was discovered that participants who were instructed to generate a mental image of a brand had more positive attitudes toward the brand than those who did not engage in mental imagery. Additionally, the mediating influence of personal factors on the correlation between mental imagery and attitude

toward a brand has been examined by previous research. For example, in a study of eco-friendly products, Park and Kim (2021) observed that customers who were highly environmentally concerned were more likely to form a positive brand attitude when they engaged in mental imagery of the brand's sustainable features. Recent research suggests that mental imagery shapes consumers' brand attitudes. By creating a vivid and memorable brand image, mental imagery can enhance consumers' emotional responses toward a brand and drive purchase behaviour. The association between mental imagery and brand attitude is moderated by individual factors such as environmental concern, and future research may explore additional factors that influence this relationship. Therefore, the following hypothesis can be made:

H7: Mental imagery has a positive influence on the brand's attitude.

3.3.8 Relationship between Perceived social presence and brand attitude

“The degree to which individuals perceive the presence of others in a VR environment" is called perceived social presence (Oh, Bailenson, & Welch, 2018). It is crucial in VR and AR experiences because it can significantly impact users' attitudes and behaviours towards brands. Ryu, Lee, and Kim (2020) conducted research and revealed that the perceived degree of social presence favours the attitude regarding a brand and the willingness to buy. Participants interacted with a virtual salesperson avatar, and those who experienced a greater sense of social presence demonstrated a more positive brand attitude and stronger purchase intention in the experiment. Another investigation conducted by Kim and Bae (2019) found that social presence in VR environments positively influenced purchase intention and brand attitude. It was suggested that social presence can enhance customers' emotional connections with brands, leading to more positive attitudes and behaviours. An experiment where participants watched a virtual reality sports event discovered that individuals who perceived an increased social presence reported more favourable brand attitudes and higher loyalty toward the sports team (Lim, Kim, & Park, 2019). Perceived social presence is a critical factor influencing brand attitude in VR and AR experiences. Several recent studies discovered that increased levels of perceived social presence led to more positive brand attitudes and behaviours, such as purchase intention and loyalty. Marketers and businesses can utilise this information to design VR and AR experiences that enhance customers' emotional connections with brands and increase their brand attitudes and behaviour. Therefore, the following hypothesis can be made:

H8 Virtual Reality Presence has a positive influence on Brand attitude.

3.3.9 Relationship between brand attitude and adoption of VR

The "consumers' overall evaluation and perception of a brand, which can influence their purchase behaviour and brand loyalty," is defined as brand attitude (Shin et al., 2014). the employment of VR innovation allows individuals to engage with a three-dimensional simulated world through immersive equipment like head-mounted displays and hand-held controllers. The acceptance of VR technology is impacted by various factors such as the perceived efficacy, convenience, and stance towards the technology (Davis, 1989). Numerous investigations have examined the correlation between brand perspective and the uptake of VR technology within different fields. For instance, in Cummings et al. (2022) research, a favourable brand perspective regarding VR technology was identified as a significant predictor of the intention to adopt, with brand perspective functioning as a mediator in the connection between reliance on the technology and adoption intention. Similarly, Chen et al. (2021) found that a positive brand attitude toward VR technology positively influenced adoption intention among university students.

Moreover, research has explored the function of brand perspective towards VR technology in specific sectors. For example, Huang et al. (2021) investigation examined the influence of brand perspective on the adoption of VR in the tourism sector, revealing that brand perspective had an essential impact on the intention to adopt. The effect of brand attitude on the uptake of VR technology in the education industry found that a favourable brand attitude towards VR technology positively influenced adoption intention (Yoon et al., 2021). These inquiries emphasise the significance of cultivating a positive brand attitude towards VR technology to improve adoption and usage among the intended audience. Nonetheless, it is vital to note that brand attitude is only one of many factors that impact the adoption of VR technology, and other factors, such as perceived efficacy and convenience, should also be considered. Therefore, the ensuing hypothesis can be put forward.:

H9 Brand attitude has a positive influence on the adoption of VR.

3.3.10 Relationship between Online purchase intention and online purchase behaviour

One key factor that has been observed to impact online purchase intention and behaviour is perceived risk. Research has shown that consumers perceive greater risk when purchasing online than offline due to concerns about product quality, security, and trust (Chen & Chang, 2013; Shin & Kim, 2008). This perception of risk can significantly impact consumers' intentions to make online purchases and their actual behaviour, as they may choose to abandon their shopping cart or not complete their investment due to these concerns. Another critical factor that influences online buying intention and behaviour is perceived value. Buyers are more likely to make online purchases when they sense they are getting good value for their money, such as through discounts or free shipping (Chen & Chang, 2013; Kim & Lee, 2011). Additionally, the perceived convenience of online shopping has been found to positively influence both intention and behaviour (Chen & Chang, 2013; Kim & Lee, 2011). Social influence has also been seen to impact online purchase intention and behaviour. Studies have examined that consumers are more likely to make online purchases when they perceive that others have positive experiences with the product or service, such as through online reviews or recommendations from friends and family (Chen & Chang,2013; Kim & Lee, 2011).

On the other hand, negative social influence, such as negative reviews or a lack of social proof, can discourage consumers from making online purchases. Trust is another critical factor that has been found to impact online purchase intention and behaviour. When there is trust in the retailer or website, consumers are inclined to conduct online transactions or share their personal and financial information (Chen & Chang, 2013; Shin & Kim, 2008). Building and maintaining trust is therefore critical for online retailers seeking to encourage online purchase behaviour. In summary, the connection between online purchase intention and behaviour is influenced by various factors, including perceived risk, perceived value, convenience, social influence, and trust. Online retailers must understand and address these factors to encourage online purchase behaviour and improve sales and revenue. Therefore, the following hypothesis can be made:

H10: Online purchase intentions have a positive relationship with online purchase behaviour.

3.3.11 Relationship between VR adoption and online purchase behaviour

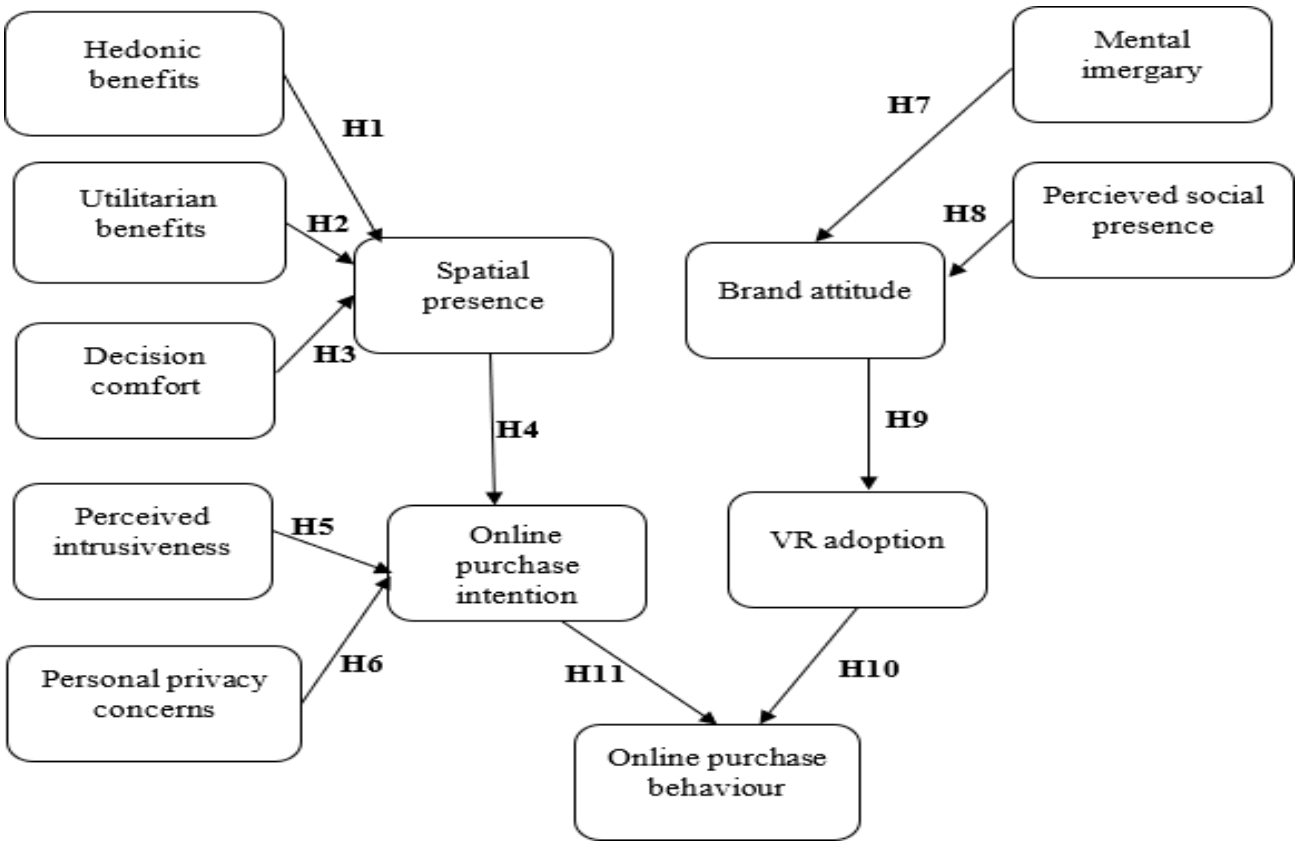
The link between the adoption of VR and online purchase behaviour has gained attention in recent years. Despite VR being a relatively new technology, it has already been adopted by numerous

businesses, including those in the e-commerce industry, to enhance the online shopping experience. Another study by Chang and Chen (2020) explored the influence of VR on buyers' perceived risk and purchase intention in the online shopping context. Their results indicated that VR adoption negatively correlated with consumers' perceived risk and had a significant positive impact on their purchase intention. This suggests that VR adoption can reduce consumers' perceived risk in e-commerce, leading to increased purchase behaviour. VR integration substantially influenced consumers' comprehension of products and willingness to purchase (Wang et al.,2019). The study also identified that the supposed simplicity of utilising VR technology positively influenced consumers' comprehension of products. In contrast, perceived effectiveness had a positive impact on willingness to purchase.

These discoveries indicate that the integration of VR can augment consumers' comprehension of products and their desire to purchase in the online fashion retail setting. Lastly, Kim et al. (2020) investigated the influence of VR on consumers' online shopping behaviour by examining the function of perceived risk and trust. The results showed that VR adoption had a significant positive impact on consumers' perceived trust and a negative influence on their perceived risk. This suggests that VR adoption can increase consumers' perceived confidence in the online shopping environment, indicating an increased purchase behaviour. The findings suggest that VR adoption can enhance consumers' perceived enjoyment, usefulness, ease of use, product knowledge, product value, and trust, and reduce perceived risk, all of which can lead to increased purchase intention and actual purchase behaviour in an online shopping environment. Therefore, the following hypothesis can be made:

H11 VR adoption has a positive influence on online purchase behaviour.

Figure 3.1: Proposed conceptual model



Source: Author

3.4 Conclusion

In conclusion, chapter 3 has provided a comprehensive review of the existing literature on the research topic, highlighting the theoretical theories grounding this research, the empirical literature, and the hypothesis development for this research. This has established a foundation for Chapter 4, which will establish the methodology of this study. It is critical to ensure that the study is conducted rigorously and systematically, enabling the generation of valid and reliable results. By establishing a robust methodology, the study can effectively address the research questions and objectives and contribute to the existing body of knowledge on the topic.

Chapter 4: Research Methodology

4.1 Introduction

Chapter 4 aims to expand on the methodology employed within this study. The chapter will comprehensively discuss the research philosophies and approaches, highlighting their various dimensions and how they relate to the current study. The chapter then elucidates marketing research processes and employs existing literature to illustrate marketing approaches applicable in AR and VR technology studies to influence online purchase intentions. Additionally, this chapter emphasises the importance of generating hypotheses through an extensive literature review. This research study proposes eleven hypotheses that will be further tested in Chapter 5. Finally, the research design is presented in the latter part of this chapter. Specifically, this section details the questionnaire design utilised to gather participant data

4.2 Research philosophy and Approaches

Research philosophy pertains to the fundamental assumptions and beliefs that are the basis for conducting research. It is a theoretical framework that outlines the researcher's worldview and shapes their research approach (Saunders et al.,2018). Research philosophy is made up of four primary philosophies, namely, interpretivism, positivism, critical realism, and pragmatism.

Table 4.1: Summary of positivism and interpretivism research paradigms

Orientation	Positivism	Interpretivism
Basic Assumption	The world exists independently of our knowledge of it, and reality can be objectively observed and measured.	The world is complex and subjective, and reality is constructed through social interactions and personal experiences.
Research Focus	Quantitative data and statistical analysis	Qualitative data and interpretation
Research Methods	Experiments, surveys, and statistical analysis	Interviews, observations, and content analysis
Research Goal	To discover universal laws and predict behaviour	To understand subjective meaning and interpret phenomena
Role of Researcher	Objective observer and data collector	Active participant and co-creator of meaning
Criticisms	May oversimplify complex phenomena and disregard the influence of social and cultural contexts.	May lack generalisability and be criticised for researcher subjectivity.

Source: (Babbie, 2016) and (Denzin & Lincoln, 2011)

Table 4.1 highlights positivism as a philosophical approach frequently employed in quantitative research. According to Bryman (2016), positivism is grounded in the belief that knowledge can be attained through empirical observation and experimentation, and the ultimate objective of research is to uncover the objective truth about the world. In a positivist approach to a quantitative study, the researcher would develop a hypothesis based on existing theories and literature and subsequently design a study to test that hypothesis utilising standardised, objective measures (Creswell, 2014). Data collection for this study will be conducted using methods such as experiments, surveys, or statistical analysis of existing data and analysed using quantitative techniques such as regression analysis or PLS-SEM. The goal of such an approach would be to Identify causal relationships between variables and produce generalisable results that can be

applied to a larger population (Bryman, 2016; Creswell, 2014).

According to Bryman (2021), positivism is an approach in which researchers begin with a theory and test it through observation and experimentation. The researcher strives to maintain objectivity and independence throughout the study and remains separate from the research process. Positivism also emphasises using quantitative data, considered more objective and reliable than qualitative data (Creswell, 2014). However, it has been criticised for over-relying on numerical data and disregarding subjective experiences and social contexts (Bryman, 2021; Creswell, 2014). Researchers can opt for an interpretive or critical realist approach, highlighting the significance of subjective experiences and social contexts in shaping knowledge and understanding (Bryman, 2021). For instance, researchers may opt for a positivist approach in research where the researcher wants to examine the associations between consumer loyalty and satisfaction in the retail sector. The researcher could formulate a hypothesis that suggests higher levels of customer satisfaction result in greater loyalty and subsequently design an investigation to gather data from a representative sample of customers. The survey could feature standardised satisfaction and loyalty measures, and the data obtained could be analysed using statistical methods to assess the hypothesis and identify any significant relationships between the variables (Hennink, Hutter, & Bailey, 2021).

According to Creswell (2014), interpretivism is a research philosophy that prioritises the subjective aspect of human experience and highlights the significance of comprehending the meanings people assign to their experiences. Similarly, Denzin and Lincoln (2018) state that interpretivists believe that social reality is multi-dimensional and cannot be fully understood by simply observing and measuring it. Instead, they argue that researchers should focus on understanding the subjective meanings that people attach to their experiences and how these meanings shape their behaviour. Pragmatism emphasises the importance of relevance and usefulness to those who will use the research findings. Critical realism is a research philosophy that aims to understand social reality's underlying mechanisms and processes (Bryant & Charmaz, 2019). It emphasises the dynamic nature of social reality and the need to go beyond simple descriptions of observed phenomena. Critical realism aims to close the disparity.

Positivism and interpretivism through recognising the reality of objective and subjective elements in the world. It advocates for diverse methods approach that links quantitative and qualitative research methods (Bryman, 2016; Creswell, 2014; Danermark et al., 2002). This study will use a positivist approach; table 4.2 summarizes the difference between qualitative and quantitative research.

Table 4.2. Summary of classification for qualitative and quantitative research

	Quantitative Study	Qualitative Study
Focus	Numbers, statistical analysis	Words, meanings, interpretation
Research Question	Tests a hypothesis	Explores a phenomenon
Sample Size	Large	Small
Data Collection	Structured methods (surveys, questionnaires)	Unstructured methods (interviews, focus groups)
Data Analysis	Statistical analysis	Thematic analysis, content analysis
Findings	Generalisable	Contextualised
Objective	Objective	Subjective
Researcher's Role	Detached observer	Active participant
Examples	Experimental studies, surveys	Case studies, ethnography

Reasoning	Deductive	Inductive

Source: (Creswell, 2014) and (Denzin & Lincoln, 2011).

This approach is commonly linked with collecting and examining data that is not numerical, including but not limited to interviews, observations, and open-ended surveys (Creswell, 2014). Qualitative research is frequently employed to create theories and hypotheses and gain a deep understanding of complex social phenomena (Creswell, 2014; Bryman, 2016). In contrast, quantitative research emphasises using numerical data to describe and analyse phenomena. It is typically associated with a deductive approach, whereby researchers begin with a theory or hypothesis and then test it using empirical data collected through surveys, experiments, and statistical analysis. Quantitative research is often employed to identify patterns and connections between variables and to make generalisations about the population (Creswell, 2014; Bryman, 2016).

Table 5.2 demonstrates that researchers conducting quantitative research typically use deductive reasoning, while those conducting qualitative research generally apply inductive reasoning (Antwi & Hamza, 2015). Deductive reasoning is a method that involves developing models and assumptions from existing knowledge, which are then tested through empirical observation and data collection (Creswell, 2014). It typically involves the formulation of a hypothesis that is tested using statistical analysis and is often used in quantitative research (Bryman & Bell, 2015). In contrast, inductive reasoning is a bottom-up approach that involves developing theories and hypotheses from specific observations and data. This approach is typically associated with qualitative research, where researchers use inductive reasoning to develop theories and hypotheses based on their analysis of data collected through methods like interviews, focus groups, and participant observation (Creswell, 2014; Bryman & Bell, 2015). In summary, deductive reasoning tests existing theories in quantitative research, while inductive reasoning is used to develop new theories based on specific observations and data in qualitative research.

4.3 Rationale for adopting positivism paradigm, quantitative and deductive approach.

The research question necessitates an extensive analysis of the factors that influence online purchase behaviour using statistical analysis. The positivism paradigm is aligned with the study's objective since it involves testing hypotheses and theories through empirical data collection (Bryman, 2016). A quantitative approach is appropriate for the study since it uses numerical data to test hypotheses and answer research questions (Creswell, 2014). Surveys and experiments can collect quantitative data, which will be analysed using statistical methods, providing an opportunity to discover the use of AR and VR technologies.

The deductive approach is suitable for the study since it begins with a theory or hypothesis and tests it is using empirical data. The deductive approach in this study involves testing hypotheses on the factors that influence online purchase behaviour using augmented and virtual reality. Furthermore, the use of a deductive approach ensures that the study's results are objective, reliable, and generalisable to a larger population, providing valuable insights for the furniture industry. The adoption of the positivism paradigm, quantitative approach, and deductive reasoning in this study allow for the collection of quantitative data that is analysed using statistical methods to test research hypotheses.

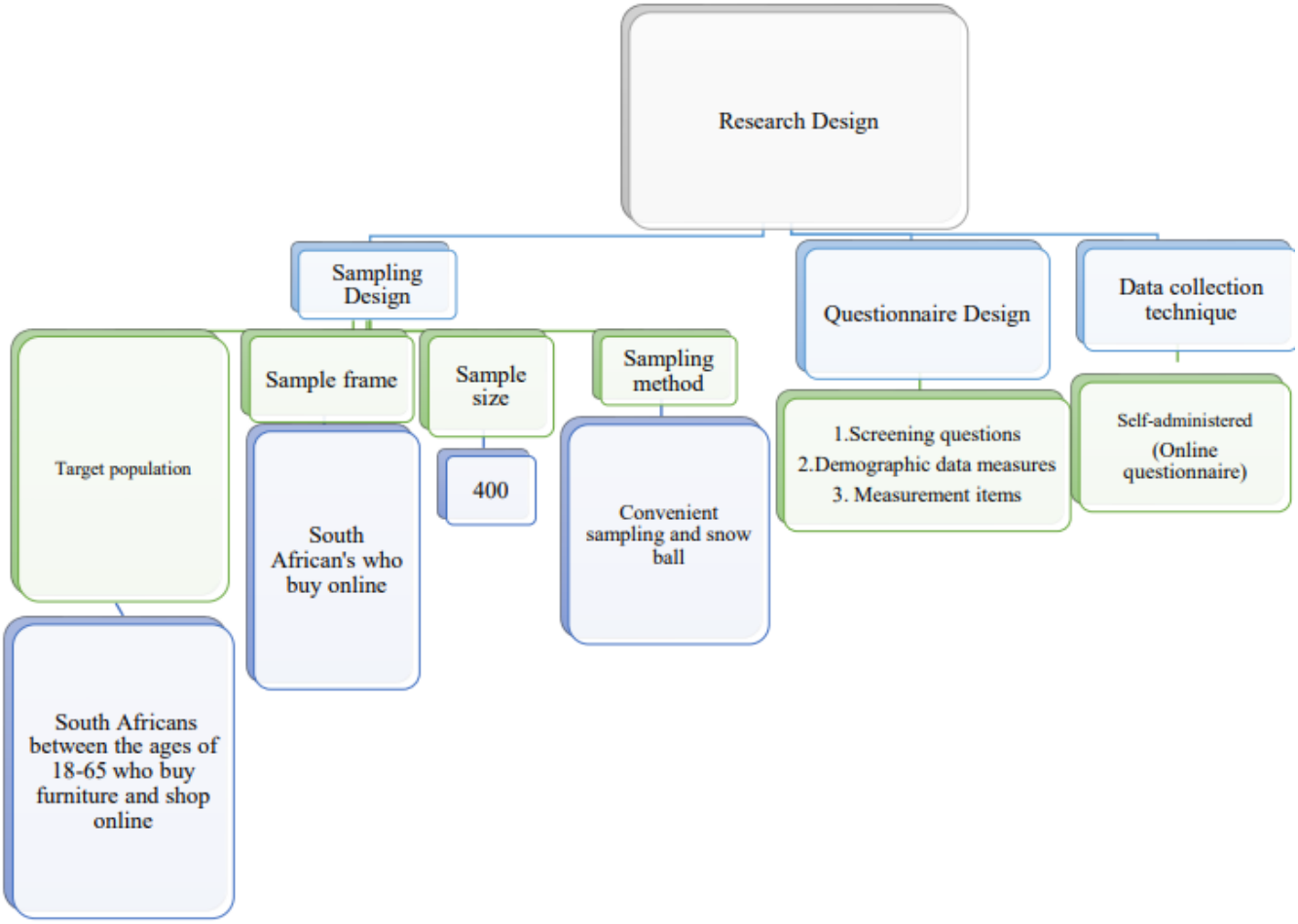
4.4 Marketing research process

4.4.1 Problem definition

This collaborative approach can help researchers to clarify the issues and set the framework for the investigation. By establishing a clear problem statement, defining research objectives, and engaging with team members to refine their understanding, researchers can ensure that the marketing research project is focused and effective (Kotler et al., 2022). The research gap is the limited usage of AR and VR in the furniture industry, which could be addressed by deploying AR and VR to enhance the shopping experience for consumers, as highlighted by Li and Yu (2019) and Li and Li (2020). To address this gap, further investigation is required to identify how the combination of VR and AR can influence purchase intention and brand attitude and the optimal sequences, as mentioned by Li and Yu (2019) and Li and Li (2020). Hence, the main objective of this research is to recognise the variables that impact online buying conduct utilising AR and VR technologies within the furniture sector.

4.5 Research design

Figure 4.1: Research design



Source: Author

4.5.1 The aim of the study

This study will examine factors that impact online purchase behaviour using VR and AR in the furniture industry. Using previous and present literature, theories around this topic, and the industry overview.

