



The Influence of New Retail Marketing Techniques on Brick-and-Mortar Foot Traffic: The Hologram



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LETTER FROM THE EDITOR

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To whom it may concern

This is to confirm that I, the undersigned, have language edited **the mini dissertation** of

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The responsibility of implementing the recommended language changes rests with the author of the document.

Yours truly,



Dr Linda Scott

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ABSTRACT

This study investigates the impact of hologram technology on foot traffic and consumer behaviour in brick-and-mortar retail stores. It addresses the need for physical retailers to innovate, particularly in response to competition from online platforms. Focusing on South African consumers, the research explores how holograms can enhance customer perception by leveraging sensory stimulation, using the technology acceptance model (TAM) and the AIDA (attention, interest, desire, action) framework. Through a quantitative survey of 308 respondents, the study assesses consumer perceptions of holograms, with a particular focus on perceived usefulness, ease of use and behavioural intentions.

Key findings suggest that holograms may have the ability positively influence in-store foot traffic through increased consumer perceptions and consumer engagement, with sensory stimulation and consumer interest emerging as strong predictors of customer behaviour. While minimal gender differences were observed, the overall response to hologram technology was favourable, highlighting its potential to enhance in-store experiences. The study recommends that retailers should adopt hologram displays to create immersive shopping environments, but notes limitations related to convenience sampling and the presentation of hologram technology via video formats rather than in-person engagement. Future research should focus on real-world applications and the long-term effects of holograms on consumer behaviour and their potential impact on sales growth.

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CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

In the contemporary business landscape, marked by a significant surge in e-commerce-based retail, the strategies employed by online retailers to captivate consumer attention have taken the forefront (Gupta, Kushwaha, Badhera, Chatterjee & Gonzalez, 2023:201). According to Husain, Sani, Ardhiansyah and Wiliani (2020), a myriad of techniques are employed by online retailers to enhance web store traffic. Among these strategies, the meticulous utilisation of search engine optimisation (SEO) plays a pivotal role in enabling retailers to craft content that resonates with online consumers, thus improving their visibility on search engines such as Google. This heightened visibility ultimately results in augmented click-through rates and consequently, an increase in online purchase conversions (Usmany, Rachmawati, Rembe, Sopacua, Santosa, Arifin, Fitria & Suhardi, 2024:807-808). Additionally, online retailers leverage paid advertising, including Google Ad campaigns and other paid methodologies, to amplify their digital foot traffic (Papagiannis, 2020:17).

In contrast, brick-and-mortar outlets encounter a more challenging landscape in enticing potential consumers to enter their stores (Zumstein & Kotowski, 2020). Physical retail does not rely on easily accessible real-time web-based technologies. In the last decade, traditional retailers have pivoted their efforts towards garnering attention through social media platforms, posits Weinandy, Chen, Pozzo and Ryan (2022:19). This is in the hopes to entice more passers-by to explore their stores in search of new sales and products (Zumstein & Kotowski, 2020). Furthermore, brick-and-mortar outlets have focused on the development of cohesive branding messages, manifesting through eye-catching store signage and appealing store aesthetics, as proposed by Venugopal and Akhila (2023:12). Against this backdrop, this research endeavoured to explore innovative avenues for brick-and-mortar retailers to attract and captivate the attention of potential customers. In particular, it investigated the emergence of hologram-based technology as a potential mechanism for augmenting in-store foot traffic by understanding the perceptions of consumers via quantitative survey research.

The paucity of research investigating hologram-based technologies is primarily attributed to the fact that these technologies are relatively new and have only recently become available in both the digital advertising and academic domains. Furthermore, extant literature on the effects of hologram technology on in-store traffic remains practically devoid from stock literature. The focus of this research paper was to highlight the lack of innovation in physical stores in comparison to their 'new generation' online counterparts and to uncover if novel hologram advertising devices have the ability to positively impact consumer behavioural intentions.

1.2 RESEARCH PROBLEM

A research problem is the core of a particular study. It is a clear and precise statement that identifies the area of concern or investigation, supported by evidence. The research problem guides the research questions and objectives, forming the framework for interpreting the research findings (Kebritchi, 2024).

The study aims to assess the impact of holographic technology on in-store foot traffic and consumer behavioural intentions. Specifically, it seeks to determine whether the implementation of holographic displays can attract more customers into retail spaces and influence their purchasing decisions. This investigation is pertinent as retailers continually seek innovative methods to enhance customer engagement and drive sales. Understanding the effectiveness of holographic technology in achieving these objectives will provide valuable insights for strategic decision-making in retail marketing.