4.5.2 Research strategy

Research design is critical to any study because it helps answer the research questions and accomplish the aims. The research design describes the overall method of the study and lays out a strategy for data collection and analysis (Saunders, Lewis, & Thornhill, 2019). This section will explain the methodology employed in this investigation on factors influencing online purchase behaviour in the furniture industry using augmented and virtual reality. Research methods are generally divided into three types: exploratory, causal, and descriptive (Malhotra & Peterson, 2018). When a researcher has a limited understanding of the research issue, he or she conducts exploratory research to acquire insights and generate hypotheses. This form of research is frequently carried out using qualitative techniques such as interviews, focus groups, and observation (Marshall et al., 2021). Causal research aims to ascertain the correlation between two or more variables that establish a cause-and-effect relationship. This type of research is often conducted using experimental designs, in which the investigator manipulates one or more independent variables while observing the impact on the dependent variable (Cooper & Schindler, 2019). According to Cooper and Schindler (2019), explanatory research is used to explain and quantify the properties of a population or phenomenon, and it is often conducted through surveys, questionnaires, and secondary statistics.

Descriptive research is a type of study that aims to describe and measure the properties of an inhabitant or phenomenon. This type of research is classified into longitudinal and cross-sectional studies (Malhotra et al., 2017). Longitudinal research involves collecting continuous data from the same sample over an extended duration (Kumar, 2014). Cross-sectional research includes collecting data at a particular time (Malhotra et al., 2017; Neuman, 2014). A cross-sectional research design is often used to examine patterns of association or relationships between two or more constructs (Bryman, 2012). The choice of research design depends on the research objectives, population under investigation, and available resources. In this study, a cross-sectional design was

chosen as it allowed for the gathering of data over a short period at a given particular time and also allowed for a large quantity of data to be collected from a sizeable population using a survey instrument (Saunders et al., 2009; Kumar, 2014; Malhotra et al., 2017). This study of investigating factors that influence online purchase behaviour using AR and VR in the furniture industry will be a quantitative research design with a cross-sectional design. The study will use a deductive research approach and a survey questionnaire as the primary data collection tool. The target population will be customers who buy online, and the sample will be selected using a random sampling technique.

4.5.3 Measurement and measures

This study aims to examine the relationships between different variables in a single sample. This study will employ a cross-sectional research design, and the data will be collected through a survey questionnaire. The questionnaire will begin with screening questions to ensure the participants fit the desired demographic criteria. The questionnaire will contain closed-ended questions that require respondents to select one answer from a list of options. In some cases, respondents may be allowed to choose multiple answers depending on the type of question. Previous research has shown that closed-ended questions effectively obtain precise and uniform participant responses (Kabir, 2016). Therefore, this study will use a survey questionnaire with closed-ended questions to facilitate data analysis. The final section of the questionnaire will consist of questions related to the constructs of the study. The concepts will be evaluated using the five-point Likert survey. The five-point Likert scale questionnaire is widely used to measure the divergence of dependent and independent variables in a research project. This assessment tool enables participants to indicate their level of agreement or disagreement with a statement by selecting a number between 1 and 5, where one corresponds to "strongly disagree" and five corresponds to "strongly agree" (Wiid & Diggines, 2015).

A survey questionnaire with closed-ended questions and the 5-point Likert scale is appropriate for collecting and measuring the data needed for this study. This methodology allows for efficient and effective data analysis, which is particularly important when dealing with extensive data. The Likert scale is a reliable and valid method of measuring attitudes, opinions, and beliefs (Piedmont, 2014) and has been employed in numerous studies associated with online purchasing behaviour

(e.g., Yang et al., 2020; Deng et al., 2019). In summary, the measurements and measures in this study will be conducted through a survey involving screening and closed-ended questions. The study's constructs will use the 5-point Likert scale, a reliable and valid method of measuring attitudes and opinions. This methodology allows for efficient data collection and analysis, crucial for investigating the complex relationships between variables in online purchasing behaviour.

The section below is the questionnaire for this study.

Table 4.3: Scale reference and adapted scale

Construct	**Scale Reference**	**Adapted scale (number of instruments)**
Hedonic Benefits	Childers et al., (2001)	5
Utilitarian benefits	Childers et al., (2001)	5
Decision comfort	Parker et al., (2016)	5
Spatial presence	Smink et al., (2020	4
Perceived intrusiveness	Li et al., (2002)	5
Personal privacy concerns	Rauschnabel et al., (2018)	5
Online Purchase intention	Zeithaml et al., (1996) and Lu, Chang, and Chang(2014), revised, Nam, Dong, and Lee (2017), revised and Pena et al., (2020)	4
Mental imagery	Park & Yoo (2020)	4
Perceived Social Presence	Hassanein et al., (2007); PSchubert et al., (2001) and Lu et al., (2016)	4
Brand attitude (BA) adopted from	Li et al., (2002)	5

VR adoption (VRA) adopted from	Shankar et al., (2020) and Lee and Chen (2022)	4
Online purchase behaviour	Pratesi et al., (2021) and Teo and Liu, (2007)	5

Source: Author

4.6 Development and pre-testing of the questionnaire

Literature suggests that questionnaire development and pretesting are crucial in ensuring the reliability and validity of data collected in a research study (Dillman, Smyth, & Christian, 2014). It is critical for researchers to carefully develop and pretest their questionnaires to ensure that the questions are clear, concise, and accurately capture the intended constructs. Researchers should also consider the content validity of their questionnaire by ensuring that the questions are relevant to the research question and that they cover all aspects of the construct measured (DeVellis, 2017). Additionally, researchers must also consider the construct validity of the questionnaire by ensuring that the questions accurately measure the intended construct and that they are free from bias (DeVellis, 2017). Pilot studies and pretesting are recommended to identify problems with the questionnaire before administering it to the study participants (Dillman et al., 2014). The process can include conducting cognitive meetings with a small group of members to test the clarity and understandability of the questions. This process can also help identify potential problems with the wording or structure of the questions, which can require some revision before the final data collection.

Furthermore, researchers should consider the length of the questionnaire to ensure that it is short enough, as either can lead to reduced response rates or incomplete responses (Fowler, 2013). Skip patterns can help reduce the length of the questionnaire by only presenting relevant questions to participants based on their previous responses. Overall, it is critical for academics to carefully build and pretest their questionnaires to ensure that the questions are clear, concise, and accurately measure the intended constructs. This can improve the reliability and validity of the data collected and ultimately improve the quality of the research findings.

4.6 Sampling design

4.6.1 Defining the target population

Defining the population to be studied is a significant step in research design since it establishes the scope of the study and decides which group of people or objects will be studied (Saunders et al., 2019). The target audience for this study researching the factors that influence online purchase behaviour using augmented and virtual reality in the furniture industry is people who have made or are likely to make an online purchase. This includes people who have previously bought furniture online and those who plan to do so in the future. Discovering the factors influencing online purchase behaviour in the furniture industry is critical for businesses looking to improve their online marketing strategies and customer experience. Furthermore, choosing this target group aligns with the research purpose to observe the determinants that impact AR and VR reality-driven online purchasing behaviour within the furniture sector. By focusing on individuals who have made or are likely to make furniture purchases online, the study can provide insights into how integrating AR and VR can impact e-commerce buying within the furniture sector. The research target population ensures that the study is focused and relevant to the research purpose. In this case, selecting individuals who have made or are likely to make furniture purchases online provides a suitable target population for investigating the factors influencing online purchase behaviour using augmented and virtual reality in the furniture industry.

4.6.2 Determining the sampling frame

Identifying the list or set of all elements or units that comprise the community from which the sample will be drawn is referred to as determining the "sampling frame" (Saunders et al., 2009). A sample frame is a group of people, objects, or units from which the researcher will draw a sample. The population from which the sample is derived is portrayed by the sampling framework. Establishing the sampling framework is crucial as it directly impacts the precision and applicability of the study's outcomes (Bryman, 2016). If the sampling frame does not represent the population, the sample may not correctly reflect the population's characteristics and diversity, and the findings may be inapplicable. The researcher must clearly understand the population being studied to develop an accurate sampling frame. The sampling frame should include all the units that make up

the population and should be as comprehensive and up to date as possible. Depending on the study, the sampling frame may be developed using existing databases or by creating a list of potential participants through other methods, such as online surveys or data mining (Creswell & Creswell, 2018). To summarise, identifying the sampling framework is a vital phase in the research procedure, as it establishes the groundwork for choosing a representative sample that precisely mirrors the population under investigation.

The target population is people who buy online. The sampling frame that this study will use is convenience sampling. Convenience sampling is a non-probability sampling technique where the researcher selects participants based on their easy availability and accessibility (Saunders et al., 2019). The participants are chosen based on convenience rather than randomly or systematically selected from the population. This technique is often used in research studies where the time and resources required to obtain a random sample are not feasible or practical (Saunders et al., 2019). The importance of developing an accurate and representative sampling frame in research studies. Lai et al. (2020) used a sampling frame of students who had previously made online purchases on online shopping behaviour among college students. The study found that using a sampling frame of only previous online shoppers may have resulted in a biased sample and limited the generalisability of the findings. Therefore, it is crucial to develop an inclusive and representative sampling frame to guarantee the legitimacy and transferability of the research results

4.6.3 Selecting a sampling technique

Sampling technique refers to selecting the participants or units of analysis from the target population for a research study (Saunders et al., 2019). The two types of sampling techniques are probability sampling, and non-probability sampling are two types of. Probability sampling involves selecting a sample representing the entire target population, where each group representative has an equal chance of being selected (Trochim & Donnelly, 2008). Simple random sampling, stratified random sampling, and cluster sampling are commonly used probability sampling techniques (Saunders et al., 2019). Non-probability testing, on the other hand, entails selecting participants using techniques that are not random (Trochim & Donnelly, 2008). Purposive sampling involves selecting participants based on specific criteria relevant to the

research question. Snowball sampling is a method of selecting individuals by referring them to other participants (Saunders et al., 2019). In studies that depend on voluntary involvement, such as online surveys, non-probability sampling with a convenience strategy is common (Saunders et al., 2019; Trochim & Donnelly, 2008). While non-probability sampling is associated with sampling bias and reduced generalisability of findings, it can still provide valuable insights into the research problem and generate hypotheses for future studies (Fossey et al., 2002). Non-probability sampling can be helpful when the target population is challenging to access or identify or when the research project has limited time and resources (Polit & Beck, 2017).

In the present study, non-probability sampling with a convenience strategy will be used to recruit participants from the target population of online furniture shoppers. The participants will be recruited through social media platforms, online forums, and email invitations to online furniture communities. The sampling strategy aims to achieve a diverse sample of participants regarding demographic profiles to expand the generalisability of the findings. While convenience sampling can limit selection and bias the generalisability of the findings, the study will use statistical techniques, such as descriptive statistics and regression analysis, to observe the connection between variables and generate hypotheses for future studies (Fossey et al., 2002). The results of this research will be used as a foundation for future studies that use probability sampling techniques to confirm the generalisability of the findings. Overall, the convenience sampling technique is appropriate for this study as it is efficient and cost-effective, allowing for a larger sample size and a more comprehensive range of participants to be recruited (Saunders et al., 2019). Furthermore, a non-probability sampling strategy is helpful for studies that aim to explore relationships between variables and generate hypotheses rather than provide definitive conclusions about the population (Polit & Beck, 2017).

4.6.4 Determine the sample size

Appropriate sample size is a critical aspect of research design that directly affects the reliability and accuracy of study findings (Hair et al., 2019). According to Saunders et al. (2019), the sample size should be determined based on the research design, research question, and data collection method. Sample size ranges vary across disciplines and study types, with typical ranges for

psychology and social sciences between 30-500 participants, medical research requiring at least 50-100 participants for pilot studies, and survey research depending on the population size, margin of error, and level of confidence required for the study (Faul et al., 2007; Chow et al., 2008; Cochran, 1977). Establishing a suitable sample size range for a study is a critical aspect of research design that requires careful consideration of various factors (Hair et al., 2019).

Determining an applicable sample size is crucial for ensuring the reliability and accuracy of the results in PLS-SEM analysis (Gefen, Rigdon, & Straub, 2011). One widely used approach for determining the sample size is power analysis, which considers the desired level of significance, effect size, and statistical power (Pallant, 2016). The suggested smallest possible sample size for PLS-SEM analysis varies depending on the difficulty of the model, the number of indicators, and the degrees of freedom (Gefen, Rigdon, & Straub, 2011). However, researchers should aim to achieve the smallest sample size of 200 to ensure adequate numerical capacity and precision in PLS-SEM analysis (Pallant, 2016). Similarly, a sample size of at least 100 is recommended for CFA analysis. Notably, these are only conventional guidelines, and the appropriate sample size should be determined based on the specific research question, data collection methods, and statistical techniques employed in the study (Kline, 2018). Researchers should also consider the potential impact of the sample size on the reliability of the results and consult relevant literature or experts in the field to ensure the sample size is appropriate for their study (Kock, 2015).

SmartPLS4 is a popular statistical software utilised to determine the appropriate sample size for a research study using PLS-SEM analysis. One method of determining sample size in SmartPLS4 is through power analysis, which calculates statistical power based on the desired level of significance, effect size, and sample size (Gefen, Rigdon, & Straub, 2011). To conduct power analyses and determine the appropriate sample size, the SmartPLS4 employs bootstrapping and Monte Carlo simulations. The researcher enters the intended significance level and the expected effect size during this procedure (Ismail, & Afifi, 2017). Previous research provides some advice on the minimum sample size needed for studies using AR and VR to investigate online purchase behaviour, such as Wu and Liang (2017), Jung and Park (2018), and Cheng et al. (2020), for example, used sample sizes of 200, 206, and 250 individuals respectively. According to these studies, a minimum sample size of 200-250 participants may be appropriate for investigating

online purchase behaviour using AR and VR. The smallest possible sample size required can differ depending on various aspects such as the investigated inquiry, research plan, data gathering techniques, and statistical approaches applied in the examination. The determined a minimum sample size of 400 participants for this research. This decision is rooted in the complexity of the SEM model, the targeted power level, and the available resources for data collection and analysis (Kline, 2018). Based on previous research recommendations for SEM analysis, a minimum sample size of 400 is recommended (Hooper et al., 2012).

4.6.5 Executing the sampling process and validating the sample

The sampling process involves selecting participants from the population that meets the inclusion criteria (Saunders et al., 2019). To verify the sample's adequacy, the investigator will contrast its attributes with the population's (Babbie, 2016). This entails gathering demographic data such as the level of education, income, age, and gender and comparing it to the community's demographics. If the sample's demographics match the population's, the sample can be deemed representative. The researcher will also perform a non-response bias analysis to see if there is any bias in the sample due to participants failing to complete the questionnaire (Dillman et al., 2014). The characteristics of respondents and non-respondents will be compared to see if there are any notable differences. Furthermore, the researcher will use CFA analyses to assess the questionnaire's reliability and validity. Cronbach's alpha assesses the internal consistency of the questionnaire's questions, whereas CFA assesses the construct validity of the questionnaire. Cronbach's alpha values of 0.7 or higher, as well as factor loadings of 0.5 or higher, are regarded as adequate (Hair et al., 2019). Furthermore, the sample process and validation are designed to ensure the data gathered is reliable, valid, and representative of the community of interest.

4.6.2 Data collection

According to Johnson and Christensen (2014), data collection instruments are tools or techniques used to gather data for research purposes. These instruments are designed to collect data that will assist researchers in testing hypotheses, responding to research questions, and achieving research objectives. Various types of data collection instruments are used in research, including questionnaires, interviews, observations, experiments, focus groups, and surveys. The choice of

instrument depends on several factors, such as the research objectives, research questions, research design, and population under study (Johnson & Christensen, 2014). This study's primary data collection instrument is a self-administered online questionnaire. Hair et al. (2019) stated that a standard data collection instrument frequently used in quantitative research is the questionnaire. The questionnaire in this study will be intended to collect data on the factors influencing online purchase behaviour in the furniture business using augmented and virtual reality. The questionnaire will include closed-ended questions, allowing the researcher to analyse the data quickly. The survey is sectioned into three parts. The first portion will include screening questions to help identify qualified participants.

The second part will include questions about the variables under investigation, including the independent variables (hedonic benefits, utilitarian benefits, decision benefits, personal privacy concerns, mental imagery, and perceived social presence) and the dependent factors (online purchase intention, brand attitude, adoption of VR, and online purchase behaviour). Diamantopoulos and Siguaw (2014) suggest that the questions be designed using a Likert scale. Participants can evaluate their agreement or disagreement with statements on a scale ranging from strongly disagree to agree using the Likert scale firmly. In addition to the questionnaire, secondary data sources will be used in the research. Secondary data sources will include academic articles, journals, and other pertinent literature. Using augmented and virtual reality, secondary data will provide more in-depth knowledge of the aspects that affect online purchase behaviour in the furniture industry. The instruments used in this research are intended to gather valid and trustworthy data to allow the researcher to examine the hypotheses and answer research questions. Using a survey and secondary data sources will thoroughly identify the factors that influence online purchase behaviour in the furniture industry using augmented and virtual reality

4.7 Ethical considerations

Ethical considerations are crucial in research to ensure that participants are not harmed, and ethical principles are followed. This study considered various ethical considerations, such as informed consent, confidentiality, data protection, risk assessment, debriefing, respect for participants, and the safe use of technology. Informed consent was obtained from participants, and their identities

and personal information were kept confidential. Data was collected and stored securely, and measures were taken to minimize potential risks. Participants were treated with respect, and the use of technology was safe and responsible. These ethical considerations ensured that the research was conducted ethically and that the participants' rights were respected. Adhering to ethical principles in research is essential for the validity and trustworthiness of the results (Punch, 2014). Before conducting this research, the researcher obtained an ethical clearance certificate, please refer to Appendix B.

4.8 Pilot testing

Pilot testing is a crucial step in research that involves testing the research design and instruments on a small sample of participants before the actual data collection. Pilot testing aims to identify and correct any issues with the research design or instruments before the main study to improve the quality of data collected (Saunders, Lewis, & Thornhill, 2019). According to Wang and Wang (2020), pilot testing can help researchers warrant that the research instruments are valid and reliable, and that the data collection process is efficient and effective. In addition, pilot testing can also help researchers identify any potential ethical issues in the research design and address them before the main study. The pilot testing procedure entails choosing a small sample of participants representative of the desired population and administering the research tools. The researcher then examines the data to find any issues or problems with the research instruments or data collection process. Participants' feedback should be sought during the pilot testing to improve the study instruments and data collection procedure (Saunders, Lewis, & Thornhill, 2019). The researcher should also keep track of any issues during pilot testing and how they were resolved to improve the study design and instruments. Researchers can ensure that the data collected is valid, reliable, and ethical by identifying and addressing possible issues before the primary study. This research conducted a pilot test with 60 respondents to ensure the data was valid and reliable; the issues found were the choice of wording in some constructs and the removal and addition of some constructs with a more positive relationship than the existing ones.

4.9 Data collection process

The data collection process for this study will involve the distribution of the questionnaire through

an online platform such as Google Forms or SurveyMonkey. The questionnaire will be sent to potential participants through email or social media platforms like Facebook or LinkedIn. Participants will be informed about the purpose and nature of the study, their rights as participants, and the confidentiality and anonymity of their responses. Informed consent will also be obtained from each participant before answering the questionnaire. According to Hair et al. (2019), online surveys have become increasingly popular due to their cost-effectiveness, convenience, and ability to reach a large sample size. Moreover, as technology advances, online surveys have become more sophisticated and provide researchers with various tools to enhance the data collection process, such as skip logic, branching, and multimedia. Additionally, online surveys have been found to have high validity and reliability, and their results are comparable to those obtained through traditional methods such as telephone or face-to-face interviews (Buhrmester et al., 2018). To ensure data quality in this study, several measures will be taken: A pretest will be conducted with a sample of potential respondents to identify and correct any errors, ambiguities, or inconsistencies. Responses will be screened for completeness and accuracy to avoid missing data or invalid responses. Data cleaning and validation procedures will be performed to ensure data accuracy and consistency.

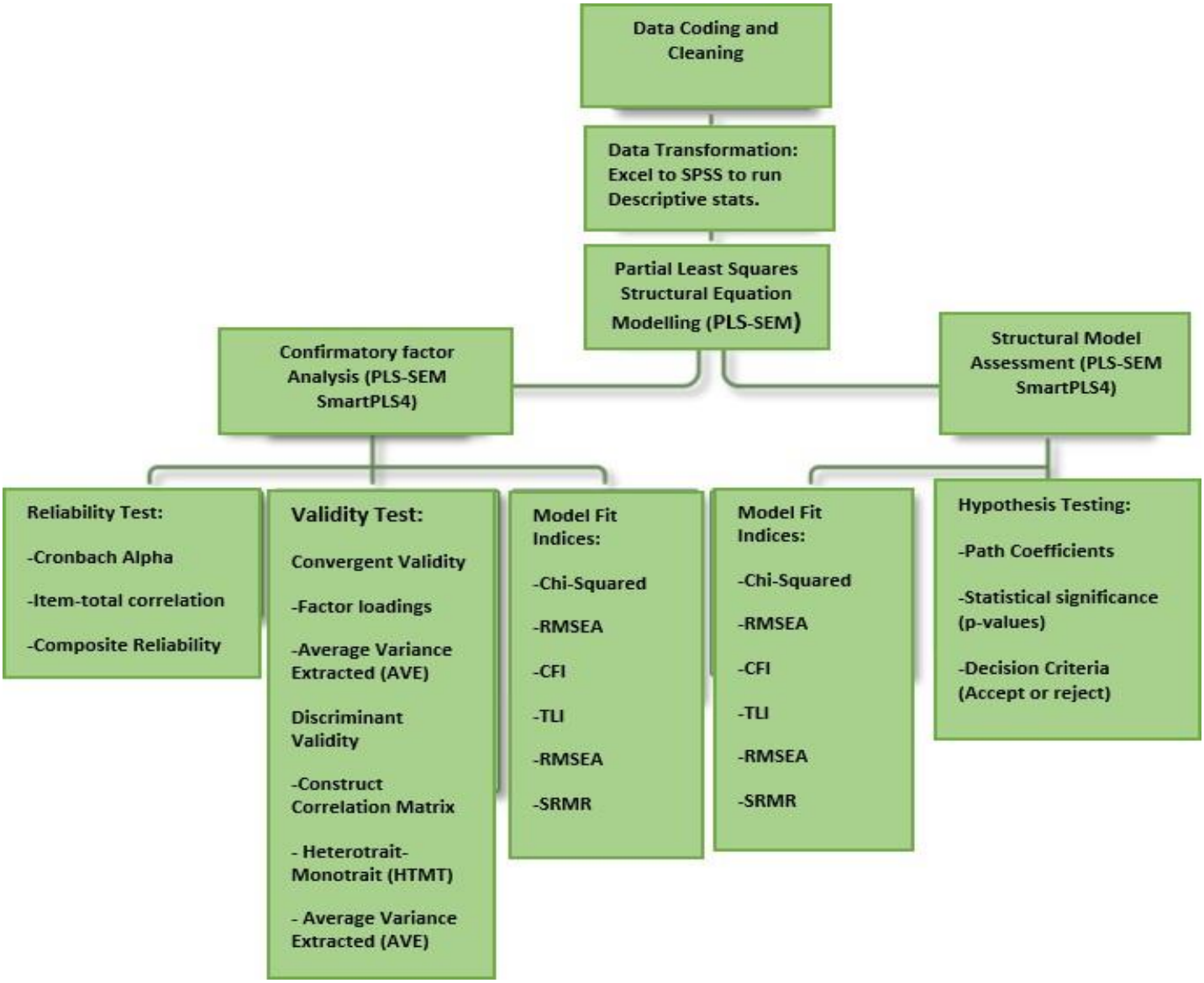
4.9 Data Analysis

Several studies have overwhelmingly supported the PLS-SEM data analysis method. In the Chinese coffee market, for example, Lai, Li, and Chen (2019) used PLS-SEM to investigate the relationship between perceived quality, brand attitude, customer value, and buy intention. According to their results, PLS-SEM helps investigate the interrelationships between constructs in complex models. Rana and Dwivedi (2020) examined the impact of perceived value, service excellence, and customer contentment on customer allegiance in the Indian hospitality industry employing PLS-SEM. The findings showed that PLS-SEM is a powerful technique for analysing complex relationships between constructs and giving insights into their nature. Previous research has highlighted the significance of CFA in assessing the reliability and validity of measurement scales in PLS-SEM analysis (Henseler et al., 2015). It was also contended that CFA can aid in ensuring that the measurement model is specified correctly and can serve as a foundation for model improvement. Furthermore, SmartPLS4 software is commonly used in PLS-SEM data processing. Haque et al. (2020) investigated the determinants of e-commerce adoption in Bangladesh using

SmartPLS4 and different statistical analyses such as descriptive statistics, correlation analysis, and regression analysis. It was also discovered that SmartPLS4 is an easy-to-use program that can be used to conduct various statistical analyses in social science research.

Prior research has extensively supported the application of PLS-SEM in data analysis. As an illustration, Liu et al. (2020) explored the consequences of perceived value and trust on online purchase intention in AR mobile shopping, utilising PLS-SEM. Through PLS-SEM analysis, they uncovered that both perceived value and trust exert a substantial favourable influence on online purchase intention. Correspondingly, Shen et al. (2020) scrutinized the effects of perceived risk, perceived worth, and trust on consumer adoption of AR mobile shopping. By employing PLS-SEM to analyse the data, they found that perceived risk has an adverse impact, while perceived value and trust positively impact consumers' adoption of AR mobile shopping. Likewise, Khan et al. (2021) investigated the contribution of augmented reality to enhancing online purchase intent in the furniture industry. Using PLS-SEM, they determined that augmented reality significantly and positively affects online purchase intention. These studies collectively exhibit the efficacy of SmartPLS4 in analysing data related to online purchasing behaviour involving AR and VR.

Figure 4.2: Data analyses



Source: Author

4.9.2 Data cleaning

Data cleaning and coding are crucial steps in data analysis that aim to enhance the quality and accuracy of the collected data. According to Field (2013), data cleaning involves checking for and correcting errors or inconsistencies, while coding involves assigning numerical or categorical values to the collected data for more accessible analysis. In this research, refining and categorising the data was executed with tools such as SPSS and SmartPLS4 to guarantee the absence of inaccuracies and the preparedness for examination. This step is essential as it helps to identify and

correct any inconsistencies or errors in the data that could affect the results of the study. Additionally, coding helps to simplify the analysis process by allowing for easier categorization and grouping of data. Therefore, data cleaning and coding are essential to ensure the reliability and validity of the findings acquired from the statistical analysis process.

4.9.2 Descriptive statistics

Descriptive statistics are a set of statistical techniques used to explain and review the main characteristics of a dataset (Saunders, Lewis, & Thornhill, 2019). It provides insights into the data's principal tendency, dispersion, and shape. The measures of central tendency include mean, median, and mode, while the measures of dispersion include range, variance, and standard deviation (Field, 2013). This study will use descriptive statistics to describe the characteristics of the data collected from the sample population. Descriptive statistics will summarise and organise the data, enabling straightforward interpretation of the findings. The results will be visually analysed using tables and graphs to represent the data (Field, 2013). The descriptive statistics will be analysed using SPSS software.

4.9.3 Normality assessment

Assessing normality is an essential step in data analysis using PLS-SEM and CVM, and SmartPLS4 offers various assessment tools. One way to assess normality is by visually inspecting histograms and standard probability plots. SmartPLS4 provides these visualizations for all observed variables, allowing researchers to identify significant deviations from normality (Kline, 2018). Additionally, SmartPLS4 offers two statistical tests for normality assessment: “the Kolmogorov-Smirnov test and the Shapiro-Wilk test” (Ringlet, Sarstedt & Straub, 2012). These tests can be applied to the residuals of the inner and outer models separately. If the data is found to be non-normal, SmartPLS4 provides various options for data transformation, including square root, logarithmic, and inverse transformations (Ringle, Sarstedt & Straub, 2012). Alternatively, non-parametric tests can be used if normality assumptions are unmet. Overall, SmartPLS4 provides a comprehensive set of tools for normality assessment in PLS-SEM and CVM, allowing researchers to ensure the reliability and validity of their statistical analyses (Hair et al.,2017).

The CVM threshold is a criterion used to assess the convergence and stability of results in PLS-SEM analysis. It is based on the idea that the model should have a certain level of goodness-of-fit to the data. There is no fixed threshold for the CVM, as it depends on the specific research context and the complexity of the analysed model. However, some researchers have suggested that a CVM value below 0.10 indicates a good model fit, while values above 0.20 indicate a poor model fit (Henseler et al., 2016; Hair et al., 2017).Based on the literature on other studies on online purchase behaviour, a few studies have investigated the normality of data related to AR and VR. As an example, in research conducted by Liu et al. (2020), which examined the impact of perceived value and confidence on online buying inclination within the setting of AR mobile commerce, the writers evaluated the regularity of their data utilising Kolmogorov-Smirnov and Shapiro-Wilk examinations. The results showed that the data for perceived value and trust were normally distributed, indicating that parametric statistical tests could be used. Shen et al. (2020) investigated the influence of perceived hazard, perceived worth, and reliance on the acceptance of AR mobile shopping among customers; the researchers assessed the normalcy of their data by utilising the Kolmogorov-Smirnov and Shapiro-Wilk examinations. The results showed that the data for perceived risk, value, and trust were normally distributed, indicating that parametric statistical tests could be used.

Nevertheless, it is crucial to acknowledge that information linked to AR and VR might only sometimes follow a standard distribution. To illustrate, Khan et al. (2021) researched the impact of augmented reality on boosting online purchase inclination in the furniture sector and discovered that the data concerning online purchase inclination did not conform to normal distribution. As a consequence, non-parametric statistical examinations were employed by the researchers to scrutinise the data. Therefore, the normality of data related to AR and VR may vary depending on the specific research context and variables being investigated. Conducting normality assessments to determine the appropriate statistical tests for data analysis is essential.

4.9.4 Testing for multicollinearity

In PLS-SEM, multicollinearity is tested using the variance inflation factors (VIF). Multicollinearity occurs when there is a high correlation between independent variables in a

regression model, leading to unreliable estimates of regression coefficients and inflated standard errors. Various methods can be used to test for multicollinearity, such as correlation matrices, variance inflation factors (VIF), and tolerance values. In this study, testing for multicollinearity is essential because it ensures the validity of the regression results and helps identify which independent variables have a high correlation and might need to be excluded from the model. A general rule is that a VIF value greater than 0.33 or tolerance values less than 0.2 indicate significant multicollinearity and may warrant further investigation (Hair et al., 2014; (Kline, 2018). However, it is important to note that the threshold for multicollinearity may vary depending on the research context and the nature of the studied variables. Therefore, researchers should exercise caution when interpreting the results of multicollinearity tests and seek expert guidance if necessary. Several studies, such as Hair et al. (2014) and Kline (2018), have emphasised detecting and addressing multicollinearity in regression analysis. Moreover, using PLS-EM in this study allows for a more comprehensive assessment of multicollinearity as it enables the examination of the correlation between latent constructs rather than just observed variables (Kline, 2018). Testing for multicollinearity is crucial in ensuring the validity and reliability of the regression results of the research.

4.9.5 Testing Reliability and Validity

The extent to which the cues employed to evaluate a concept are positively correlated with one another is referred to as convergent validity. This can be evaluated in the context of AR and VR studies on online purchase behaviour by looking at the relationship between the various indicators used to measure constructs like perceived usefulness, perceived ease of use, and purchase intention. For example, Chen et al. (2021) discovered that the indicators used to assess perceived usefulness in the context of an AR-based shopping application had high convergent validity, with factor loadings ranging from 0.709 to 0.882. The extent to which a concept varies from other concepts within the framework is known as discriminative validity. This can be evaluated in the context of AR and VR studies on online purchase behaviour by analysing the relationship between the AVE of each construct and the squared correlation between the construct and the other constructs in the model. A good level of discriminant validity is shown when the square root of each construct's AVE is more significant than its associations with other constructs. An alternative to the Fornell-Larcker criterion is the HTMT method, which calculates the ratio of heterotraits to

monotraits. The HTMT method determines discriminant validity by examining the correlation between a construct and other constructs relative to the correlation between the construct and its indicators. The acceptable threshold for the correlation between two constructs, according to the HTMT method, is less than 0.85 (Henseler, Ringle, & Sarstedt, 2015).

4.9.6 Structural Equation Modelling (SEM)

In the PLS-SEM context, Structural Equation Modelling (SEM) is a commonly used statistical technique that allows researchers to examine complex relationships among constructs and test theoretical models (Hair et al., 2019). One significant advantages of PLS-SEM is its ability to assess model fit, which involves determining how well the theoretical model fits the observed data. Model fit is crucial in ensuring the validity of the results, and several fit indices, such as R- R-squared, Q-squared, CFI, TLI, RMSEA, and SRMR, are used to evaluate the fit of the model (Hair et al., 2019). Previous studies, such as Hair et al. (2016) and Henseler et al. (2014), have emphasised the importance of using multiple fit indices to ensure a good model fit, which is indicated by non-significant chi-square values, CFI and TLI values above 0.90, and RMSEA and SRMR values below 0.08 and 0.10, respectively. Additionally, PLS-SEM allows for hypothesis testing, typically done using bootstrapping to determine the significance of the estimates (Kline, 2018). Furthermore, CFI and TLI are two common fit indices used in structural equation modelling (SEM), including PLS-SEM (Dash & Paul, 2021). In summary, SEM provides a powerful tool for testing theoretical models, assessing model fit, and conducting hypothesis testing in PLS-SEM.

This study will use Q-squared, R-squared, and SRMR as fit indices to assess the model fit, which is justified by previous research. For example, Hair et al. (2019) recommend using Q-squared and R-squared to evaluate the predictive relevance of the model and the amount of variance explained by the model, respectively. Additionally, SRMR has been suggested as a reliable fit index for PLS-SEM models, as it is less sensitive to sample size and distributional assumptions than other fit indices (Henseler et al., 2015). Therefore, the use of Q-squared, R-squared, and SRMR in this study is consistent with previous research and reflects best practices for assessing the fit of PLS-SEM models.

4.10 Conclusion

Chapter 4 provided a comprehensive and detailed overview of the methodology structure employed in this study. It outlined the steps and procedures to address the research questions and objectives. This chapter serves as a guide for the rigorous and systematic execution of the study, ensuring the generation of valid and reliable results. The next chapter, five, will examine data presentation and analyse.

Chapter 5: Presentation of results

5.1 Introduction

The researcher typically provides a clear and detailed account of the findings in this chapter, including statistical analyses, tables, graphs, and other visual aids. The objective of this chapter is to convey the findings of the investigation in a lucid, succinct, and well-structured approach. This chapter should provide readers with a clear understanding of the results and their implications for the research questions or hypotheses.

5.2 Descriptive statistics

5.2.1 Demographic profile of respondents

5.2.1.1 *Gender*

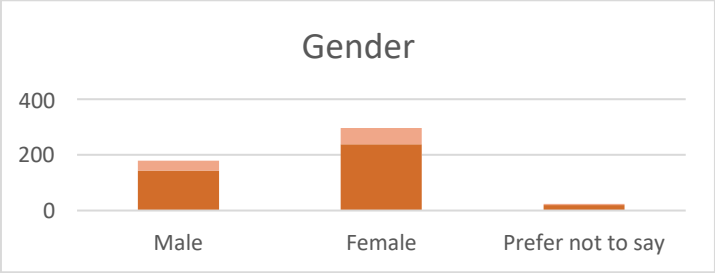


Figure 5.1: Gender

Source: Author

Most of the respondents were females, with 238 responses, making it a 58,0% response rate, followed by Males, with 144, making it a 35,1 % response rate. There were about 19 respondents who indicated that they did not want to specify their gender.

5.2.1.2 *Age*

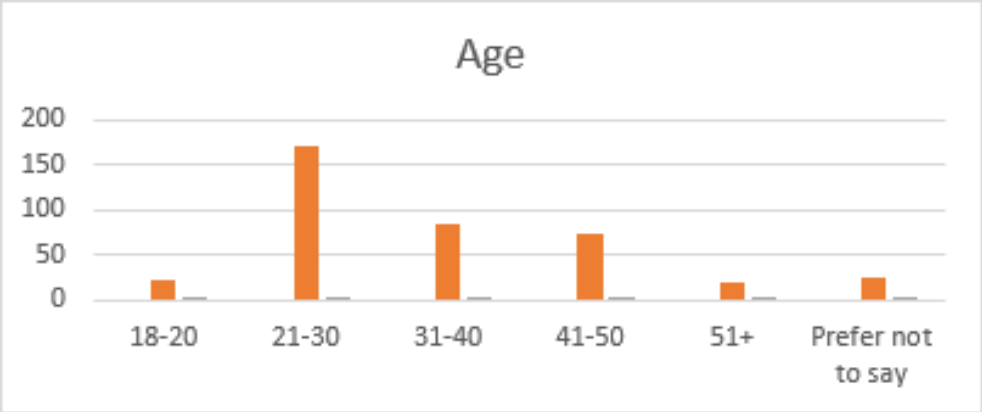


Figure 5.2: Age

Source: Author

Most participants fell within the age range of 21-30 years at 42%, followed by 31-40 with 21% and 41-50 with 18,3%, and followed respondents who indicated they were not interested in sharing their age.

5.2.1.3 *Occupation status*



Figure 5.3: Occupational status

Source: Author

Out of 401 respondents, about 228 indicated that they were employed, making it 55.5% of the response rate, followed by 81 respondents who indicated that they were students, making up 19.8%, followed by 71 respondents indicating that they were self-employed with 17.3%.

5.2.1.4 Qualification

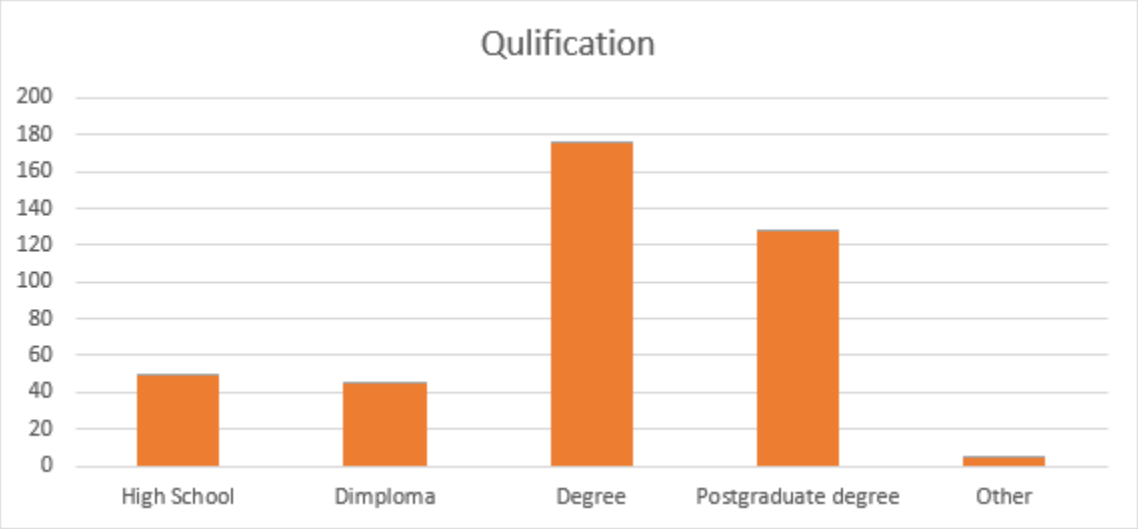


Figure 5.4: Qualification

Source: Author

The results of the survey indicated that 49 respondents (12.0%) held a high school education, 45 (11.0%) held a diploma, 175 (42.7%) held a degree, 128 (31.2%) held a postgraduate degree, and 4 (1.0%) held other educational qualifications

5.2.1.5 Monthly income

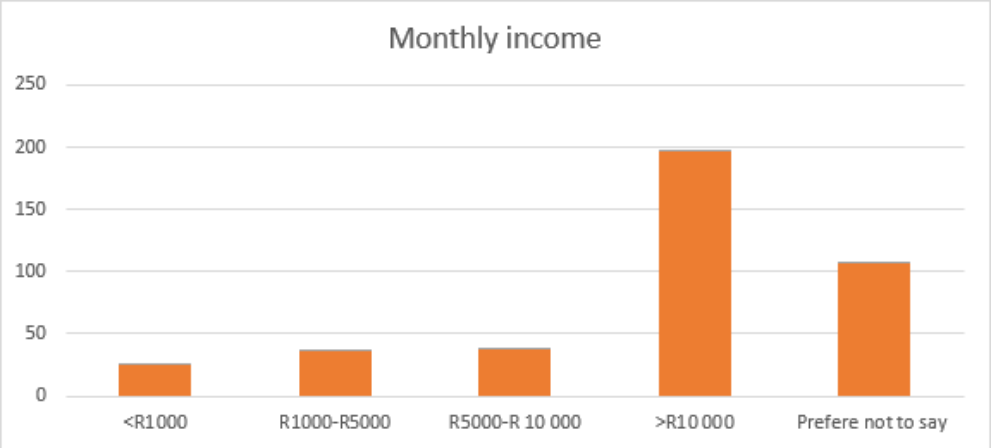


Figure 5.5: Monthly income

Source: Author

The survey results showed that 25 respondents (6.1%) reported earning less than R1000 per month, 36 (8.8%) reported earning between R1000 and R5000 per month, 37 (9.0%) reported earning between R5000 and R10 000 per month, 196 (47.8%) reported earning more than R10 000 per month, and 107 (26.1%) preferred not to disclose their monthly earnings.

5.2.1.6 *Online purchase*



Figure 5.6: Online purchase

Source: Author

The results of the survey indicated that 45 respondents (11.0%) reported that they buy online at least once a week, 97 (23.7%) reported that they buy online at least once or twice a month, 51 (12.4%) reported that they buy online at least once or twice every six months, and 31 (7.6%) reported that they buy online at least twice or four times (or more) in a year.

5.2.1.7 *roducts*

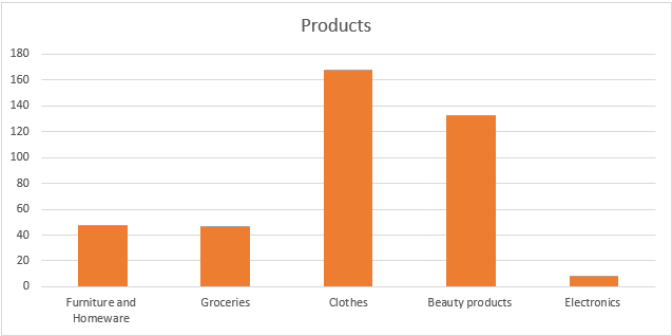


Figure 5.7: Products

Source: Author

The survey results showed that 47 respondents (11.5%) reported purchasing furniture and homeware online, 46 (11.2%) reported purchasing groceries, 167 (40.7%) reported purchasing clothes, 132 (32.2%) reported purchasing beauty products, and 8 (2.0%) reported purchasing electronics online.

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5.2.1.8 Furniture Brand



Figure 5.8: Furniture brand

Source: Author

The results of the survey showed that 24 respondents (5.9%) reported purchasing furniture from the brand "@Home," 166 (40.5%) reported purchasing from "Mr. Price home," 90 (22.0%) reported purchasing from "Coricraft," 75 (18.3%) reported purchasing from "Cielo", and 20 (4.9%) reported purchasing from other furniture brands.

5.2.2 Descriptives statistics of measurement items

It outlines the participants' responses to the questions related to each measurement item. The tables below present data on the responses on the measuring items of each construct survey. The survey

used a 5-point Likert scale, ranging from "Strongly disagree" to "Strongly agree". The table provides the frequencies and percentages of each response category for the five items.

5.2.2.1 Hedonic Benefits

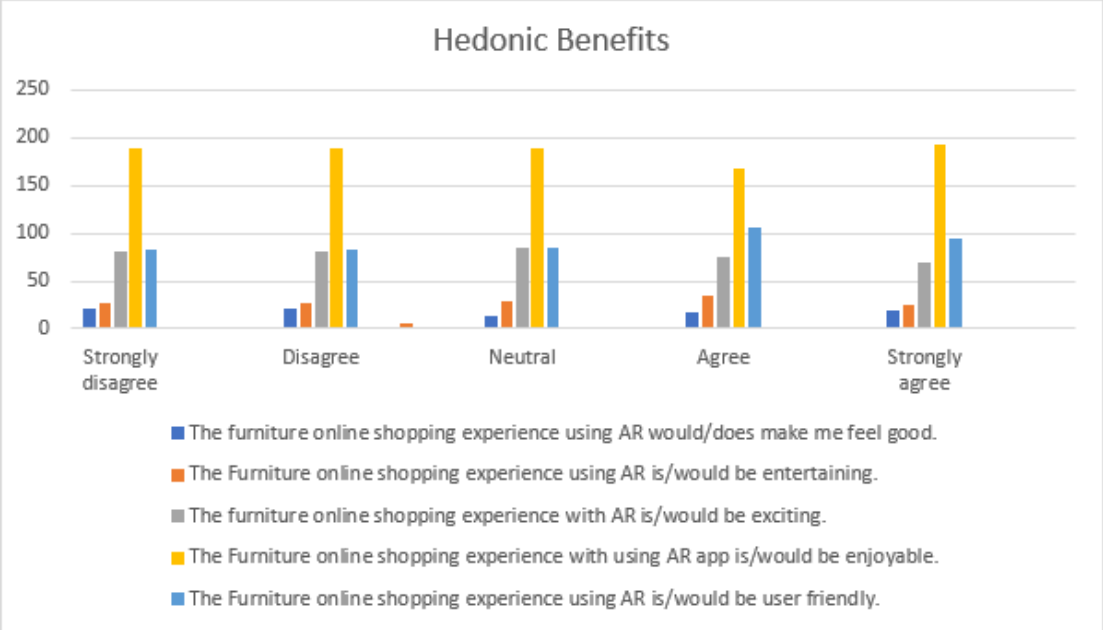


Figure 5.9: Hedonic benefits

Source: Author

Figure 5.9 provides the frequencies and percentages of each response category for the five items.

- The item "The Furniture online shopping experience using AR is/would be enjoyable" had the highest frequency of agreement, with 193 (35.9%) respondents selecting the "Strongly agree" option and 190 (35.4%) respondents selecting the "Agree" option. The item "The furniture online shopping experience with AR is/would be exciting" also had a high frequency of agreement, with 85 (15.8%) respondents selecting the "Strongly agree" option.
- The item "The Furniture online shopping experience using AR would/does make me feel good" and "The Furniture online shopping experience using AR is/would be user-friendly" had moderate frequencies of agreement, with 20 (3.7%) and 94

(17.5%) respondents selecting the "Strongly agree" option, respectively.

- The items "The Furniture online shopping experience using AR app is/would be entertaining" and "The Furniture online shopping experience with using AR app is/would be enjoyable" had lower frequencies of agreement, with 24 (4.5%) and 167 (31.1%) respondents selecting the "Strongly agree" option, respectively.

5.2.2.2 Utilitarian benefits

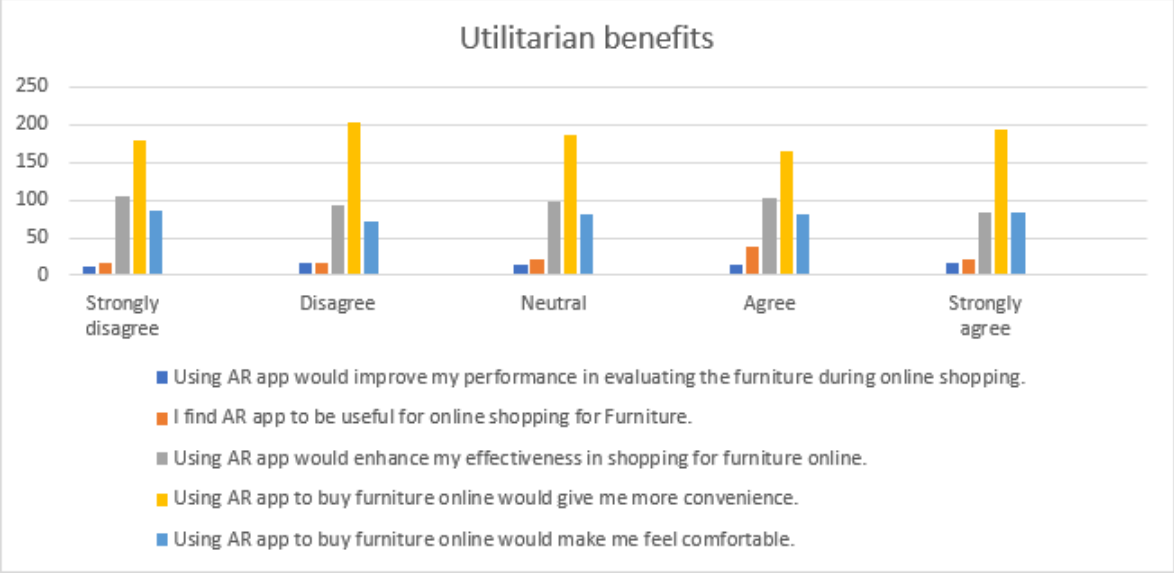


Figure 5.10: Utilitarian benefits

Source: Author

Figure 5.10 provides the frequencies and percentages of each response category for the five items.