1.3 OBJECTIVES

The objective of this study was to assess the potential influence that visual hologram-based technology may have on brick-and-mortar stores in the retail industry. This consumer survey-based research endeavour holds the potential to equip numerous brick-and-mortar store owners with critical insights into whether the adoption of hologram technology in the retail setting is advisable, based on feedback from real consumers in South Africa. Moreover, this quantitative study sought to either accept or reject the alternative hypothesis:

- H_0 The use of hologram technology in retail marketing has no effect on in-store foot traffic and consumer behavioural intentions.
- H_a Hologram technology used in retail marketing has a significant positive effect on in-store foot traffic and consumer behavioural intentions.

In this set of hypotheses, the null hypothesis (H_0) postulates that the adoption of hologram technology has no effect on in-store foot traffic and consumer behaviour intentions, while the alternative hypothesis (H_a) contends the presence of a significant positive effect on foot traffic.

1.3.1 Primary Objective

The study aimed to investigate consumers' perceptions of hologram-based technology and its potential impact on in-store foot traffic and behavioural intentions in the context of South Africa.

1.3.2 Theoretical Objectives

To achieve the researcher's main purpose, the study delineated the following theoretical aims:

- Review the literature on existing hologram technology.
- Comprehensively review the literature on hologram technology in the retail setting.
- Conduct an in-depth analysis on the key factors that influence the use of other digital signage technologies in the retail setting.
- Uncover the relevance of both the Attention, Interest, Desire and Action (AIDA) and the Technology Acceptance Model (TAM) within the realm of digital advertising.

1.3.3 Empirical Objectives

Aligned with the study's primary goal, the following empirical objectives were delineated:

- Determine South African consumers' attention, sensory stimulation, interest, perceived usefulness, attitudes, perceived ease of use, desire and behavioural intentions towards hologram technology.
- Determine the relationship between South African consumers' attention, sensory stimulation, interest, perceived usefulness, attitudes, perceived ease of use, desire and behavioural intentions concerning hologram technology.
- Investigate potential disparities between male and female South African consumers concerning their perceived interest, attitudes and behavioural inclination.

To meet the empirical goals of the study, the following hypotheses were developed for the study:

H_{o1}: South African consumers do not exhibit inclinations of positive attention_{1a}, sensory stimulation_{1b}, interest_{1c}, perceived usefulness_{1d}, attitudes_{1e}, perceived ease of use_{1f}, desire_{1g} and behavioural intentions_{1h} towards hologram technology.

H_{a1}: South African consumers do have inclinations of positive attention_{1a}, sensory stimulation_{1b}, interest_{1c}, perceived usefulness_{1d}, attitudes_{1e}, perceived ease of use_{1f}, desire_{1g} and behavioural intentions_{1h} towards hologram technology.

H_{o2}: There is no relationship between South African consumers' attention_{2a}, sensory stimulation_{2b}, interest_{2c}, perceived usefulness_{2d}, attitudes_{2e}, perceived ease of use_{2f}, desire_{2g} and behavioural intentions_{2h} regarding hologram technology.

H_{a2}: There is a relationship between South African consumers' attention_{2a}, sensory stimulation_{2b}, interest_{2c}, perceived usefulness_{2d}, attitudes_{2e}, perceived ease of use_{2f}, desire_{2g} and behavioural intentions_{2h} regarding hologram technology.

H_{o3}: There is no distinction between male and female South African consumers' attention_{3a}, sensory stimulation_{3b}, interest_{3c}, perceived usefulness_{3d},

attitudes_{3e}, perceived ease of use_{3f}, desire_{3g} and behavioural intentions_{3h} concerning hologram technology.

H_{a3}: There is a distinction between male and female South African consumers' attention_{3a}, sensory stimulation_{3b}, interest_{3c}, perceived usefulness_{3d}, attitudes_{3e}, perceived ease of use_{3f}, desire_{3g} and behavioural intentions_{3h} concerning hologram technology.

1.4 PRELIMINARY LITERATURE REVIEW

In a world marked by technological advancements and rapid changes in the retail landscape, it has become essential for brick-and-mortar stores to adopt innovative technologies and strategies to drive in-store foot traffic. Due to the competitiveness of online retail, brick-and-mortar retailers are shifting from low-tech to high-tech stores, adopting several innovative technologies and trends (Sheth, 2021:7). Some of these innovative technologies consist of augmented reality, smart mirror technology, interactive display screens and the adoption of self-checkout systems and robot assistance usage in stores. Moreover, this literature review explores the possible use of hologram-based displays and their potential to attract customers to physical retail outlets by uncovering consumer perceptions in accordance with the TAM and the AIDA model.