- The item "Using AR app to buy furniture online would give me more convenience" had the highest frequency of agreement, with 203 (37.8%) respondents selecting the "Disagree" option and 193 (35.9%) selecting the "Strongly agree" option.
- The item "Using AR app would enhance my effectiveness in shopping for furniture online" had the subsequent highest frequency of agreement, with 103 (19.2%) respondents selecting the "Strongly agree" option.
- The item "I find AR app to be useful for online shopping for Furniture" had an

even distribution of responses, with 21 (3.9%) respondents selecting the "Neutral" option and 38 (7.1%) respondents selecting the "Agree" option.

- The items "Using AR app to buy furniture online would make me feel comfortable" and "Using AR app would improve my performance in evaluating the furniture during online shopping" had lower frequencies of agreement, with 84 (15.6%) respondents selecting the "Strongly agree" option for each item.

5.2.2.3 Decision comfort

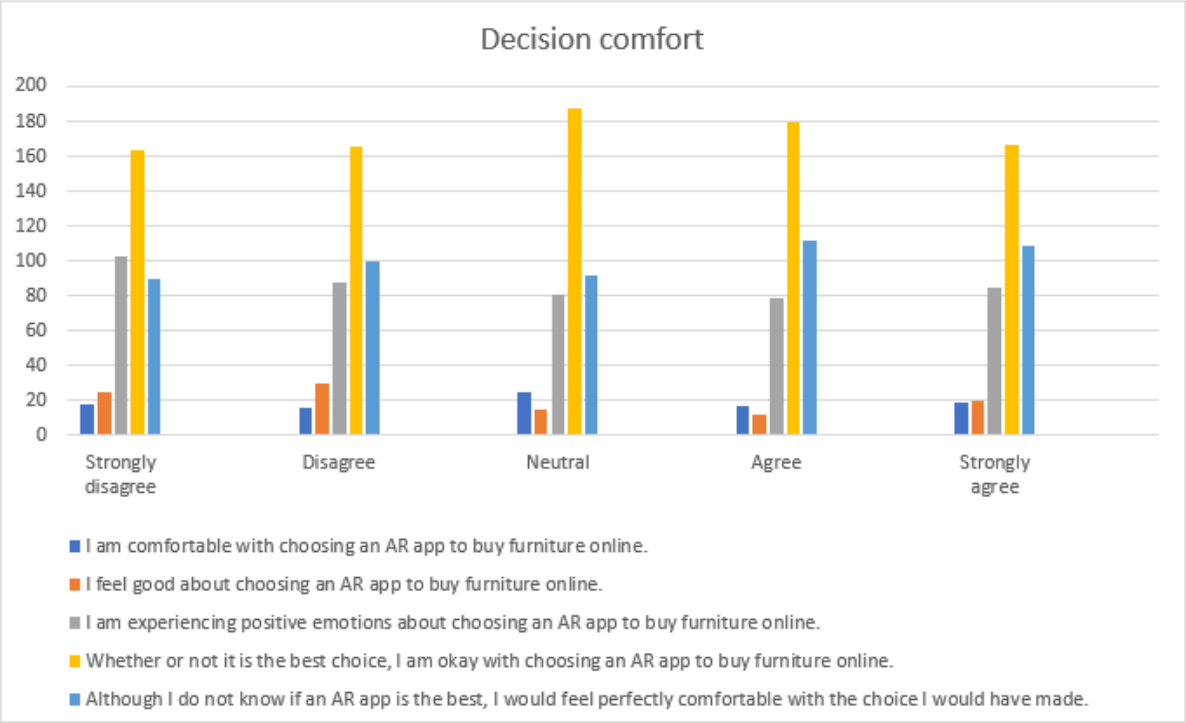


Figure 5.11: Decision comfort

Source: Author

figure 5.11 provides the frequencies and percentages of each response category for each of the five items.

- The item "Whether or not it is the best choice, I am okay with choosing an AR app to buy furniture online" had the highest frequency of agreement, with 187 (34.8%) respondents selecting the "Agree" option and 167 (31.1%) respondents selecting

the "Strongly agree" option.

- The item "I am experiencing positive emotions about choosing an AR app to buy furniture online" also had a high frequency of agreement, with 85 (15.8%) respondents selecting the "Strongly agree" option.
- The item "I feel good about choosing an AR app to buy furniture online" had the lowest frequency of agreement, with 20 (3.7%) respondents selecting the "Strongly agree" option. This item also had the highest frequency of disagreement, with 30 (5.6%) respondents selecting the "Disagree" option.

5.2.2.4 Spatial presence

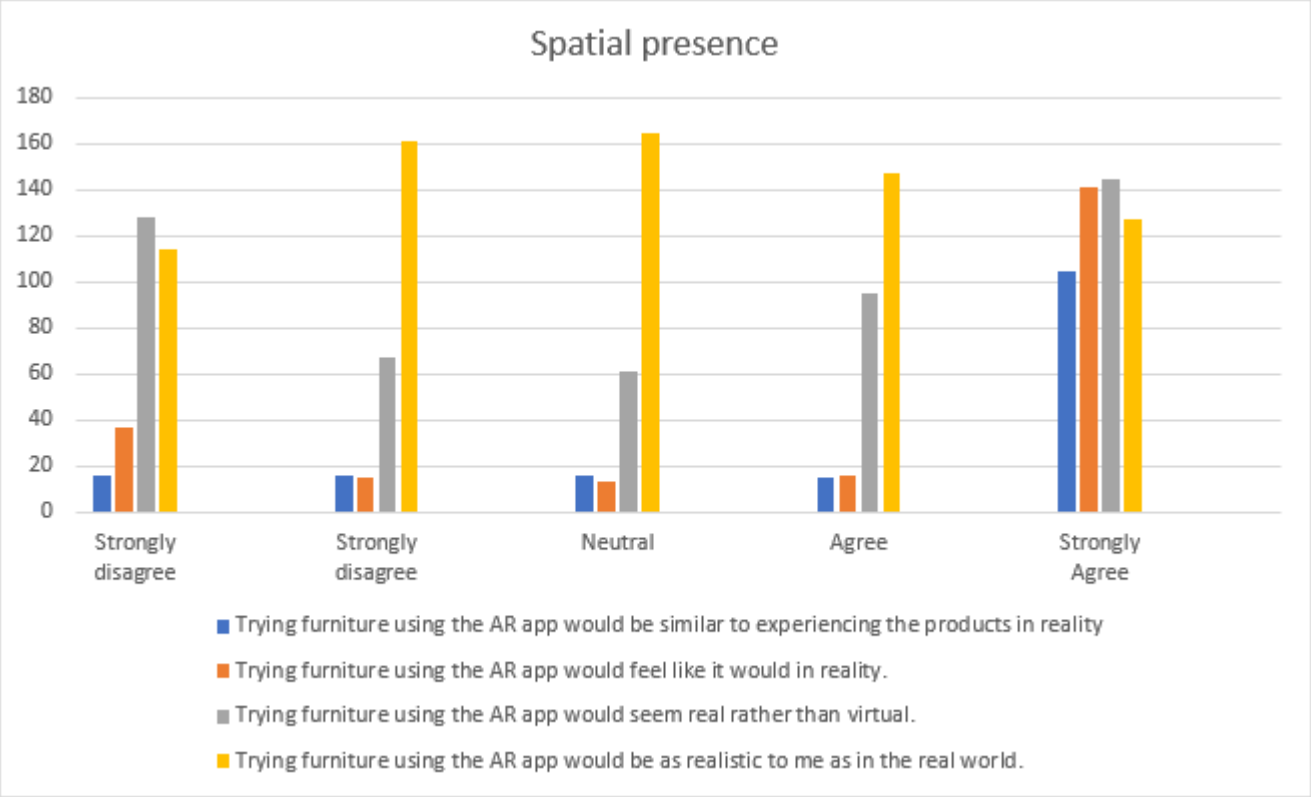


Figure 5.12: Spatial presence

Source: Author

Figure 5.12 provides the frequencies and percentages of each response category for the four items.

- The item with the highest frequency of agreement was "Trying furniture using the AR app would be similar to experiencing the products in reality," with 105 (19.6%) respondents selecting the "Strongly agree" option.
- The item "Trying furniture using the AR app would feel like it would in reality" also had a high frequency of agreement, with 141 (26.3%) respondents selecting the "Strongly agree" option.
- The item "Trying furniture using the AR app would seem real rather than virtual" had a slightly lower frequency of agreement, with 145 (27.0%) respondents selecting the "Strongly agree" option. However, it also had a high frequency of disagreement, with 128 (23.8%) respondents selecting the "Strongly disagree" option.
- The item "Trying furniture using the AR app would be as realistic to me as in the real world" had the most varied responses, with 161 (30.0%) respondents selecting the "Strongly disagree" option and 127 (23.6%) selecting the "Strongly agree" option.

5.2.2.5 Perceived Intrusiveness

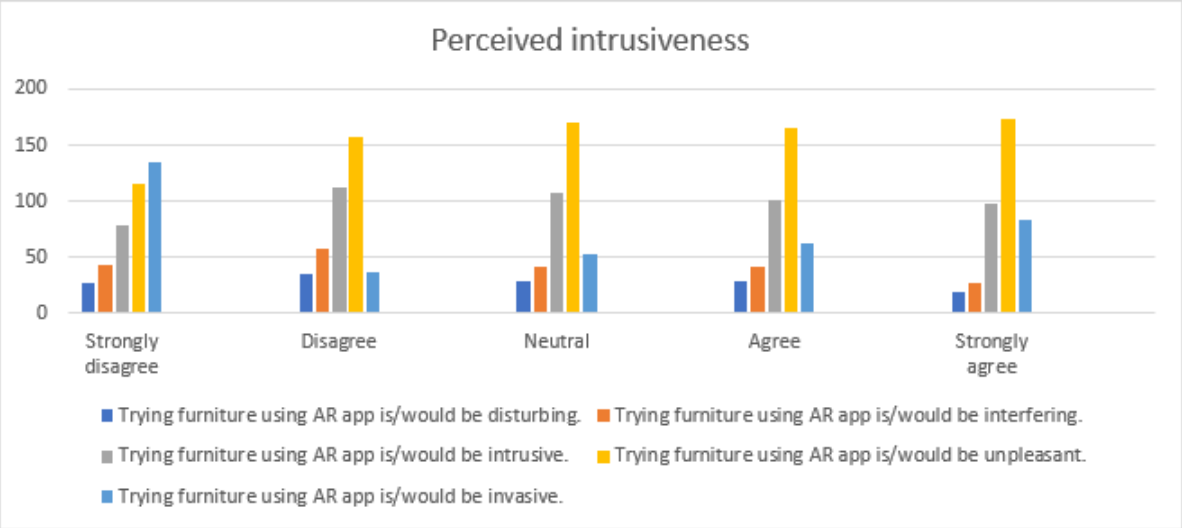


Figure 5.13: Perceived intrusiveness

Source: Author

Figure 5.13 provides the frequencies and percentages of each response category for the five items.

- Respondents agreed or strongly agreed with the negative comments about using AR apps to try out furniture. The item "Trying furniture using AR app is/would be unpleasant," for example, had the most significant frequency of agreement, with 173 (32.2%) respondents selecting "Strongly agree" and 166 (30.9%) selecting "Agree." The item "Trying furniture using AR app is/would be invasive" also had a high frequency of agreement, with 83 (15.5%) respondents selecting the "Strongly agree" option.
- The item with the highest frequency of disagreement was "Trying furniture using AR app is/would be interfering," with 58 (10.8%) respondents selecting the "Disagree" option and
- 27 (5.0%) selected the "Strongly disagree" option. However, the item still had a relatively high frequency of agreement, with 100 (18.6%) respondents selecting the "Agree" option and 42 (7.8%) selecting the "Strongly Agree" option.
- The other three items - "Trying furniture using AR app is/would be disturbing," "Trying furniture using AR app is/would be intrusive," and "Trying furniture using AR app is/would be unpleasant" - had a relatively consistent distribution of responses across the five-point scale, with a relatively high frequency of agreement for each statement.

5.2.2.6 Personal privacy concerns

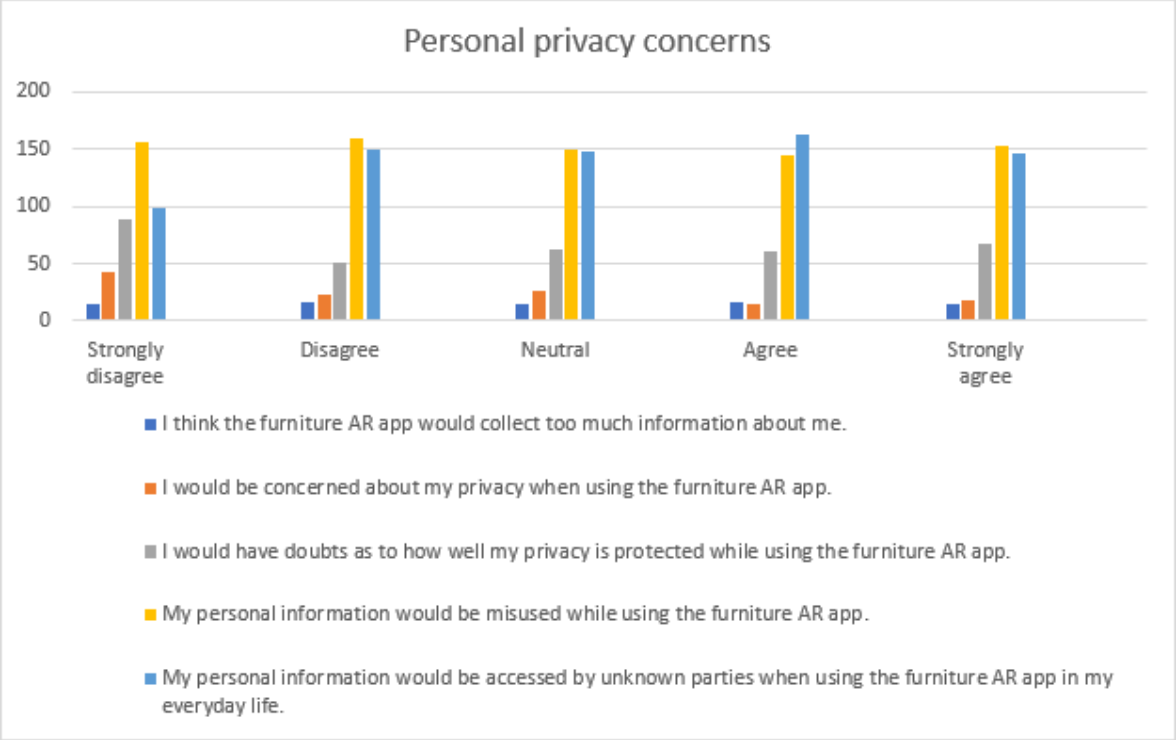


Figure 5.14: Personal privacy concerns

Source: Author

Figure 5.14 provides the frequencies and percentages of each response category for the five items.

- Respondents expressed significant concerns about their privacy when using furniture AR apps. For example, the item "My personal information would be misused while using the furniture AR app" had the highest frequency of agreement, with 153 (28.5%) respondents selecting the "Strongly agree" option and 145 (27.0%) selecting the "Agree" option.
- The item "My personal information would be accessed by unknown parties when using the furniture AR app in my everyday life" also had a high frequency of agreement, with 146 (27.2%) respondents selecting the "Strongly agree" option and 163 (30.4%) selecting the "Agree" option.
- The item with the highest frequency of disagreement was "I think the furniture AR app would collect too much information about me", with 31 (5.8%) respondents selecting the "Disagree" option and 15 (2.8%) selecting the "Strongly disagree" option. However,

the item still had a relatively high frequency of agreement, with 16 (3.0%) respondents selecting the "Strongly agree" option and 16 (3.0%) selecting the "Agree" option.

- The other two items - "I would be concerned about my privacy when using the furniture AR app" and "I would have doubts as to how well my privacy is protected while using the furniture AR app" - had a relatively consistent distribution of responses across the five-point scale, with a relatively high frequency of agreement for each statement.

5.2.2.7 Online purchase intention

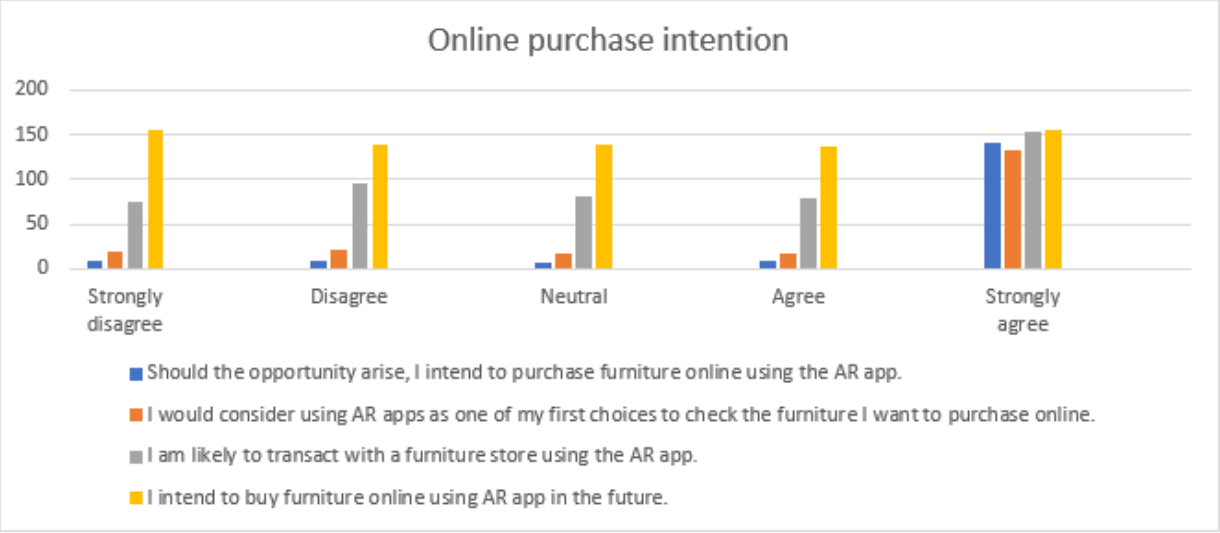


Figure 5.15: Online purchase intention

Source: Author

Figure 5.15 provides the frequencies and percentages of each response category for the four items.

- For the statement, "Should the opportunity arise, I intend to purchase furniture online using the AR app," most respondents (141) selected "Strongly agree," indicating that they were very likely to purchase furniture using the AR app if given the opportunity.

- For the statement "I would consider using AR apps as one of my first choices to check the furniture I want to purchase online," most respondents (133) selected "Strongly agree," indicating that they considered using AR apps as one of their primary methods for checking furniture online.
- For the statement "I am likely to transact with a furniture store using the AR app," most respondents (154) selected "Strongly agree," indicating that they were very likely to transact with a furniture store using the AR app.
- For the statement "I intend to buy furniture online using AR app in the future," most respondents (155) selected "Strongly agree," indicating that they intended to buy furniture using the AR app in the future.

5.2.2.8. Mental imagery

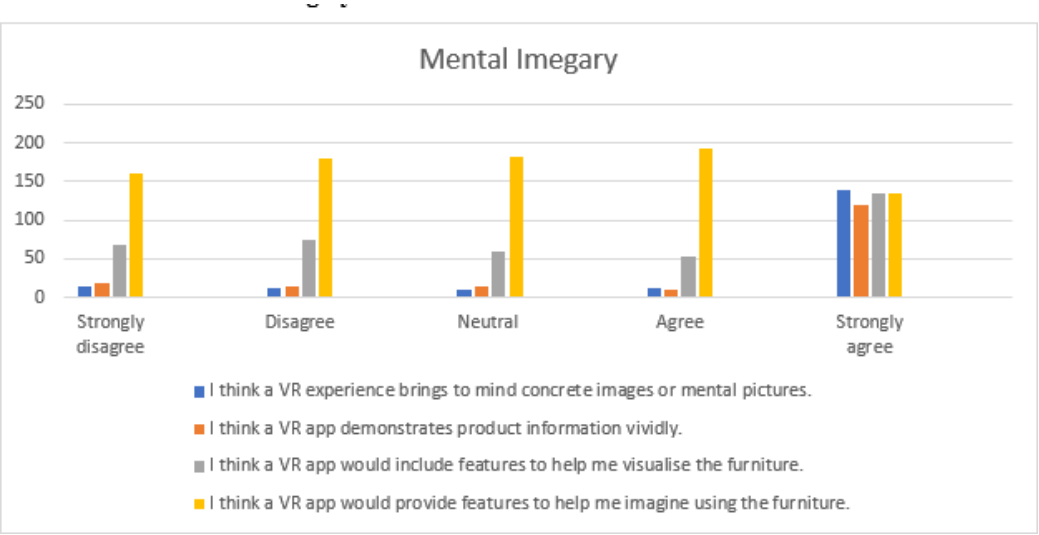


Figure 5.16: Mental imagery

Source: Author

Figure 5.16 displays the frequencies and percentages of each response category for the four items.

- Overall, the respondents expressed positive opinions about using VR in furniture shopping. For example, the item "I think a VR app would provide features to help me imagine using the furniture" had the highest frequency of agreement, with 192 (35.8%) respondents selecting the "Agree" option and 134 (25.0%) selecting the "Strongly agree" option. The item "I think a VR app would include features to help me visualise the furniture" also had a relatively high

frequency of agreement, with 53 (9.9%) respondents selecting the "Strongly Agree" option and 135 (25.1%) selecting the "Agree" option.

- The other two items had lower frequencies of agreement but were still generally positive. The item "I think a VR experience brings to mind concrete images or mental pictures" had a relatively high frequency of agreement, with 11 (2.0%) respondents selecting the "Strongly disagree" option, and 140 (26.1%) selected the "Strongly agree" option. The item "I think a VR app demonstrates product information vividly" also had a relatively high frequency of agreement, with 10 (1.9%) respondents selecting the "Strongly disagree" option and 120 (22.3%) selecting the "Strongly agree" option

5.2.2.9. Perceived social presence.

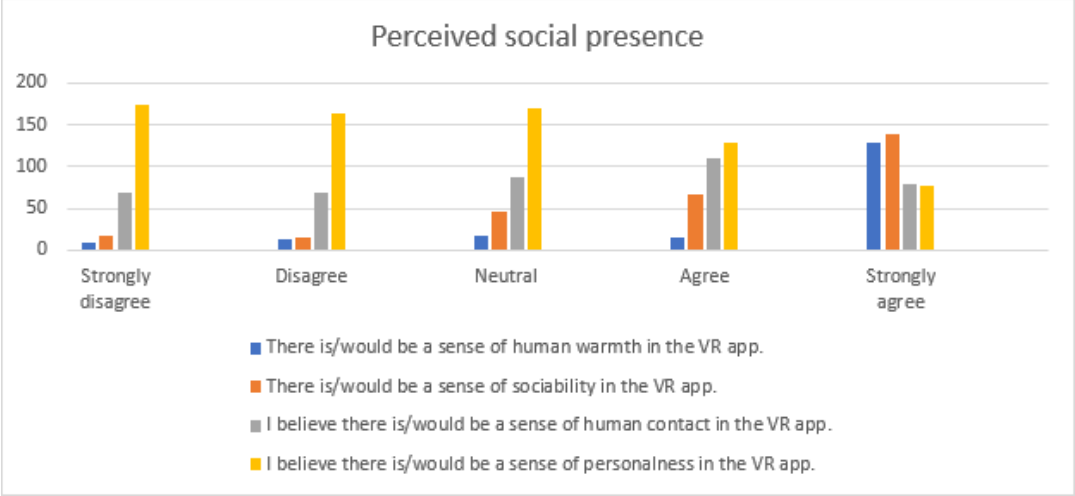


Figure 5.17: Perceived social presence

Source: Author

Figure 5.17 displays the frequencies and percentages of each response category for the four items.

- "There is/would be a sense of sociability in the VR app": Most respondents (140) chose "Strongly agree" for this statement, while 67 respondents chose "Agree." The "Strongly disagree" and "Disagree" categories had relatively low scores, with 17 and 15 respondents, respectively.

- "I believe there is/would be a sense of human contact in the VR app": The categories received more evenly distributed responses for this statement, with 69 respondents in both the "Strongly disagree" and "Disagree" categories, 87 in the "Neutral" category, 111 in the "Agree" category, and 79 in the "Strongly agree" category.
- "I believe there is/would be a sense of personalness in the VR app": This statement received the highest score in the "Neutral" category with 169 respondents, while the "Strongly disagree" and "Disagree" categories had 175 and 163 respondents, respectively. 78 respondents chose "Strongly agree," indicating that they believed the VR app would provide a sense of personalness.

5.2.2.10. Brand attitude

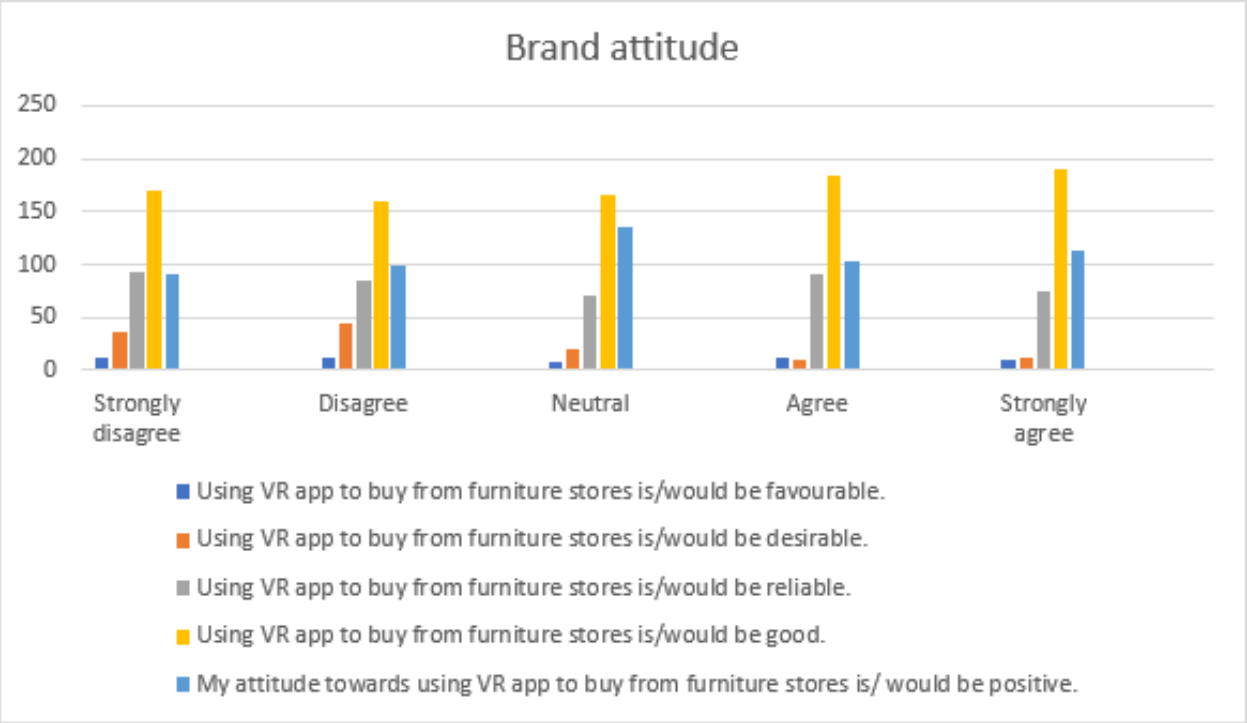


Figure 5.18: Brand attitude

Source: Author

Figure 5.18 displays the frequencies and percentages of each response category for the five items.

- The statement "Using VR app to buy from furniture stores is/would be favourable" received low scores in the "Strongly disagree" and "Disagree" categories, with 12 and 12 respondents, respectively. Most respondents (10) chose "Strongly agree," indicating that they believed using a VR app to buy furniture would be favourable.
- Similarly, the statement "Using VR app to buy from furniture stores is/would be desirable" received relatively low scores in the "Strongly disagree" and "Disagree" categories, with 37 and 44 respondents, respectively. Most respondents (11) chose "Strongly agree," indicating that they believed using a VR app to buy furniture would be desirable.
- The statement "Using VR app to buy from furniture stores is/would be reliable" received high scores in the "Strongly disagree" and "Disagree" categories, with 92 and 85 respondents, respectively. However, a substantial number of respondents (75) chose "Strongly agree," indicating that they believed using a VR app to buy furniture would be reliable.
- The statement "Using VR app to buy from furniture stores is/would be good" received relatively high scores across all categories, with most respondents (191) choosing "Strongly agree."
- Finally, the statement "My attitude towards using VR app to buy from furniture stores is/would be positive" received a mix of responses across all categories, with most respondents (113) choosing "Strongly agree."

5.2.2.11. VR adoption

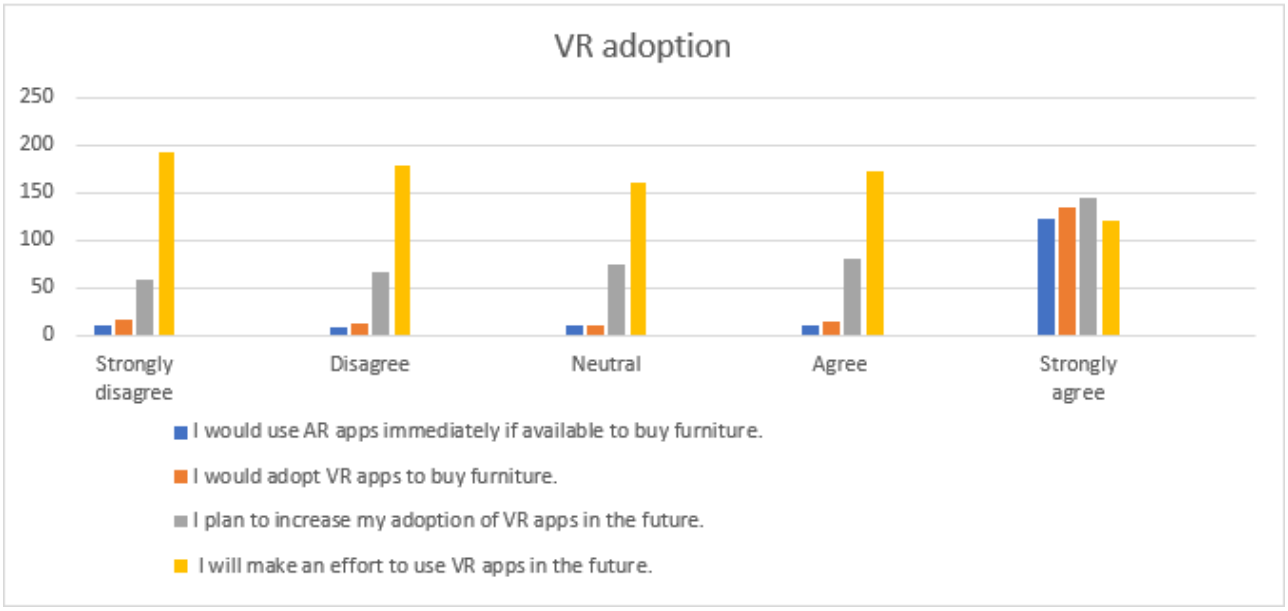


Figure 5.19: Virtual reality adaptation

Source: Author

Figure 5.19 displays the frequencies and percentages of each response category for the four items.

- The statement "I would use AR apps immediately if available to buy furniture" received relatively low scores in the "Strongly disagree" and "Disagree" categories, with 10 and 9 respondents, respectively. Most respondents (122) chose "Strongly agree," indicating that they would use AR apps immediately if available to buy furniture.
- The statement "I intend to increase my use of VR apps in the future" got relatively even scores across all categories, with the majority of respondents selecting "Neutral." (75).
- The statement "I will make an effort to use VR apps in the future" got the most responses on "Strongly disagree" with 192 responses. With a significant proportion of respondents, 173 responded with "Agree," and 121 respondents chose "Strongly agree" (121), indicating that they will experiment with VR apps in the future.

5.2.2.12. Online purchase behaviour

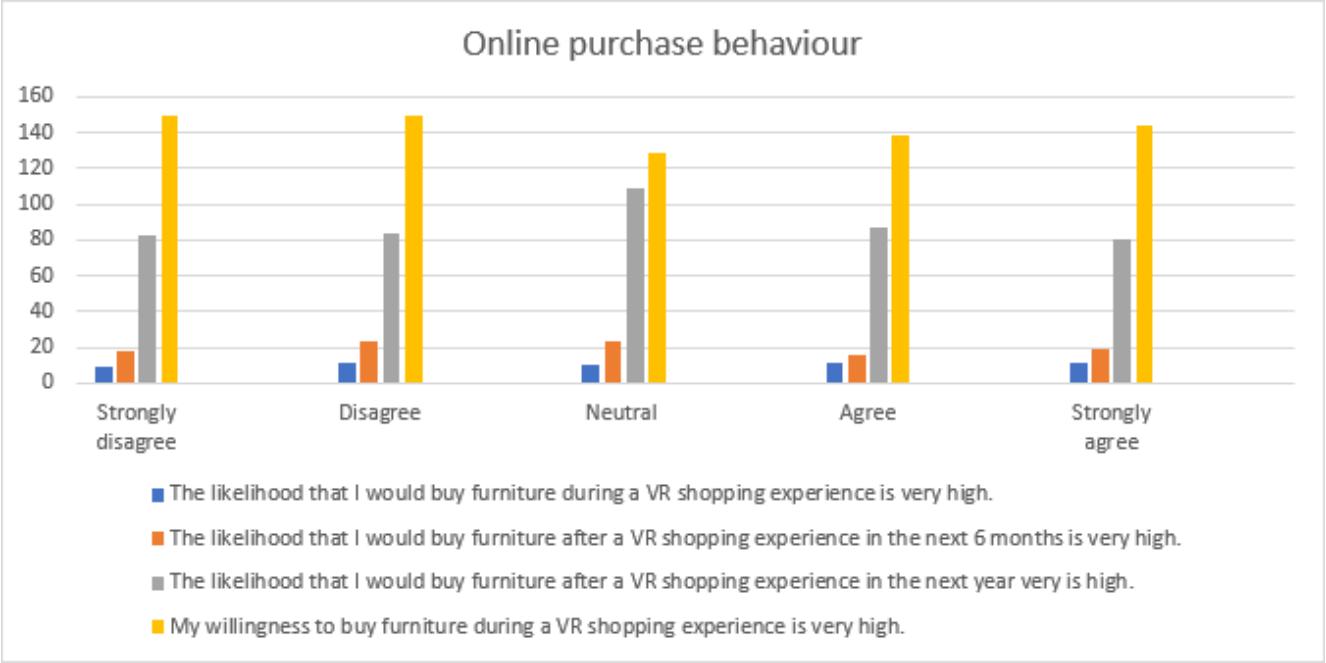


Figure 5.20: Online purchase behaviour

Source: Author

Figure 5.20 displays the frequencies and percentages of each response category for the four items.

- The statement "The likelihood that I would buy furniture during a VR shopping experience is very high" most respondents chose "Neutral" (10), followed closely by "Agree" (11) and "Strongly agree" (11). The "Strongly disagree" and "Disagree" categories received relatively low scores, with 9 and 11 respondents, respectively.
- The statement "The likelihood that I would buy furniture after a VR shopping experience in the next six months is very high," the "Neutral" category received the most responses (23), followed by "Disagree" (24) and "Agree" (16). "Strongly disagree" and "Strongly agree" received relatively low scores, with 18 and 19 respondents, respectively.
- The statement "The likelihood that I would buy furniture after a VR shopping experience in the next year is very high," the "Neutral" category received the most responses (109),
- Followed by "Agree" (87) and "Strongly disagree" (83). "Disagree" and "Strongly agree" received relatively low scores, with 84 and 80 respondents, respectively.

- The statement "My willingness to buy furniture during a VR shopping experience is very high," most respondents chose "Agree" (139) and "Strongly agree" (144), indicating a positive attitude towards buying furniture during a VR shopping experience. The "Neutral" category received the lowest number of responses (129), followed by "Disagree" (150) and "Strongly disagree" (150).

5.2.3 Mean construct values and corresponding standard deviations.

Table 5.4: Summary construct descriptive

Research construct		**Descriptive statistics**	
		Mean value	**Standard deviation**
Hedonic benefits	HB1	3.78	0.943
	HB2	3.71	1.042
	HB3	3.76	0.969
	HB4	3.78	1.064
	HB5	3.79	1.028
Utilitarian benefits	UB1	3.78	0.923
	UB2	3.75	0.937
	UB3	3.76	0.946
	UB4	3.64	1.024
	UB5	3.76	0.984
Decision Comfort	DC1	3.71	1.027
	DC2	3.76	1.037
	DC3	3.77	1.045
	DC4	3.89	0.986
	DC5	3.82	1.040

Spatial presence	SP1 SP2 SP3 SP4	3.64 3.99 4.03 3.89	1.088 1.016 1.003 1.021
Perceived intrusiveness	PI1PI2 PI3PI4 PI5	3.72 3.25 3.45 3.49 3.69	1.227 1.099 1.068 1.094 1.026
Personal privacy concerns	PPC1 PPC2 PPC3 PPC4 PPC5	3.70 4.01 3.98 4.06 3.99	1.066 1.046 1.050 1.034 1.027
Mental imagery	MI1 MI2 MI3 MI4	3.98 3.96 4.06 4.07	1.018 0.936 0.905 0.901
Perceived social presence	PSP1 PSP2 PSP3 PSP4	3.99 4.01 3.61 3.47	0.945 0.984 1.068 1.096

Brand attitude	BA1	3.72	1.010
	BA2	3.73	1.049
	BA3	4.00	0.949
	BA4	3.89	0.926
	BA5	3.97	0.898
Virtual reality adoption	VRA1	4.00	0.922
	VRA2	4.05	0.908
	VRA3	4.04	0.946
	VRA4	3.95	0.944
Online purchase intention	OPI1	4.00	0.968
	OPI2	4.04	2.740
	OPI3	4.03	0.973
	OPI4	4.16	2.732
Online purchase behaviour	OPB1	3.99	0.971
	OPB2	3.92	1.010
	OPB3	3.86	1.016
	OPB4	3.99	0.997
	OPB5	3.99	1.002

Source: Author

5.3 Confirmatory factor analysis (CFA)

5.3.1 Assessment of normality

PLS-SEM was used to examine the assessment of normality in the CFA using SmartPLS4, software that allows users to evaluate the quality of their models and conduct advanced analyses such as multi-group analysis and bootstrapping. (Hair et al.,2022). The study's initial sample size

was 500, but due to unusable data points, only 400 were available, showing an 80% response rate. PLS-SEM can effectively analyse sample sizes varying from diminutive (n100) to large, implying that the 400 data points in this study were adequate for PLS-SEM analysis. While some structures were more remarkable than 0,03, previous studies have shown that a cut-off of 0.03 or lower for the proportion of variance explained by the common factor in Harman's one-factor test is an appropriate cut-off for showing the absence of significant CMV (Podsakoff et al., 2003; Malhotra et al., 2006). Other studies have backed up this threshold, indicating that a value of 0.10 or higher may signal a significant level of CMV (Kock & Lynn, 2012; Yang et al., 2014). This study's results support the use of a 0.03 threshold for detecting CMV. Moreover, the SmartPLS4 examination of the external model facilitated an exhaustive evaluation of the measuring model, encompassing the detection and exclusion of low-loading items and the assessment of the construct's discriminant and convergent validity (Hair et al., 2019). Overall, the analysis findings showed that the measurement model used in this study was valid and reliable for analysing the research hypotheses.

5.3.2 Assessment of reflective measurement model analysis

The standard guidelines used to evaluate the quality of measurement models in PLS-SEM is the reliability test through analysing the factor loadings, AVE, outer loadings, and Cronbach alpha. The consistency and stability of a measure or scale over time and across various samples is referred to as its reliability. Cronbach's alpha is the most commonly used measure of reliability and ranges from 0 to 1, with values greater than 0.7 deemed acceptable and more significant than 0.8 considered good (Hair et al., 2022). Factor loadings assess the strength of the connection between an item and the underlying construct being measured. Factor loadings range from -1 to 1, with values greater than 0.5 deemed acceptable and more significant than 0.7 showing a solid relationship (Hair et al., 2022). Outer loadings indicate the reliability of the indicators used to measure each construct, and a value greater than 0.7 is generally considered good. Cronbach's alpha measures the internal consistency of each construct's indicators, with a value greater than 0.7 indicating excellent consistency. rho_A is a construct reliability metric that indicates how well the indicators quantify the same underlying construct.

A value higher than 0.7 suggests that the indicators consistently measure the construct. The internal

consistency of the indicators within each construct is measured by composite reliability (CR), and a value higher than 0.7 is deemed suitable. Average variance extracted (AVE) is a convergent validity metric that indicates how well a concept captures more variance than its measurement error. Variance Inflation Factors (VIF) assess multicollinearity among indicators within each construct, with a value of less than five showing no multicollinearity. (Hair et al., 2017).

Table 5.5 shows that all of the outer loadings in the model are greater than 0.7, suggesting a high degree of indicator reliability. Cronbach's alpha values for all constructs are higher than 0.7, indicating good internal consistency among the indicators within each construct. All constructs' rho_A values exceed 0.7, suggesting that the indicators within each construct measure the same underlying construct. Composite Reliability (CR): All constructs have CR values greater than 0.7, showing reliability. All constructs have Average Variance Extracted (AVE) values higher than 0.5, showing that each construct captures more variance than its measurement error. All constructs' VIF are less than 3.5, suggesting no multicollinearity among the indicators within each construct. In summary, the reflective measurement model below satisfies the standard criteria for reliability and validity, suggesting that it can be used to measure the constructs of interest in the study, as presented in Table 5.5 below.

Table 5.5: Reflective measurement model analysis

Constructs		Outer loadings (> 0.7)	Cronbach's Alpha (> 0.7)	rho_A (> 0.7)	Composite reliability (CR)	Average variance extracted (AVE) (> 0.5)	Variance Inflation Factors (< 5)
Brand attitude	BA2	0,878	0.866	0.867	0.918	0.789	2.344
	BA3	0,925					3.049
	BA4	0,861					2.024
Decision comfort	DC3	0,880	0.904	0.935	0.939	0.838	2.655
	DC4	0,936					3,585

	DC5	0,928					2,883
Hedonic benefits	HB1	0,923	0.854	0.890	0.910	0.772	2,529
	HB2	0,816					1,810
	HB4	0,894					2.341
Mental imagery	MI2	0,959	0.910	0.911	0.957	0.917	3.295
	MI4	0,956					3.295
Online purchase behaviour	OPB2	0,940	0.872	0.872	0.940	0.886	2.484
	OPB5	0.943					2.484
Online purchase intention	OPI1	0,942	0.676	0.913	0.795	0.531	3,241
	OPI2	0,510					1,160
	OPI3	0,939					3,209
	OPI4	0,307					1,057
Perceived intrusiveness	PI1	0,862	0.837	0.877	0.889	0.668	1.983
	PI2	0,783					2.059
	PI3	0,875					2.760
	PI5	0,741					1.424
Personal privacy concern	PPC1	0,773	0.861	0.918	0.914	0.781	1.660
	PPC3	0.934					3.369
	PPC5	0.935					3.180
Perceived social presence	PSP3	0.934	0.835	0.841	0.923	0.858	2.052
	PSP4	0.918					2.052

Spatial presence	SP1	0.901	0.813	0.834	0.914	0.842	1.886
	SP4	0.933					1.886
Utilitarian benefits	UB1	0.922	0.902	0902	0.939	0.836	3.132
	UB4	0.922					3.183
	UB5	0.8999					2.475
Virtual reality adoption	VRA1	0.931	0.860	0864	0.934	0.877	2.321
	VRA4	0.942					2.321

Source Author

5.3.3. Discriminant validity (correlation matrix)

The Fornell-Larcker criterion, shown in Table 5.6, assesses discriminant validity in the PLS-SEM. It compares the square root of the AVE for each construct with the correlation coefficients between the constructs to determine how different the constructs in a model are from one another (Kline, 2016). Suppose the square root of the AVE for a construct is more significant than its correlations with other constructs. In that case, it suggests that the construct has adequate discriminant validity, according to this method.

The Fornell-Larcker criterion was used to assess discriminant validity in a PLS-SEM model, and the findings are shown in Table 5.6. Each cell shows the square root of the AVE for each diagonal construct and the correlation coefficient between constructs in off-diagonal cells. The square root of the AVE for each construct should be greater than the correlations between that construct and other constructs in the model to evaluate discriminant validity. The diagonal values (i.e., the square root of the AVE) for all constructs are more significant than the Pearson correlations between those constructs, as presented in Table 5.6. This then indicates an acceptable discriminant validity, as shown in Table 5.6.

Table 5.6: Fornell-Larcker criterion

	BA	DC	HB	MI	OPB	OPI	PI	PSP	PPC	SP	UB	VRA
BA	0,875											
DC	0,63	0,892										
HB	0,657	0,748	0,877									
MI	0,777	0,667	0,598	0,894								
OPB	0,774	0,634	0,599	0,748	0,927							
OPI	0,451	0,343	0,3	0,415	0,637	0,728						
PI	0,501	0,52	0,509	0,494	0,503	0,34	0,835					
PSP	0,815	0,592	0,569	0,842	0,741	0,453	0,505	0,863				
PPC	0,679	0,659	0,583	0,738	0,672	0,395	0,633	0,687	0,893			
SP	0,72	0,712	0,682	0,732	0,749	0,471	0,624	0,73	0,705	0,906		
UB	0,652	0,756	0,777	0,615	0,614	0,294	0,438	0,576	0,637	0,659	0,915	
VRA	0,852	0,691	0,629	0,816	0,824	0,452	0,534	0,763	0,704	0,74	0,643	0,92

Source: Author

The criterion was developed as a replacement for the Fornell-Larcker criterion, which has some limitations, especially when the number of indicators are small (Henseler et al., 2015). According to this new discriminant criterion, the HTMT (Heterotrait-Monotrait) value between two distinct constructs should be less than 0.9 to ensure the validity of HTMT. If the HTMT value exceeds 0.9, it becomes challenging to differentiate between the two constructs, suggesting that they may essentially measure the same underlying construct (Henseler et al., 2015). The HTMT analysis is an additional technique for assessing discriminant validity in Partial Least Squares Structural Equation Modelling (PLS-SEM), as presented in Table 5.7 below. Both Shafer et al. (2016) and Henseler et al. (2015) have proposed methods for evaluating discriminant validity, including deattenuated correlations and the HTMT ratio with a threshold of 0.85 in variance-based SEM. Voorhees et al. (2016) extended the HTMT approach to covariance-based SEM. However, there are certain limitations, such as Henseler et al.'s (2015) use of inter-item correlations instead of covariances in the HTMT equation, which may

lead to biased estimates of the deattenuated correlation between composites unless construct scores are based on averaged standardised item scores. Moreover, comparing deattenuated correlations or HTMT ratios to a 0.85 threshold disregards sampling error, making it challenging to draw population-level conclusions from this criterion.

Roemer et al. (2021) proposed the HTMT2 index as an improvement over HTMT, particularly for non-equivalent measures. However, it still relies on inter-item correlations and is not suitable for non-standardized composite construction. In the context of this study the HTMT was used to assess discriminant validity and as shown in the values in Table 5.7 represent the ratio between the correlations of two different constructs and the correlations of the same construct. VRA had an HTMT of 0,942 meaning that there is a lack of discriminant validity. Therefore, the study went further to apply the HTMT2 to access the discriminant validity. Recent research suggests that HTMT2 is a more suitable choice for assessing discriminant validity, especially when indicator loading patterns are diverse (Roemer et al., 2021; Cano et al., 2020). This is particularly advantageous when dealing with latent variables that exhibit heterogeneous loading patterns, as HTMT2 provides less biased estimations of correlations. Therefore, in Table 5.7, where HTMT values are presented showing values with a lack of discriminant validity, the values align with the use of HTMT2 as supported by Appendix F, considering the potential heterogeneity in indicator loadings, and offering more reliable results for assessing discriminant validity as per the study by (Roemer et al., 2021).

Table 5.7: Heterotrait-Monotrait Ratio (HTMT)

	BA	DC	HB	MI	OPB	OPI	PI	PSP	PPC	SP	UB	VRA
BA												
DC	0,647											
HB	0,735	0,815										
MI	0,835	0,613	0,613									
OPB	0,844	0,597	0,636	0,742								
OPI	0,514	0,325	0,338	0,426	0,769							

PI	0,582	0,612	0,610	0,506	0,554	0,383						
PSP	0,783	0,645	0,647	0,709	0,754	0,443	0,782					
PPC	0,859	0,445	0,542	0,739	0,709	0,461	0,504	0,622				
SP	0,800	0,647	0,722	0,749	0,810	0,540	0,717	0,772	0,776			
UB	0,712	0,769	0,833	0,596	0,664	0,334	0,526	0,705	0,601	0,731		
VRA	0,942	0,696	0,703	0,858	0,930	0,503	0,605	0,767	0,729	0,813	0,708	

Source: Author

Henseler et al. (2015) stated that cross-loadings evaluate the degree to which a measurement item loads on its underlying construct versus other constructs in the model. In general, items should have higher loadings on their intended construct than on any other construct. Table 5.7 shows that most items have higher loadings on their intended construct than on other constructs. However, a few items have cross-loadings above 0.4 on other constructs, which may indicate potential problems with construct validity. For example, item OPI1 ("I find it difficult to approach others") has a relatively high cross-loading of 0.429 on the SP construct may suggest that this item is not solely measuring the intended construct of "Other-orientation." Similarly, item MI1 ("I am usually prepared") has a cross-loading of 0.731 on the PI construct, indicating potential overlap between the two constructs. It is important to note that some level of cross-loading can be expected and tolerated as long as the primary loading is substantially higher than any other loading. As a general guideline, the primary loading should be at least 0.3 higher than any cross-loading (Henseler et al., 2011).

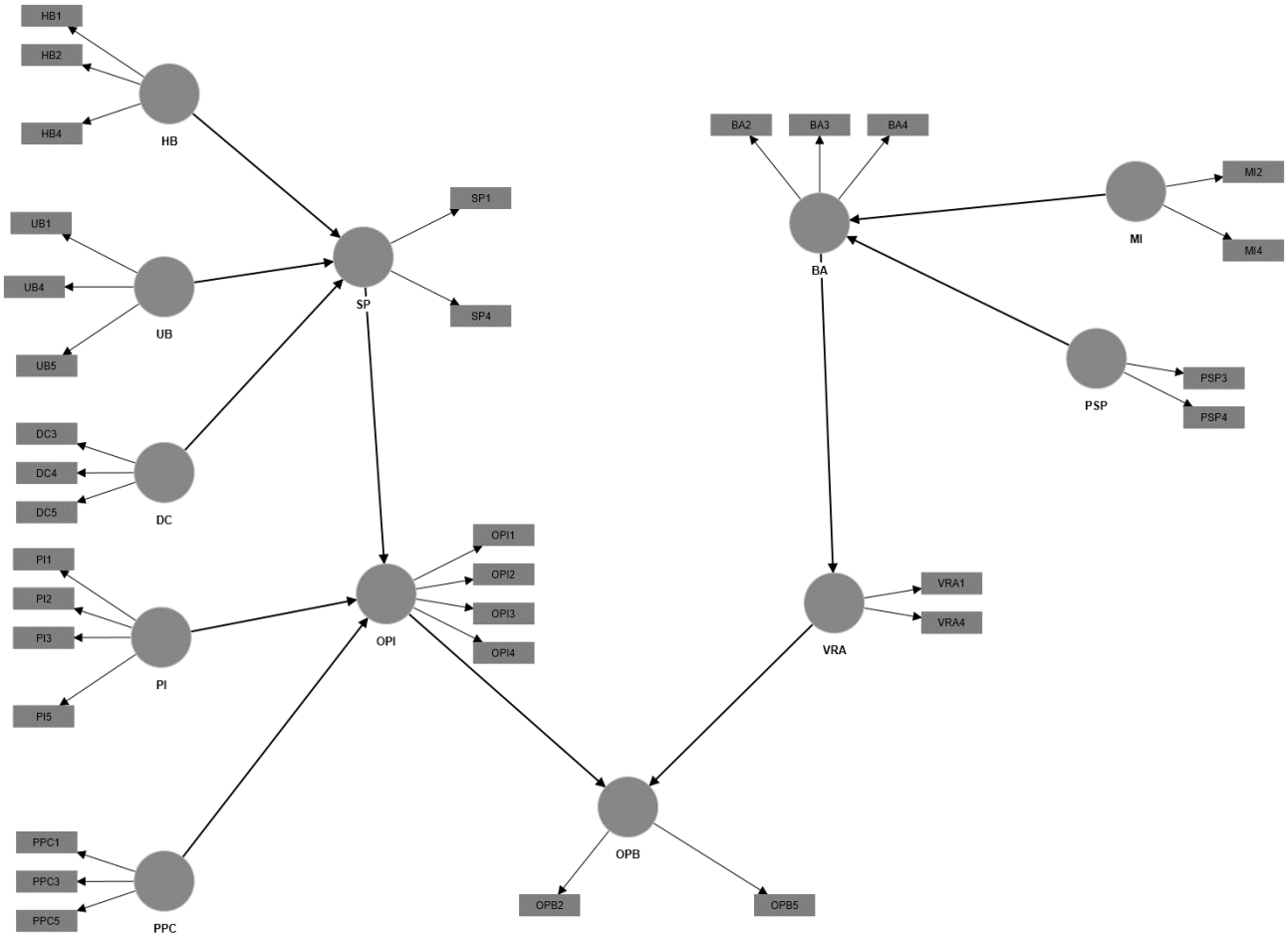
Table 5.8: Cross loading

	BA	DC	HB	MI	OPB	OPI	PI	PPC	PSP	SP	UB	VRA
BA2	**0,878**	0,399	0,518	0,629	0,589	0,385	0,399	0,539	0,736	0,592	0,510	0,642
BA3	**0,925**	0,555	0,616	0,681	0,696	0,438	0,499	0,643	0,654	0,617	0,568	0,743
BA4	**0,861**	0,589	0,581	0,664	0,668	0,378	0,464	0,630	0,560	0,586	0,601	0,779
DC3	0,441	**0,880**	0,648	0,422	0,420	0,242	0,560	0,441	0,267	0,407	0,555	0,507
DC4	0,585	**0,936**	0,649	0,546	0,511	0,257	0,459	0,554	0,375	0,526	0,675	0,589
DC5	0,548	**0,928**	0,667	0,560	0,525	0,314	0,480	0,577	0,430	0,605	0,681	0,588

HB1	0,656	0,677	**0,923**	0,565	0,541	0,283	0,468	0,572	0,516	0,636	0,742	0,602
HB2	0,453	0,615	**0,816**	0,404	0,379	0,221	0,526	0,408	0,261	0,419	0,516	0,434
HB4	0,560	0,592	**0,894**	0,456	0,527	0,287	0,423	0,495	0,434	0,543	0,673	0,555
MI2	0,722	0,539	0,509	**0,959**	0,639	0,387	0,443	0,618	0,622	0,627	0,513	0,717
MI4	0,698	0,543	0,543	**0,956**	0,627	0,366	0,442	0,614	0,617	0,608	0,523	0,735
OPB2	0,707	0,534	0,548	0,628	**0,940**	0,591	0,483	0,649	0,573	0,673	0,563	0,779
OPB5	0,674	0,477	0,503	0,617	**0,943**	0,671	0,450	0,593	0,567	0,618	0,546	0,743
OPI1	0,427	0,273	0,277	0,368	0,696	**0,942**	0,309	0,377	0,372	0,449	0,278	0,448
OPI2	0,160	0,104	0,112	0,129	0,232	**0,510**	0,131	0,141	0,165	0,158	0,112	0,152
OPI3	0,459	0,319	0,323	0,412	0,617	**0,939**	0,369	0,422	0,387	0,462	0,317	0,463
OPI4	0,073	0,040	0,010	0,043	0,136	**0,307**	0,067	0,054	0,061	0,082	0,029	0,034
PI1	0,403	0,458	0,491	0,398	0,436	0,366	**0,862**	0,534	0,357	0,594	0,358	0,431
PI2	0,300	0,354	0,313	0,232	0,283	0,176	**0,783**	0,373	0,289	0,364	0,277	0,319
PI3	0,363	0,414	0,372	0,343	0,305	0,237	**0,875**	0,464	0,271	0,417	0,291	0,356
PI5	0,560	0,493	0,484	0,474	0,527	0,286	**0,741**	0,738	0,468	0,575	0,572	0,575
PPC1	0,527	0,458	0,439	0,412	0,489	0,245	0,661	**0,773**	0,390	0,503	0,523	0,492
PPC3	0,600	0,501	0,505	0,607	0,607	0,375	0,565	**0,934**	0,473	0,592	0,537	0,607
PPC5	0,667	0,574	0,554	0,646	0,637	0,421	0,590	**0,935**	0,540	0,628	0,589	0,654
PSP3	0,712	0,433	0,472	0,650	0,578	0,377	0,427	**0,529**	0,934	0,616	0,519	0,596
PSP4	0,639	0,302	0,407	0,542	0,542	0,346	0,377	**0,460**	0,918	0,567	0,447	0,550
SP1	0,578	0,477	0,512	0,577	0,587	0,390	0,531	0,568	**0,589**	0,901	0,511	0,582
SP4	0,654	0,566	0,615	0,606	0,665	0,455	0,609	0,626	**0,587**	0,933	0,639	0,669
UB1	0,619	0,642	0,697	0,536	0,559	0,286	0,439	0,583	0,496	**0,588**	0,922	0,608
UB4	0,531	0,582	0,636	0,450	0,514	0,267	0,415	0,519	0,481	**0,566**	0,922	0,526
UB5	0,575	0,702	0,708	0,495	0,542	0,275	0,442	0,594	0,459	**0,580**	0,899	0,578
VRA1	0,769	0,614	0,561	0,727	0,685	0,380	0,503	0,617	0,553	0,621	**0,579**	0,931
VRA4	0,754	0,545	0,585	0,695	0,823	0,474	0,491	0,634	0,606	0,661	**0,590**	0,942

Source: Author

Figure 5.21: Measurement model output



Source: Author

5.4 The Structural model and hypotheses testing.

5.4.1 Model fit indices for the path model

The structural model must be evaluated as the first stage in hypotheses testing the research. The structural model in PLS-SEM can be assessed using VIF to look for multicollinearity. The VIF is a statistical measure used to evaluate the degree of multicollinearity among predictor variables in a regression analysis. Multicollinearity occurs when there are high correlations among the predictor variables, which can result in unreliable regression coefficients and inflated standard

errors. In general, a VIF value of 1 show that the predictor variables have no multicollinearity, whereas a value higher than 1 indicates some degree of multicollinearity. A commonly used threshold for identifying high multicollinearity is a VIF value of 3,3 or 3. According to Hair et al. (2017), Forecasting factors having VIF values surpassing these thresholds might encounter issues with multicollinearity and necessitate scrutiny and probable exclusion from the model.

However, the acceptable VIF value threshold may differ based on the context and study question (Hair et al., 2019). As shown in Table 5.3, all constructs had VIF values less than 0,33 showing no multicollinearity problem. Brand mindset (R2= 0.691; Q2 =0.683), Online purchase intention (R2= 0.231; Q2 =0.071), Online purchase behaviour (R2= 0.767; Q2 =0.584), Spatial presence (R2= 0.565; Q2 =0.551), Virtual reality (R2= 0.727; Q2 =0.644). The results suggest that the exogenous latent variables in the structural model strongly influence brand attitude, spatial presence, virtual reality, and online purchase behaviour in the South African furniture industry. However, the influence on online purchase intention is moderate, indicating that other factors not included in the model may also shape this variable. The standardised Root Mean Square Residual (SRMR) was also acceptable at 0.069, which is below the recommended threshold of (< 0.080) (Kline, 2016). This model's CFI and TLI values were above 0,9, indicating a better model fit (Hair et al., 2019).

5.4.2 Hypotheses testing

Bootstrapping with a minimum sample size of 5,000 was used to assess the significance of the suggested relationships. The results of the direct effects and mediation experiments are discussed. Table 5.9 shows the results for path coefficients, t-values, and p-values in PLS-SEM, which may differ based on variables such as framework complexity and dimension, number of indicators, size of sample, and research context. However, the following general principles can be followed: Path coefficients (β) with absolute values greater than 0.2 are considered significant, while coefficients with absolute values greater than 0.5 are regarded as influential (Hair et al.,2017). These thresholds, however, can vary based on the research context. T-values greater than 1.96 (or less than -1.96) shows that the path coefficient is statistically significant at the 5% level. Some researchers, however, recommend a more conservative threshold of 2.58 to allow for repeated

testing. P-values less than 0.05 show that at the 5% level, the applicable path coefficient is highly significant. Some researchers, however, recommend a more conservative threshold of 0.01 or 0.001 to allow for multiple testing. (Hair et al.,2017). The coefficients of the path model in Table 5.10 show the significance of the associations between the variables, with higher coefficients showing stronger relationships. The p-values were calculated to determine whether or not the hypotheses were supported, with higher correlations showing stronger relationships and lower p-values indicating more significant relationships. According to Obilor and Amadi (2018), a p-value less than 0.05 confirms the hypothesis at a 95% level of statistical significance. Table 5.9 shows the critical and supported relationships and the insignificant and unsupported relationships.

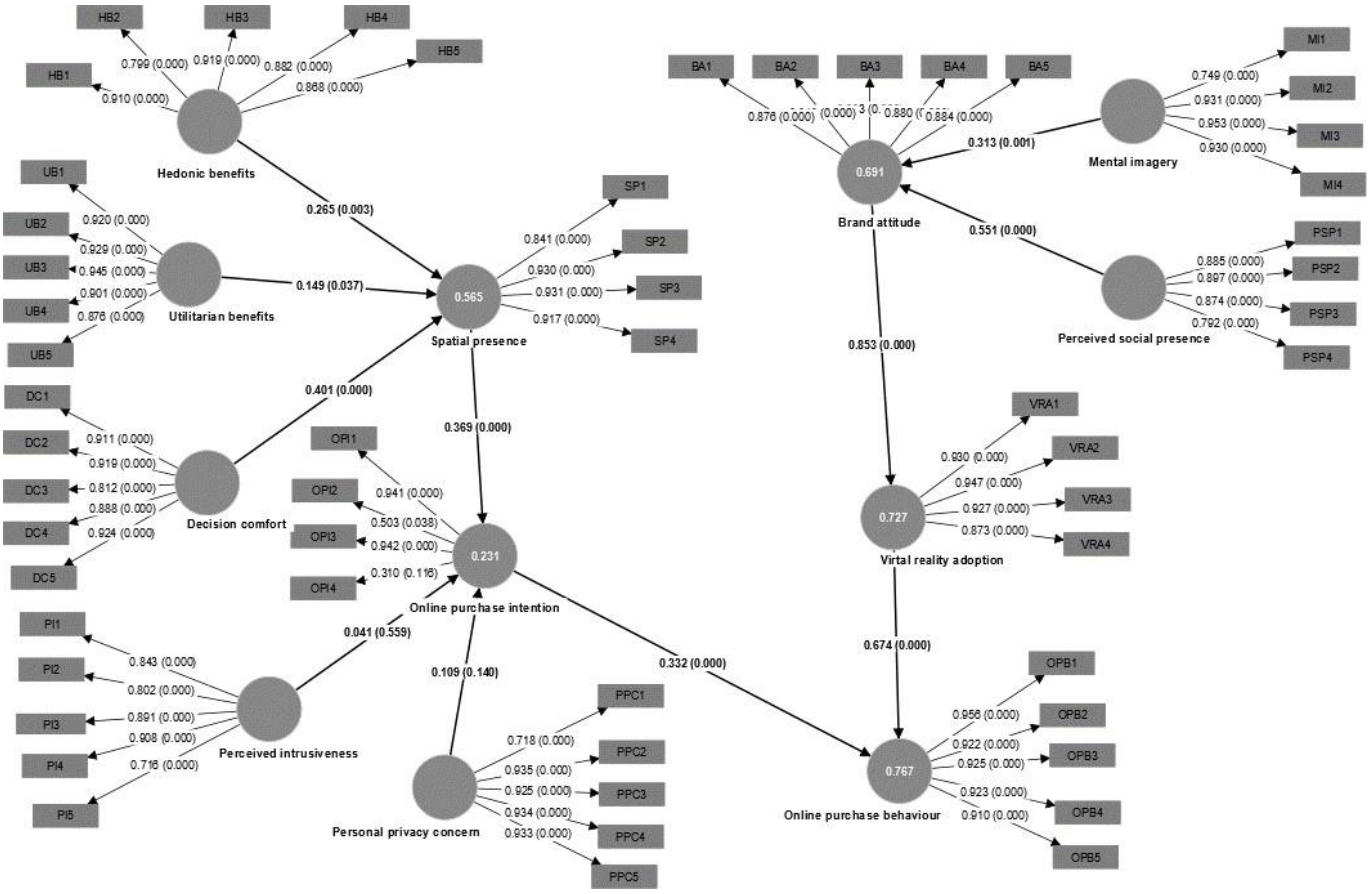
Table 5.9: Path coefficients and hypotheses results

Hypotheses	**Path**	**Path coefficient (β)**	**T-values**	**P-values**	**Decision**
H1	Hedonic benefits -> Spatial presence	0.265	3.004	0.003	Supported
H2	Utilitarian benefits -> Spatial presence	0.149	2.089	0.037	Supported
H3	Decision comfort -> Spatial presence	0.401	5.875	0.000	Supported
H4	Spatial presence -> Online purchase intention	0.369	4.917	0.000	Supported
H5	Perceived intrusiveness -> Online purchase intention	0.041	0.585	0.559	Not supported
H6	Personal privacy concerns -> Online purchase intention	0.109	1.475	0.140	Not supported

H7	Mental imagery -> Brand attitude	0.313	3.233	0.001	Supported
H8	Perceived social presence -> Brand attitude	0.551	5.821	0.000	Supported
H9	Brand attitude -> VR adoption	0.853	39.583	0.000	Supported
H10	VR adoption -> Online purchase behaviour	0.674	15.067	0.000	Supported
H11	Online purchase intention -> Online purchase behaviour	0.332	7.281	0.000	Supported

Source: Author

Figure 5.22: Path Model



Source Author

5.4.3: Discussion of relationships between constructs

5.4.3.1 Relationship between construct Hedonic benefits and spatial presence

As shown in Table 5.9, H1 is supported. Hedonic benefits statistically favourably influence spatial presence ($p = 0.003$, $\beta = 0.265$, $t = 3.004$). This indicates that when users perceive hedonic benefits, they are likelier to feel a higher spatial presence.

5.4.3.2 Relationship between construct Utilitarian benefits and spatial presence

As shown in table 5.9, H2 is supported; utilitarian benefits have a statistically significant relationship with spatial presence ($p = 0.037$, $\beta = 0.149$, $t = 2.089$); this implies that when users sense utilitarian benefits, they are more likely to feel a higher level of spatial presence.

5.4.3.3 Relationship between construct Decision comfort and spatial presence

As shown in Table 5.9, H3 is supported; decision comfort has a statistically significant relationship with spatial presence ($p = 0.000$, $\beta = 0.401$, $t = 5.875$). This suggests that when users feel at ease making decisions in a VR environment, they are likelier to experience a more significant spatial presence.

5.4.3.4 Relationship between construct spatial presence and online purchase intention

As shown in Table 5.9, H4 is supported; spatial presence has a statistically significant relationship with online purchase intention ($p = 0.000$, $\beta = 0.369$, $t = 4.917$). This means that users with a greater sense of spatial presence are likelier to make an online purchase.

5.4.3.5 Relationship between construct Perceived intrusiveness and Online purchase intention

As shown in Table 5.9, H5 is not supported; perceived intrusiveness has a statistically insignificant relationship with online purchase intention ($p = 0.559$,$\beta = 0.041$, $t = 0.585$). This indicates that perceived intrusiveness might have little effect on online purchase intent.

5.4.3.6 Relationship between construct Personal privacy concern and Online purchase intention

As shown in table 5.9, H6 is not supported. Personal privacy concerns have a statistically insignificant relationship with online purchase intention ($p = 0.140$, $\beta = 0.109$, $t = 1.475$). This indicates that personal privacy concerns might not affect online purchase intention.

5.4.3.7 Relationship between construct mental imagery and Brand attitude

As shown in table 5.9, H7 is supported. Mental imagery correlates statistically with brand attitude (p= 0.001, β = 0.313, t = 3.233). This suggests that users with more mental imagery are more inclined to have a favourable attitude toward the brand.

5.4.3.8 Relationship between construct Perceived social presence and Brand attitude.

As shown in Table 5.9, H8 is supported; perceived social presence has a statistically significant relationship with brand attitude (p = 0.000, β = 0.551, t = 5.821). This means that users with a more significant perceived social presence are more inclined to have a positive brand attitude.

5.4.3.9 Relationship between construct Brand attitude and VR adoption

As shown in Table 5.9, H9 is supported; VR adoption statistically correlates with online purchase behaviour (p = 0.000,β = 0.674, t = 15.067). This suggests that VR technology users are more inclined to make online purchases.

5.4.3.10 Relationship between construct VR adoption and Online purchase behaviour

As shown in table 5.9 H10 is supported, VR adoption has a statistically significant relationship with online purchase behaviour (p = 0.000,β = 0.674, t = 15.067). This suggests that users who useVR technology are more inclined to make online purchases.

5.4.3.11 Relationship between construct online purchase intention and Online purchase behaviour

As shown in Table 5.9, H11 is supported; online purchase intention has a statistically significant relationship with online purchase behaviour (p = 0.000,β = 0.332, t = 7.281), supporting H11. This finding is consistent with previous research that suggests that intentions are a strong predictor of behaviour. Therefore, it can be concluded that H11 is supported, and online retailers should focus on increasing online purchase intention to boost online purchase behaviour.

5.5 Conclusion

The chapter presents results from the data collected on online purchase behaviour using AR and VR technologies. The study includes descriptive statistics, reliability, and validity tests, model fit assessment using PLS-SEM, CFA, and hypotheses testing. Chapter 6 explains the research findings in depth, highlighting the significant predictors of online purchase behaviour in the furniture business.

Chapter 6: Discussions of Results, Implications (theoretical and practical contributions), Limitations, Recommendations and Conclusions

6.1 Introduction

Chapter 6 will thoroughly discuss the research findings on the factors influencing online purchase behaviour in the South African furniture industry using AR and VR. The chapter starts with a detailed analysis of the empirical goals met, followed by a discussion of the findings on the hypothesised Relationship and a detailed explanation of how furniture brands can use this factor. This chapter will also provide conclusions on the study objective and research problem. Then, suggestions will be made, including research contributions and the study's limitations.

6.2 Discussion on the achievement of empirical objectives

6.2.1 Research objective 1: To examine the impact of AR factors on spatial presence and online purchase intention

Some essential implications exist for furniture retailers leveraging AR technology to enhance the online customer experience and increase sales. By creating an immersive and realistic AR experience that promotes a sense of spatial presence, retailers can potentially increase the likelihood of customers developing an intention to purchase their products online. Furthermore, this finding suggests that retailers should focus on providing a more realistic and engaging AR experience to enhance spatial presence, as this can ultimately influence customers' online purchase intentions. Retailers should also consider providing more interactive and personalised AR experiences that allow customers to visualise and customise their furniture choices, enhancing the sense of spatial presence and increasing the likelihood of online purchases.

Consequently, the results of this investigation demonstrate that the existence of space significantly influences the inclination to purchase goods over the Internet within the furniture sector of South Africa when utilizing AR and VR technologies. This provides valuable insights for furniture retailers on strategically using AR technology to enhance the online customer experience and increase online sales by creating more immersive and engaging AR experiences that promote a greater sense of spatial presence.

Research objective 2: To determine the impact of VR factors on brand attitude and, ultimately, adoption of VR In order to determine the impact of VR factors on brand attitude and, eventually, the employment of VR technology in the furniture sector of South Africa, alongside its impact on online buying patterns, would be an additional aspect to consider. According to the findings in Table 5.7, brand attitude and VR adoption have a significant and positive impact on each other, with a T-statistic of 39.583 and p-values of 0.000, supporting the hypotheses related to these relationships. This suggests that a positive brand attitude can lead to a greater adoption of VR technology and vice versa.

These findings have important implications for furniture retailers leveraging VR technology to enhance the online customer experience and increase sales. By building a positive brand attitude through effective marketing and promotion of VR technology, retailers can increase the adoption of VR technology and subsequently increase online purchases. Furthermore, by providing an immersive and realistic VR experience, retailers can further enhance the adoption of VR technology and increase online purchases. The study's results emphasise the significant Relationship between brand attitude and VR adoption and the effect of VR adoption on online purchase behaviour in the South African furniture industry. This provides valuable insights for furniture retailers on strategically using VR technology to enhance the online customer experience and increase online sales by building a positive brand attitude and providing an immersive and engaging VR experience.

6.3 Discussion on the relationships

6.3.1 Discussion on the Relationship hedonic benefits and spatial Presence

Based on the results, the path coefficient of 0.263 and the statistically significant p-value of 0.004 indicate that the relationship between hedonic benefits and spatial presence is solid and reliable. Several studies have found a favourable correlation between hedonic benefits and spatial presence. (Koo, Kim, & Song, 2020; Lee, Park, & Chung, 2021). This finding suggests that businesses and marketers in the retail industry can leverage immersive technologies to enhance the consumer experience and drive sales. By creating engaging and enjoyable virtual environments, businesses

can increase the likelihood of consumers experiencing a sense of Presence and feeling more connected to their products or services. By incorporating hedonic elements such as gamification, storytelling, or personalisation, retailers can make these experiences more enjoyable and engaging for consumers, increasing the likelihood of a purchase. The growing interest in immersive technologies in the retail industry further supports the importance of this finding. Given the increasing use of AR and VR technologies, businesses are increasingly seeking ways to provide consumers with engaging and immersive experiences (Wünderlich et al., 2020). Marketers can create immersive experiences more likely to result in positive outcomes such as increased engagement, customer satisfaction, and loyalty by understanding the connection between hedonic benefits and spatial presence. This is supported further by Jie et al. (2021) and Bae and Kim (2020), who found that hedonic benefits positively impact spatial presence. Overall, the discovery of a positive relationship between hedonic benefits and spatial presence emphasises the ability of immersive technologies to create more effective and enjoyable customer experiences in the retail industry

6.3.2 Discussion on the Relationship Utilitarian benefits and Spatial presence

The research discovered a significant positive correlation between utilitarian benefits and spatial presence, with a path coefficient of 0.150 and a p-value of 0.038. According to Park and Kim (2021) and Wang and Sun (2020), there is a connection between utilitarian benefits and spatial presence in different VR applications. According to the research by Koo et al. (2020), a positive relationship exists between utilitarian benefits and spatial presence. Utilitarian benefits are the practical advantages customers can receive using a good or service, such as ease of use, effectiveness, and productivity. On the other hand, spatial presence alludes to the degree to which individuals feel present in a virtual environment. The research by Koo et al. (2020) looked at the effect of VR technology on online shopping behaviour and discovered that utilitarian benefits influenced spatial presence positively.

This indicates that customers who perceive higher utilitarian benefits from using VR technology while shopping online are likelier to feel a sense of presence in the virtual environment, which can influence their purchasing behaviour. This suggests that when users perceive utilitarian advantages

in a virtual world, they feel a sense of spatial presence. The discovery emphasises the significance of utilitarian benefits in increasing users' sense of presence in virtual environments, which has consequences for the design and development of such environments. Developers can improve users' experiences and sense of presence by focusing on providing practical and functional features, eventually leading to increased engagement and happiness. This suggests that designers of immersive environments should emphasise the environment's functionality and usefulness to improve the user's experience. For example, incorporating features such as simple navigation, clear product information, and search options can provide utilitarian advantages that can boost spatial presence (Wang et al., 2016).

6.3.3 Discussion of the relationship decision comfort and spatial presence

This research revealed a positive relationship between decision comfort and spatial presence, implying that when users feel at ease making decisions in the virtual environment, they are more likely to experience a more significant spatial presence. This result is pertinent to the study because it suggests that the degree of decision comfort can influence the user's sense of presence. According to a study by Lee and Kim (2021), there is a substantial beneficial association between decision comfort and spatial presence in online purchasing. Their empirical evidence supported this Relationship, which was statistically significant. This suggests that digital environment designers should prioritise giving users decision-making tools and information to improve their decision-making comfort. For example, allowing users to compare goods or read reviews can boost their decision-making confidence and, as a result, their sense of spatial presence (Alalwan et al., 2017).

6.3.4 Discuss the correlation between spatial presence and intention to purchase online.

The results of this investigation demonstrated a noteworthy affirmative association between spatial immersion and Internet buying inclination, indicating that individuals with heightened spatial immersion are inclined towards greater online purchase intention. This outcome is crucial to the inquiry since it indicates that boosting spatial immersion could increase purchase intentions. Hu et al. (2021) identification of the constructive impact of spatial immersion on online purchase intention corroborates previous research that has linked spatial immersion to internet buying conduct. Implying that creating a sense of presence and immersion through the use of AR and VR

technologies can lead to an increase in online purchase intention, as it enhances the customer's Engagement and involvement in the online shopping process. This implies that designers of immersive environments should focus on creating engaging and immersive experiences that can influence the user's purchase intentions. For example, incorporating interactive features such as 360-degree product views, virtual try-on features, and social sharing options can enhance users' spatial presence, resulting in their purchase intentions (Hsu et al., 2017).

6.3.5 Discussion of the Relationship perceived intrusiveness and online purchase intention

The insignificant association between perceived intrusiveness and online purchase intention indicates that perceived intrusiveness could affect online purchase intention. However, it is essential to note that though the Relationship might be insignificant, it is positive. The Relationship between perceived intrusiveness and online purchase intention may sometimes be complicated or consistent across studies. Some studies have found no significant relationship between these variables. For instance, Wang et al. (2021) found an insignificant positive relationship between perceived intrusiveness and online purchase intention, suggesting that perceived intrusiveness may have a minimal or negligible impact on purchase intentions. Thus, according to Wang et al. (2021), the negative impact on buying intention can be mitigated by providing relevant advertising that does not disrupt the consumer's online experience. Guo et al. (2019) found that marketers should offer consumers control over advertising to reduce perceived intrusiveness and enhance online purchase intention. This suggests that markers should balance personalisation and online perceived intrusiveness.

This result is pertinent to the research because it suggests that intrusive features, such as pop-up ads and automatic video playback, may sometimes harm users' purchase intentions. The mixed findings can be attributed to various factors, including the specific measures used to assess perceived intrusiveness and online purchase intention, the characteristics of the sample or context under investigation, and the presence of moderating variables. Different types of intrusive features or levels of intrusiveness may elicit varying responses from consumers, leading to inconsistent findings. As a result, additional research is required to corroborate these results and investigate the Relationship between perceived intrusiveness and online purchase intention in various contexts.

For example, providing users with options to opt out of intrusive features or allowing them to control the frequency of pop-up ads can enhance their user experience and in turn, their purchase intentions. This implies that designers of immersive environments should carefully consider the impact of intrusive features on the user's experience and take measures to minimize their adverse effects while still achieving their marketing objectives. This finding also emphasises the significance of considering multiple variables influencing online purchase intention rather than depending solely on one factor, such as perceived intrusiveness, to predict user behaviour.

6.3.6 Discussion of the Relationship between Online Purchase Intention and Personal Privacy Concerns

The Relationship between privacy concerns and online purchase intention is found to be insignificant but positive. This implies that while privacy concerns may not significantly impact online buying intention, there is still a positive association between the two variables. The finding that privacy concerns may not be a significant barrier to online purchase intention is essential in the context of user behaviour and decision-making. It suggests that privacy concerns may encourage users to engage in online purchases. However, it is crucial to recognise that privacy concerns can still influence users' online behaviours and experiences in other ways, such as demographic profiles. For instance, users may be more cautious about sharing personal information or engaging in social sharing activities due to privacy concerns (Yang & Jun, 2002). Therefore, immersive environment designers should consider privacy a necessary aspect and take appropriate measures to enhance users' trust and confidence in the privacy and security of their personal information.

One possible approach is to provide clear and transparent privacy policies that inform users about how their data will be collected, used, and protected (Kim et al., 2020). By promoting transparency and accountability, designers can help alleviate users' privacy concerns and foster trust in the online environment. Additionally, allowing users to have control over sharing their personal information can further enhance their trust and confidence. Giving users the ability to manage their privacy settings and decide what information they are comfortable sharing can empower them and address their privacy concerns (Kumar et al., 2016). Overall, while privacy concerns may not

significantly impact online purchase intention, they still shape users' behaviours and experiences. Designers should consider privacy as an essential factor in creating immersive environments and take measures to address users' privacy concerns, thus fostering a trustworthy and secure online experience.

6.3.7 Discussion of Relationship mental imagery and brand attitude

This study's findings revealed a positive connection between mental imagery and brand attitude, implying that users with a higher level of mental imagery are likelier to have a positive brand attitude. This finding is pertinent to the research because it shows that mental imagery can influence users' perceptions of brands and their attitudes toward them. This implies that immersive environment designers should concentrate on creating immersive experiences that stimulate mental imagery and improve the user's impression of the brand. For example, incorporating visual and sensory cues that elicit emotions and associations can improve mental imagery, resulting in the user's brand attitude (Kim & Lennon, 2015).

6.3.8 Discussion of Relationship perceived social presence and brand attitude

This study's findings revealed a positive relationship between perceived social presence and brand attitude, implying that users with a greater level of perceived social presence are more likely to have a positive brand attitude. This finding is relevant to the research because it shows that social presence could impact users' perceptions of brands and their attitudes toward them. This implies that immersive environment designers should concentrate on building immersive experiences that enhance social presence and foster community among users. For example, incorporating social sharing features, chat rooms, and interactive activities can boost perceived social presence and, as a result, the user's brand attitude (Hsu et al., 2018).

6.3.9 Discussion relationship brand attitude and VR adoption

This research revealed a positive association between brand attitude and VR adoption, implying that users with a positive brand attitude are more inclined to embrace VR technology. This finding

is relevant to the study as it indicates that brand attitude can influence the user's intention to adopt new technologies. This implies that designers of immersive environments should focus on creating immersive experiences that can enhance the user's brand attitude, increasing their intention to adopt VR technology. For example, incorporating immersive and engaging features that align with the brand's values and personality can enhance the user's brand attitude, resulting in their intention to adopt VR technology (Gao et al., 2020).

6.3.10 Discussion relationship VR adoption and online purchase behaviour

This study's findings revealed a favourable correlation between VR adoption and online purchase behaviour, implying that users who adopt VR technology are prone to participate in online purchase behaviour. This finding is relevant to the study as it indicates that VR technology can influence the user's online purchase behaviour. This implies that designers of immersive environments should focus on creating immersive experiences that can enhance the user's intention to purchase products or services online. For example, incorporating features such as virtual try-on options or immersive product demos can enhance the user's intention to purchase resulting in their online purchase behaviour (Liu et al., 2019).

6.3.11 Discussion relationship Online purchase intention and Online purchase behaviour

The findings of this study demonstrate a positive correlation between online purchase intention and actual online purchase behaviour. This suggests that individuals inclined to buy products or services online are likelier to engage in online purchase behaviour. This finding is significant as it highlights the predictive power of intention in the context of online purchases. To leverage these findings, designers of immersive environments should focus on creating engaging experiences that further enhance users' intention to make online purchases. For instance, incorporating persuasive elements like discounts, free trials, or limited time offers, as suggested by Pavlou and Fygenson (2006), can effectively enhance users' intention to purchase, ultimately translating into actual online purchase behaviour. By utilising such persuasive features, designers can motivate users and increase their likelihood of engaging in online purchases.

6.4 Conclusions

6.4.1 Conclusion on answering the research questions or solving the research problem

The study's findings shed light on the impact of augmented and virtual reality on online purchasing behaviour in the furniture business. The mediation table demonstrates that spatial presence, decision comfort, mental imagery, perceived social presence, and brand attitude all mediate the connection between AR and VR and online purchase behaviour. This implies that AR and VR can improve the user experience by creating immersive environments that stimulate these factors, increasing the user's intention to participate in online purchasing behaviour. The research discovered that hedonic benefits, utilitarian benefits, and decision comfort are all related to spatial presence, which is then related to online purchase behaviour. The research also discovered that mental imagery and perceived social presence are related to brand attitude and online purchase behaviour. Furthermore, the research discovered that brand attitude is related to VR adoption and online purchase behaviour. Overall, the findings suggest that AR and VR can influence online purchase behaviour within the furniture industry by enhancing the user's experience by creating immersive environments that stimulate factors such as spatial presence, decision comfort, mental imagery, perceived social presence, and brand attitude. By doing so, AR and VR can increase the user's intention to engage in online purchase behaviour, which can ultimately drive business success in the furniture industry.

Chapter 7: Conclusions and Recommendation

7.1 Introduction

This chapter serves as the research project's capstone, combining the study's key findings and emphasising the consequences for theory, practice, and future research. The conclusions reached in this chapter are based on carefully examining the data gathered, the literature reviewed, and the research techniques used. The suggestions in this chapter are intended to help practitioners and policymakers use the study's findings to better organisational and social outcomes. This chapter also identifies the study's limitations and makes recommendations for future research, emphasising opportunities for advancing knowledge in the field. This chapter provides a thorough and insightful account of the research project, providing valuable insights for scholars, policymakers, and practitioners.

7.2 Key Findings of the study

The study found that focusing on decision comfort, hedonic benefits, mental imagery, online purchase behaviour, perceived social presence, spatial presence, utilitarian benefits, and virtual reality adoption can help furniture brands improve online presence and attract more customers from offline to online stores. Another key finding of the study indicates that perceived intrusiveness and personal privacy concerns have an insignificant positive influence on online purchase intention. This means that while these factors may have some impact on online purchase intention, their effects are not statistically significant. To adapt this finding to online shopping, marketers can focus on minimising perceived intrusiveness and addressing privacy concerns to create a more favourable online shopping experience. They can achieve this by providing transparent and easily accessible privacy policies, giving users control over their personal information, and minimising intrusive features in the online environment. By prioritising user privacy and reducing perceived intrusiveness, marketers can build trust, enhance the user experience, and ultimately increase online purchase intention among consumers.

By the study the findings of this research can be applied to other retail industries besides the

furniture industry, benefiting the entire retail industry. The suggestions given in this chapter can guide marketers, brands, and policymakers in leveraging the study's insights to better organisational and social outcomes. This chapter provides a thorough and insightful account of the research project, providing valuable insights for researchers, practitioners, and policymakers.

7.3 Conclusion on achieving the research question.

The research question of this study was to investigate the degree to which AR and VR influence online purchase behaviour within the furniture business. The study employed a quantitative approach and collected data from 400 respondents through an online survey. The data was processed through PLS-SEM to assess the relationships between the constructs. The study sought to investigate the impact of augmented and virtual reality on online purchasing behaviour in the furniture business. The analysis revealed that AR and VR significantly impact online purchasing behaviour, supporting the research question. The study's findings indicate that combining AR and VR significantly impacts online purchase behaviour in the furniture business. Brand attitude, decision comfort, hedonic benefits, mental imagery, perceived intrusiveness, personal privacy concern, perceived social presence, spatial presence, utilitarian benefits, and virtual reality adoption significantly influenced online purchase behaviour. These constructs were positively associated with online purchasing behaviour, suggesting they are essential in influencing customers' purchasing choices.

The study also discovered that AR and VR technologies can significantly improve customers' purchase intention and brand attitude. This implies that marketers and furniture companies can use AR and VR technologies to improve the consumer experience and encourage online purchases. Finally, the study's results shed light on the potential of AR and VR technologies to improve the online consumer journey for furniture stores. The study's findings can help furniture companies improve their online presence and draw more customers from physical stores to online stores. The research findings can also be applied to retail sectors other than the furniture industry, benefiting the entire retail industry. The research adds to the marketing literature by providing empirical evidence of the impact of AR and VR technologies on online purchase behaviour in the furniture business.

7.4 Recommendations

7.4.1 Recommendation for Conclusion 1: Conclusion on answering the research questions or solving the research problem

According to the study, South African furniture stores should integrate AR and VR technology into their online platforms to provide users with a more immersive and engaging experience. Retailers can collaborate with AR and VR technology providers to design effective AR and VR features that enhance the online customer experience and improve customer satisfaction. Personalised marketing strategies that cater to specific customer segments can be developed to drive online purchase behaviour based on customers' demographics, interests, and behaviour. Enhancing customer support by providing prompt and efficient responses to customer queries and concerns can build customer trust and confidence in the platform. Retailers should continuously monitor and evaluate the effectiveness of AR and VR features in driving online purchase behaviour, analysing customer behaviour and feedback to optimize their AR and VR features. By addressing concerns related to perceived intrusiveness and personal privacy concerns, retailers can improve users' experience in immersive environments, ultimately boosting online purchase behaviour. Implementing these recommendations can help South African furniture retailers gain a competitive advantage in the industry and increase business success.

7.2.2 Recommendation for conclusion 2: Conclusion on achieving the study's objective.

In conclusion, this study aimed to examine the impact of AR factors on spatial presence and online purchase intention and determine the impact of VR factors on brand attitude and the adoption of VR technology. The findings provide valuable insights for retailers in the South African furniture industry looking to leverage AR and VR technology to enhance the online customer experience and drive online purchases. To achieve the study's objectives, retailers should conduct market research and analyse customer behaviour, interests, and demographics. This information can guide the design of effective AR and VR features that align with customers' needs and preferences. Creating immersive environments with 360-degree product views, virtual try-on options, and interactive product demos can significantly enhance the online customer experience and positively impact purchase behaviour.

Additionally, retailers should consider demographic factors and strive to provide excellent customer support to improve overall customer satisfaction. By continuously monitoring and evaluating the effectiveness of AR and VR features, retailers can optimize their implementation, ensuring they align with customer preferences and enhance the online customer experience. By adopting these recommendations, South African furniture industry retailers can leverage AR and VR technology to create engaging and personalized online experiences that drive online purchase behaviour and increase customer satisfaction.

7.5 Contributions of the Study

7.5.1 Theoretical contributions

Another study contributes to using PLS-SEM to analyse the factors influencing AR and VR adoption, particularly in the context of online purchase behaviour. The research supported Several hypotheses, including the significant effects of spatial presence, utilitarian benefits, mental imagery, brand attitude, perceived social presence, and hedonic benefits on online purchase behaviour. These results are helpful for marketers and retailers looking to increase the adoption and utilization of AR and VR technologies in their online sales channels.

7.5.2 Practical contributions

The practical contributions of this study include providing insights into the factors that influence online purchase behaviour using AR and VR technology in the South African furniture industry. Retailers can use the findings to design immersive environments that enhance users' experience and increase the adoption of VR technology, leading to increased online purchase behaviour. The study's findings can also help retailers tailor their immersive environments to specific user groups based on demographic factors. Furthermore, the study recommends reducing the adverse effects of perceived intrusiveness and personal privacy concerns on online purchase behaviour and developing brand attitudes and confidence to increase VR adoption and online purchase behaviour. Overall, the study's practical contributions can help South African furniture merchants optimize their online platforms by leveraging AR and VR technology to drive online purchase behaviour,

which is critical for business success in today's digital age.

7.6 Limitations of the study and suggestions for future studies

The limitation of the study is that the theoretical framework used may need to fully capture the complexity of the Relationship between AR and VR technology and online purchase behaviour in the South African furniture industry. The researcher attempted to address some constructs with a high correlation, but the model still needed improvement. This suggests that other factors or variables that could have influenced the results should have been considered in the study. To address this limitation, future research can explore alternative models or investigate other factors contributing to online purchase behaviour, such as social influence, trust, and personalisation, while the study provides valuable insights. Additional study is required to completely comprehend the complex Relationship between AR and VR technology and online purchasing behaviour. The study's practical implications are based on the assumption that South African furniture retailers have the resources and capabilities to implement AR and VR technology into their online platforms. However, this may only be true for some retailers, particularly smaller ones with limited resources. Therefore, the study's practical implications may only apply to some furniture retailers in the South African market. Future research can resolve the current study's limitations by investigating the feasibility of incorporating AR and VR technology into web platforms for smaller furniture retailers in South Africa. Additionally, future studies can extend the research to other industries and countries to investigate the generalisability of the findings.

7.8 Concluding remarks

Finally, this research aimed to investigate the impact of AR and VR technologies on online purchasing behaviour in the South African furniture business. The study found positive relationships between various constructs, including hedonic and utilitarian benefits, decision comfort, spatial presence, mental imagery, perceived social presence, brand attitude, VR adoption, online purchase intention, and online purchase behaviour. The results suggest that AR and VR technologies can enhance users' experience and increase their intention to adopt new technologies, engage in online purchase behaviour, and ultimately drive business success in the furniture industry. The study also found that perceived intrusiveness and personal privacy concerns may not

have a significant impact on online purchase behaviour, suggesting that designers of immersive environments should carefully consider the impact of intrusive features and take measures to enhance users' trust and confidence in the privacy and security of their personal information. Overall, this research offers valuable insights into the factors that impact users' experiences in immersive environments and their online purchasing behaviour in the furniture industry.

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APPENDIX A: Participation information letter

Questionnaire ID

Participant Information Sheet

Dear Sir/Madam

My name is Mulalo Lusani Mankhili, MCOM student at the University of the Witwatersrand Johannesburg. My supervisor is Dr Melissa Zulu. I am conducting a research study titled, "**Investigating factors that influence online purchase behaviour using augmented and virtual reality in the furniture industry".** The study specifically focuses on the customer online purchase behaviour in the furniture industry using Augmented Reality (AR) and Virtual Reality (VR). This study will provide furniture brands with insight on how AR and VR can influence online purchase behaviour for furniture. AR and VR technologies allow customers to interact, move and place furniture items in their homes to see how it would fit and look before purchasing.

I am inviting you to take part in answering a questionnaire. If you decide to take part, your participation in this research study will only take about 10-15 minutes to complete. Your participation is voluntary, and no risk is associated with your participation. You are welcome to withdraw from this questionnaire at any time. Your participation is confidential and anonymous and therefore no personal information is required. By completing and submitting this online survey, it would be taken as consent to participate. The anonymised data may be provided to other researchers for future research.

Should you have any questions you are free to contact Mulalo Lusani Mankhili. My supervisor, Dr Melissa Zulu, will also be available for any concerns regarding the study or questionnaire. Ethical clearance with reference number: **H22/10/16** has been obtained to conductthis study. This

research study will be written up as a thesis and a publication. The report will be

available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0)117171408, email: hrecnon-medical@wits.ac.za

Yours Sincerely

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APPENDIX B: Questionnaire

Questionnaire

Please indicate your answer by crossing (x) to the appropriate block.

I agree to participate in this study and have my responses used for research purposes.

Yes	1	No	2

Screening Question:

Do you purchase products online (using a smartphone, computer, laptop, tablet etc.) in South Africa? If yes, please continue with completing the questionnaire and if not, please discontinue participation.

Yes	1	No	2

Please note that the questions below will be seeking your responses regarding the combination of Augmented Reality (AR) and Virtual Reality (VR). **Augmented reality (AR) is an improved version of the physical world reached through the use of digital visual elements through the use of Cellphones, Tablet and many more.**

https://www.youtube.com/watch?v=8_yXEluXLbU



Virtual reality (VR) is the term used to describe a three-dimensional, computer-generated environment which can be explored and interacted with.

https://www.youtube.com/watch?v=Zd7ZWgVqslo&t=27s



Which of the following Augmented Reality (AR) Apps have you experienced or know about?

AR effects on Snapchat	
iScape for visualising landscape design ideas	
Minecraft Earth	
Pokémon Go	
Dulux visualiser	
Augmented Reality in fashion and beauty (i.e., Woolworths Virtual Try-On)	
Other (Please specify)	

Which of the following Virtual Reality (VR) Apps have you experienced or know about?

InCell VR	
Jaunt VR	
VRSE	
Orbulus	
Jaunt VR	
YouTube	
Google Cardboard	
Other, please specify	

S**ection A: Demographic Information** (used for statistical purposes only)

Please mark with an **(x)** in the appropriate box.

A1. Gender

Male	Female	Prefer not to say
1	2	3

A2. Age

18-20	21-30	31-40	41-50	51+	Prefer not to say
1	2	3	4	5	6

A3. Occupational status:

Student	Employed	Unemployed	Self-Employed
1	2	3	4

A4. Please indicate your highest qualification

High School	Diploma	Degree	Postgraduate degree	Other
1	2	3	4	5

If other, please specify_____

A5. Monthly income

<R1000	R1000-R5000	R5000-R10 000	>R10 000	Prefer not to say
1	2	3	4	5

A6. How often do you purchase online?

At least once a week	At least once or twice a month	At least once or twice every six months	At least twice or four times (and more) a year	My online shopping pattern varies based on my needs or availability of products
1	2	3	4	5

A7. Which products do you purchase online?

Furniture and Homeware	Groceries	Clothes	Beauty Products	Electronics	Medicine	Other
1	2	3	4	5	6	7

If other, please specify_____

A8. Which of the following Furniture and Homeware brands are your favourites or buy from the most?

@Home	Mr Price Home	Coricraft	Cielo	Others
1	2	3	4	5

If other, please specify_____

Section B: Experiential factors

If you have not used an Augmented Reality and Virtual Reality app before, imagine a South African Augmented Reality and Virtual App for Furniture and Homeware that lets you imagine how the furniture will look, and fit in your home without setting foot in store.

Hedonic benefits		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
HB1	The furniture online shopping experience using AR would/does make me feel good.	1	2	3	4	5
HB2	The Furniture online shopping experience using AR is/would be entertaining.	1	2	3	4	5
HB3	The furniture online shopping experience with AR is/would be exciting.	1	2	3	4	5

HB4	The Furniture online shopping experience with using AR app is/would be enjoyable.	1	2	3	4	5
HB5	The Furniture online shopping experience using AR is/would be user friendly.	1	2	3	4	5

Utilitarian benefits		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
UB1	Using AR app would improve me performance in evaluating the furniture during online shopping.	1	2	3	4	5
UB2	I find AR app to be useful for online shopping for Furniture.	1	2	3	4	5
UB3	Using AR app would enhance my effectiveness in shopping for furniture online.	1	2	3	4	5
UB4	Using AR app to buy furniture online would give me more convenience.	1	2	3	4	5
UB5	Using AR app to buy furniture online would make me feel comfortable.	1	2	3	4	5

Decision comfort	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

DC1	I am comfortable with choosing an AR app to buy furniture online.	1	2	3	4	5
DC2	I feel good about choosing an AR app to buy furniture online.	1	2	3	4	5
DC3	I am experiencing positive emotions about choosing an AR app to buy furniture online.	1	2	3	4	5
DC4	Whether or not it is the best choice, I am okay with choosing an AR app to buy furniture online.	1	2	3	4	5
DC5	Although I do not know if an AR app is the best, I would feel perfectly comfortable with the choice I would have made.	1	2	3	4	5

Spatial presence		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SP1	Trying furniture using the AR app would be similar to experiencing the products in reality	1	2	3	4	5
SP2	Trying furniture using the AR app would feel like it would in reality.	1	2	3	4	5
SP3	Trying furniture using the AR app would seem real rather than virtual.	1	2	3	4	5

SP4	Trying furniture using the AR app would be as realistic to me as in the real world.	1	2	3	4	5

Perceived intrusiveness		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
PI1	Trying furniture using AR app is/would be disturbing.	1	2	3	4	5
PI2	Trying furniture using AR app is/would be interfering.	1	2	3	4	5
PI3	Trying furniture using AR app is/would be intrusive.	1	2	3	4	5
PI4	Trying furniture using AR app is/would be unpleasant.	1	2	3	4	5
PI5	Trying furniture using AR app is/would be invasive.	1	2	3	4	5

Personal privacy concerns		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
PPC1	I think the furniture AR app would collect too much information about me.	1	2	3	4	5
PPC2	I would be concerned about my privacy when using the furniture AR app.	1	2	3	4	5

PPC3	I would have doubts as to how well my privacy is protected while using the furniture AR app.	1	2	3	4	5
PPC4	My personal information would be misused while using the furniture AR app.	1	2	3	4	5
PPC5	My personal information wouldbe accessed by unknown parties when using the furniture AR app in my everyday life.	1	2	3	4	5

Online Purchase intention		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OPI1	Should the opportunity arise, I intend to purchase furniture online using the AR app.	1	2	3	4	5
OPI2	I would consider using AR apps as one of my first choices to check the furniture I want to purchase online.	1	2	3	4	5
OPI3	I am likely to transact with a furniture store using the AR app.	1	2	3	4	5
OPI4	I intend to buy furniture online using AR app in the future.	1	2	3	4	5

Mental imagery		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MI1	I think a VR experience brings to mind concrete images or mental pictures.	1	2	3	4	5
MI2	I think a VR app demonstrates product information vividly.	1	2	3	4	5
MI3	I think a VR app would include features to help me visualise the furniture.	1	2	3	4	5
MI4	I think a VR app would provide features to help me imagine using the furniture.	1	2	3	4	5

Perceived Social Presence		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
PSP1	There is/would be a sense of human warmth in the VR app.	1	2	3	4	5
PSP2	There is/would be a sense of sociability in the VR app.	1	2	3	4	5

PSP3	I believe there is/would be a sense of human contact in the VR app.	1	2	3	4	5
PSP4	I believe there is/wouldbe a sense of personalness in the VR app.	1	2	3	4	5

Brand attitude		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
BA1	Using VR app to buy from furniture stores is/would be favourable.	1	2	3	4	5
BA2	Using VR app to buy from furniture stores is/would be desirable.	1	2	3	4	5
BA3	Using VR app to buy from furniture stores is/would be reliable.	1	2	3	4	5
BA4	Using VR app to buy from furniture stores is/would be good.	1	2	3	4	5
BA5	My attitude towards using VR app to buy from furniture stores is/ would be positive.	1	2	3	4	5

VR Adoption		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
VRA1	I would use AR apps immediately if available to buy furniture.	1	2	3	4	5
VRA2	I would adopt VR apps to buy furniture.	1	2	3	4	5
VRA3	I plan to increase my adoption of VR apps in the future.	1	2	3	4	5
VRA4	I will make an effort to use VR apps in the future.	1	2	3	4	5

Online Purchase Behaviour		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OPB1	The likelihood that I would buy furniture during a VR shopping experience is very high.	1	2	3	4	5
OPB2	The likelihood that I would buy furniture after a VR shopping experience in the next 6 months is very high.	1	2	3	4	5
OPB3	The likelihood that I would buy furniture after a VR shopping experience in the next year very is high.	1	2	3	4	5
OPB4	My willingness to buy	1	2	3	4	5

	furniture during a VR shopping experience is very high.					
OPB5	The probability that I would consider buying furniture after a VR shopping experience is very high.	1	2	3	4	5

**********Thank you for participating in our questionnaire. *********

APPENDIX C: Ethical clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Mankhili

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H22/10/16**
PROJECT TITLE	Investigating factors that influence online purchase behaviour using augmented and virtual reality in the furniture industry
INVESTIGATOR(S)	Miss M Mankhili
SCHOOL/DEPARTMENT	School of Economics and Business Science/
DATE CONSIDERED	21 October 2022
DECISION OF THE COMMITTEE	Approved Risk Level: Minimal
EXPIRY DATE	15 November 2025

DATE 16 November 2022 **CHAIRPERSON** _____
(Professor J Watermeyer)

cc: Supervisor : Dr M Zulu

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. **I agree to completion of a regular progress report. For Minimal and Low studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.**

_____ 16 / 11 / 2022
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX D: Common Method Variance (CMV)

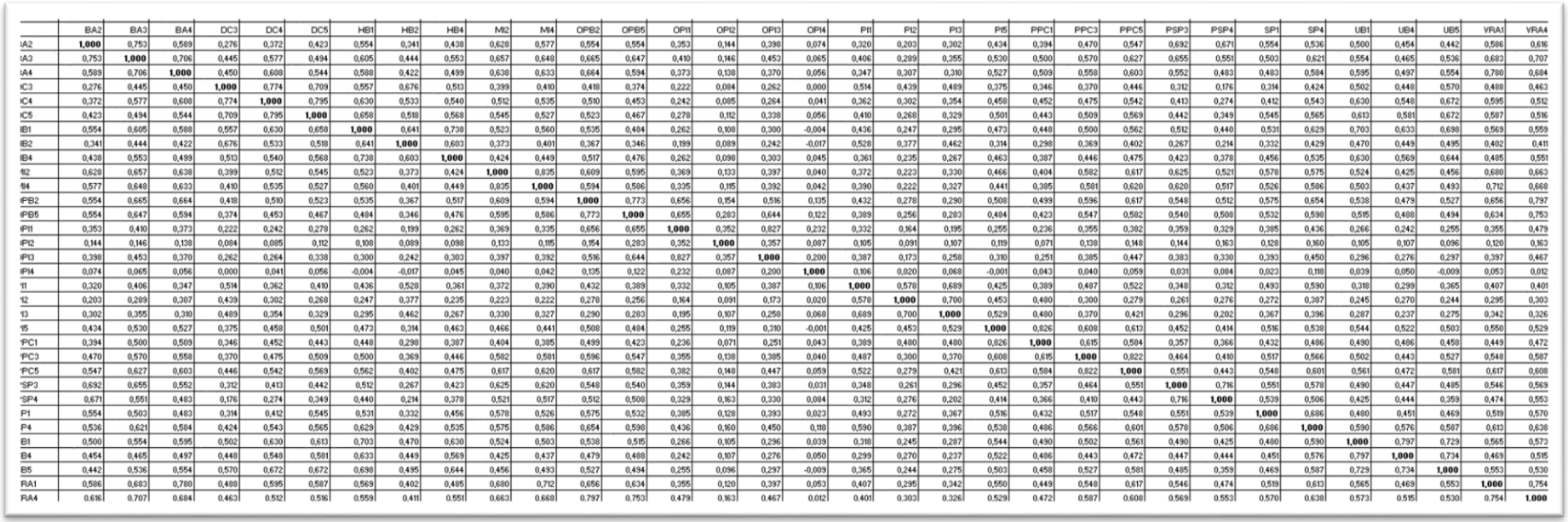
	BA	DC	HB	MI	OPB	OPI	PI	PPC	PSP	SP	UB	VRA
BA												1
DC										2.755		
HB										3		
MI	3.452											
OPB												
OPI					1.258							
PI						1.862						
PPC						2.264						
PSP	3.452											
SP						2.219						
UB										3.081		
VRA					1.258							

APPENDIX E: Kurtosis and Skewness values

	Excess kurtosis	Skewness
BA1	3,642	-0,889
BA2	4,951	-0,975
BA3	2,873	0,709
BA4	3,883	-0,458
BA5	3,598	0,059
DC1	5,417	-1,09
DC2	3,497	-0,12
DC3	18,709	-3,075
DC4	3,72	-0,008
DC5	6,806	0,689
HB1	5,693	0,123
HB2	14,165	-2,644
HB3	5,312	0,216
HB4	3,475	-0,525
HB5	13,379	-2,139
MI1	5,396	-1,452
MI2	6,214	-1,198
MI3	6,376	-0,349
MI4	13,329	-1,414
OPB1	7,909	0,766
OPB2	7,695	-1,331
OPB3	8,871	-1,851
OPB4	9,893	1,374
OPB5	14,7	0,428
OPI1	24,575	-2,89
OPI2	456,503	20,513

OPI3	30,882	-1,331
OPI4	432,157	19,679
PI1	4,373	0,477
PI2	3,934	-1,318
PI3	2,554	0,002
PI4	3,063	0,674
PI5	5,768	1,415
PPC1	4,105	-1,267
PPC2	5,974	-0,145
PPC3	9,899	-1,617
PPC4	6,259	0,545
PPC5	6,759	-0,504
PSP	3,011	0,57
PSP2	1,545	0,453
PSP3	2,131	-0,568
PSP4	2,178	-0,545
UB1	5,786	0,927
UB2	4,197	-0,357
UB3	5,848	-0,221
UB4	4,998	-1,179
UB5	13,09	-1,077
VRA1	4,625	-0,28
VRA2	6,88	-0,093
VRA3	9,475	0,794
VRA4	5,993	-0,821

APPENDIX F: Indicator loadings (Correlation)



	BA2	BA3	BA4	DC3	DC4	DC5	HB1	HB2	HB4	MI2	MI4	OPB2	OPB5	OPI1	OPI2	OPI3	OPI4	PI1	PI2	PI3	PI5	PPC1	PPC3	PPC5	PSP3	PSP4	SP1	SP4	UB1	UB4	UB5	VRA1	VRA4
IA2	**1,000**	0,753	0,589	0,276	0,372	0,423	0,554	0,341	0,438	0,628	0,577	0,554	0,554	0,353	0,144	0,398	0,074	0,320	0,203	0,302	0,434	0,394	0,470	0,547	0,692	0,671	0,554	0,536	0,500	0,454	0,442	0,586	0,616
IA3	0,753	**1,000**	0,706	0,445	0,577	0,494	0,605	0,444	0,553	0,657	0,648	0,665	0,647	0,410	0,146	0,453	0,065	0,406	0,289	0,355	0,530	0,500	0,570	0,627	0,655	0,551	0,503	0,621	0,554	0,465	0,536	0,683	0,707
IA4	0,589	0,706	**1,000**	0,450	0,608	0,544	0,588	0,422	0,499	0,638	0,633	0,664	0,594	0,373	0,138	0,370	0,056	0,347	0,307	0,310	0,527	0,509	0,558	0,603	0,552	0,483	0,483	0,584	0,595	0,497	0,554	0,780	0,684
IC3	0,276	0,445	0,450	**1,000**	0,774	0,709	0,557	0,676	0,513	0,399	0,410	0,418	0,374	0,222	0,084	0,262	0,000	0,514	0,439	0,489	0,375	0,346	0,370	0,446	0,312	0,176	0,314	0,424	0,502	0,448	0,570	0,488	0,463
IC4	0,372	0,577	0,608	0,774	**1,000**	0,795	0,630	0,533	0,540	0,512	0,535	0,510	0,453	0,242	0,085	0,264	0,041	0,362	0,302	0,354	0,458	0,452	0,475	0,542	0,413	0,274	0,412	0,543	0,630	0,548	0,672	0,595	0,512
IC5	0,423	0,494	0,544	0,709	0,795	**1,000**	0,658	0,518	0,568	0,545	0,527	0,523	0,467	0,278	0,112	0,338	0,056	0,410	0,268	0,329	0,501	0,443	0,509	0,569	0,442	0,349	0,545	0,565	0,613	0,581	0,672	0,587	0,516
IB1	0,554	0,605	0,588	0,557	0,630	0,658	**1,000**	0,641	0,738	0,523	0,560	0,535	0,484	0,262	0,108	0,300	-0,004	0,436	0,247	0,295	0,473	0,448	0,500	0,562	0,512	0,440	0,531	0,629	0,703	0,633	0,698	0,569	0,559
IB2	0,341	0,444	0,422	0,676	0,533	0,518	0,641	**1,000**	0,603	0,373	0,401	0,367	0,346	0,199	0,089	0,242	-0,017	0,528	0,377	0,462	0,314	0,298	0,369	0,402	0,267	0,214	0,332	0,429	0,470	0,449	0,495	0,402	0,411
IB4	0,438	0,553	0,499	0,513	0,540	0,568	0,738	0,603	**1,000**	0,424	0,449	0,517	0,476	0,262	0,098	0,303	0,045	0,361	0,235	0,267	0,463	0,387	0,446	0,475	0,423	0,378	0,456	0,535	0,630	0,569	0,644	0,485	0,551
MI2	0,628	0,657	0,638	0,399	0,512	0,545	0,523	0,373	0,424	**1,000**	0,835	0,609	0,595	0,369	0,133	0,397	0,040	0,372	0,223	0,330	0,466	0,404	0,582	0,617	0,625	0,521	0,578	0,575	0,524	0,425	0,456	0,680	0,663
MI4	0,577	0,648	0,633	0,410	0,535	0,527	0,560	0,401	0,449	0,835	**1,000**	0,594	0,586	0,335	0,115	0,392	0,042	0,390	0,222	0,327	0,441	0,385	0,581	0,620	0,620	0,517	0,526	0,586	0,503	0,437	0,493	0,712	0,668
OPB2	0,554	0,665	0,664	0,418	0,510	0,523	0,535	0,367	0,517	0,609	0,594	**1,000**	0,773	0,656	0,154	0,516	0,135	0,432	0,278	0,290	0,508	0,499	0,596	0,617	0,548	0,512	0,575	0,654	0,538	0,479	0,527	0,656	0,797
OPB5	0,554	0,647	0,594	0,374	0,453	0,467	0,484	0,346	0,476	0,595	0,586	0,773	**1,000**	0,655	0,283	0,644	0,122	0,389	0,256	0,283	0,484	0,423	0,547	0,582	0,540	0,508	0,532	0,598	0,515	0,488	0,494	0,634	0,753
OPI1	0,353	0,410	0,373	0,222	0,242	0,278	0,262	0,199	0,262	0,369	0,335	0,656	0,655	**1,000**	0,352	0,827	0,232	0,332	0,164	0,195	0,255	0,236	0,355	0,382	0,359	0,329	0,385	0,436	0,266	0,242	0,255	0,355	0,479
OPI2	0,144	0,146	0,138	0,084	0,085	0,112	0,108	0,089	0,098	0,133	0,115	0,154	0,283	0,352	**1,000**	0,357	0,087	0,105	0,091	0,107	0,119	0,071	0,138	0,148	0,144	0,163	0,128	0,160	0,105	0,107	0,096	0,120	0,163
OPI3	0,398	0,453	0,370	0,262	0,264	0,338	0,300	0,242	0,303	0,397	0,392	0,516	0,644	0,827	0,357	**1,000**	0,200	0,387	0,173	0,258	0,310	0,251	0,385	0,447	0,383	0,330	0,393	0,450	0,296	0,276	0,297	0,397	0,467
OPI4	0,074	0,065	0,056	0,000	0,041	0,056	-0,004	-0,017	0,045	0,040	0,042	0,135	0,122	0,232	0,087	0,200	**1,000**	0,106	0,020	0,068	-0,001	0,043	0,040	0,059	0,031	0,084	0,023	0,118	0,039	0,050	-0,009	0,053	0,012
PI1	0,320	0,406	0,347	0,514	0,362	0,410	0,436	0,528	0,361	0,372	0,390	0,432	0,389	0,332	0,105	0,387	0,106	**1,000**	0,578	0,689	0,425	0,389	0,497	0,522	0,348	0,312	0,493	0,590	0,318	0,299	0,365	0,407	0,401
PI2	0,203	0,289	0,307	0,439	0,302	0,268	0,247	0,377	0,235	0,223	0,222	0,278	0,256	0,164	0,091	0,173	0,020	0,578	**1,000**	0,700	0,453	0,480	0,300	0,279	0,261	0,276	0,272	0,387	0,245	0,270	0,244	0,295	0,303
PI3	0,302	0,355	0,310	0,489	0,354	0,329	0,295	0,462	0,267	0,330	0,327	0,290	0,283	0,195	0,107	0,258	0,068	0,689	0,700	**1,000**	0,529	0,480	0,370	0,421	0,296	0,202	0,367	0,396	0,287	0,237	0,275	0,342	0,326
PI5	0,434	0,530	0,527	0,375	0,458	0,501	0,473	0,314	0,463	0,466	0,441	0,508	0,484	0,255	0,119	0,310	-0,001	0,425	0,453	0,529	**1,000**	0,826	0,608	0,613	0,452	0,414	0,516	0,538	0,544	0,522	0,503	0,550	0,529
PPC1	0,394	0,500	0,509	0,346	0,452	0,443	0,448	0,298	0,387	0,404	0,385	0,499	0,423	0,236	0,071	0,251	0,043	0,389	0,480	0,480	0,826	**1,000**	0,615	0,584	0,357	0,366	0,432	0,486	0,490	0,486	0,458	0,449	0,472
PPC3	0,470	0,570	0,558	0,370	0,475	0,509	0,500	0,369	0,446	0,582	0,581	0,596	0,547	0,355	0,138	0,385	0,040	0,487	0,300	0,370	0,608	0,615	**1,000**	0,822	0,464	0,410	0,517	0,566	0,502	0,443	0,527	0,548	0,587
PPC5	0,547	0,627	0,603	0,446	0,542	0,569	0,562	0,402	0,475	0,617	0,620	0,617	0,582	0,382	0,148	0,447	0,059	0,522	0,279	0,421	0,613	0,584	0,822	**1,000**	0,551	0,443	0,548	0,601	0,561	0,472	0,581	0,617	0,608
PSP3	0,692	0,655	0,552	0,312	0,413	0,442	0,512	0,267	0,423	0,625	0,620	0,548	0,540	0,359	0,144	0,383	0,031	0,348	0,261	0,296	0,452	0,357	0,464	0,551	**1,000**	0,716	0,551	0,578	0,490	0,447	0,485	0,546	0,569
PSP4	0,671	0,551	0,483	0,176	0,274	0,349	0,440	0,214	0,378	0,521	0,517	0,512	0,508	0,329	0,163	0,330	0,084	0,312	0,276	0,202	0,414	0,366	0,410	0,443	0,716	**1,000**	0,539	0,506	0,425	0,444	0,359	0,474	0,553
SP1	0,554	0,503	0,483	0,314	0,412	0,545	0,531	0,332	0,456	0,578	0,526	0,575	0,532	0,385	0,128	0,393	0,023	0,493	0,272	0,367	0,516	0,432	0,517	0,548	0,551	0,539	**1,000**	0,686	0,480	0,451	0,469	0,519	0,570
SP4	0,536	0,621	0,584	0,424	0,543	0,565	0,629	0,429	0,535	0,575	0,586	0,654	0,598	0,436	0,160	0,450	0,118	0,590	0,387	0,396	0,538	0,486	0,566	0,601	0,578	0,506	0,686	**1,000**	0,590	0,576	0,587	0,613	0,638
UB1	0,500	0,554	0,595	0,502	0,630	0,613	0,703	0,470	0,630	0,524	0,503	0,538	0,515	0,266	0,105	0,296	0,039	0,318	0,245	0,287	0,544	0,490	0,502	0,561	0,490	0,425	0,480	0,590	**1,000**	0,797	0,729	0,565	0,573
UB4	0,454	0,465	0,497	0,448	0,548	0,581	0,633	0,449	0,569	0,425	0,437	0,479	0,488	0,242	0,107	0,276	0,050	0,299	0,270	0,237	0,522	0,486	0,443	0,472	0,447	0,444	0,451	0,576	0,797	**1,000**	0,734	0,469	0,515
UB5	0,442	0,536	0,554	0,570	0,672	0,672	0,698	0,495	0,644	0,456	0,493	0,527	0,494	0,255	0,096	0,297	-0,009	0,365	0,244	0,275	0,503	0,458	0,527	0,581	0,485	0,359	0,469	0,587	0,729	0,734	**1,000**	0,553	0,530
RA1	0,586	0,683	0,780	0,488	0,595	0,587	0,569	0,402	0,485	0,680	0,712	0,656	0,634	0,355	0,120	0,397	0,053	0,407	0,295	0,342	0,550	0,449	0,548	0,617	0,546	0,474	0,519	0,613	0,565	0,469	0,553	**1,000**	0,754
RA4	0,616	0,707	0,684	0,463	0,512	0,516	0,559	0,411	0,551	0,663	0,668	0,797	0,753	0,479	0,163	0,467	0,012	0,401	0,303	0,326	0,529	0,472	0,587	0,608	0,569	0,553	0,570	0,638	0,573	0,515	0,530	0,754	**1,000**