1.4.1 Technology Acceptance Model (TAM)

The theoretical framework central to this research is TAM, originally introduced by Fred Davis in 1985. This framework is designed to forecast users' perceptions and potential acceptance of emerging technologies (Davis, 1985). It has been widely applied across diverse domains to elucidate why certain technologies are swiftly adopted, while others are rejected by end-users. According to Musa, Fatmawati, Nuryakin and Suyanto (2024:3), TAM has been used in a number of industries, including e-learning, e-government, marketing technologies, banking and a myriad of other technology-dominated domains. In this case, TAM has been indirectly applied to retail through marketing technologies, payment technologies and general technology innovation.

In the context of this study, TAM serves as a foundational framework for comprehending the perceptions of potential consumers when they encounter hologram-based technology.

TAM comprises two primary components, namely perceived usefulness (PU) and perceived ease of use (PEOU) which ultimately informs behavioural intention (BI), both of which are further explained in the following section.

Perceived Usefulness (PU): This component assesses individuals' perceptions regarding the potential improvement in their daily lives and work performance by using a particular technology, making their tasks more efficient and effective. It centres on the utility and benefits that the technology offers to the user (Davis, 1985). Moreover, PU reflects users' beliefs regarding the efficiency and effectiveness of the technology in facilitating their tasks and improving overall productivity in both personal and commercial contexts (Gam, Ma & Banning, 2017:6).

Perceived Ease of Use (PEOU): This component pertains to the degree to which individuals believe using the technology will be effortless and user-friendly. It assesses the perceived complexity of the technology and the ease with which it can be adopted and used (Davis, 1985). Furthermore, Gam *et al.* (2017:5) posit that PEOU denotes individuals' subjective assessment of how effortless it is to use the technology. This perception encompasses factors such as the intuitiveness of the interface, the clarity of instructions and the overall simplicity of interacting with the technology.

Through these two components, however not the only components, TAM provides a roadmap for understanding how consumers perceive and ultimately either accept or reject new technologies such as hologram advertising devices based on their usefulness and ease of utilisation within the brick-and-mortar retail environment.

1.4.2 Technological Acceptance Model (TAM) in the Retail Setting

TAM is currently used across a myriad of sectors and industries, TAM, has the ability to provide consumers to assess the potential adoption of new technologies

and innovations, this is achieved by analysing consumer perceptions regarding the technologies overall usefulness and ease of technology adoption (Gam *et al.*, 2017:4). In the retail sector, the TAM framework is often used to explore the acceptance level of new and novel technologies. For instance, Patil (2016) used TAM to evaluate the adoption rate of Internet of Things (IoT), a technology that monitors various processes within physical retail stores. Furthermore, Alam, Susmit, Lin, Masukujjaman and Ho (2021) assert that the adoption of augmented reality in brick-and-mortar retail is also being examined using the fundamental constructs of TAM to determine its potential for comprehensive adoption and enhancement of the overall customer retail experience.

However, it remains uncertain whether hologram technology, as a tool to attract customers into retail environments, aligns with the core principles of TAM due to limited accessible research in this area. Many current research resources related to hologram technology in retail space comprise of paid corporate reports. However, research in the field of education and e-government domains do exist. To further relate hologram technology to existing technology acceptance and intention models, the AIDA model will be examined alongside TAM in this study.

1.4.3 AIDA Model (Attention, Interest, Desire and Action)

Elmo Lewis introduced the AIDA model in 1898, explaining the hierarchical response to the selling process (Li & Yu, 2013:47-51). Since then, it has been widely utilised across various social areas, particularly in advertising, to measure the effectiveness of advertisements (Abdelkader & Rabie, 2019:1694–1695). The AIDA model comprises four elements: attention, interest, desire and action. Attention represents the cognitive stage, where individuals become aware of the advertisement. Interest is the first affective stage, involving the gathering of additional information about the marketed products. Desire reflects the degree to which individuals intend and decide to buy the promoted products. Action signifies the behavioural stage, indicating practical steps taken to buy products. The effectiveness of an advertisement or image displayed by hologram technology is determined by minimising the gap between attention and action (Lee & Trim, 2022 9). Therefore, by applying the AIDA model to assess the impact of hologram-based marketing techniques on brick-and-mortar foot traffic, researchers can

analyse how effectively these technologies attract attention, generate interest, stimulate desire and ultimately drive action among consumers.

1.4.4 AIDA Model in the Retail Setting

According to Hawaldar and Ullal (2018; 285), in the domain of physical retail outlets, the AIDA model plays a pivotal role in understanding consumer behaviour and optimising advertisement effectiveness. With retail advertising expenditure soaring to over 40 billion dollars globally, it is crucial for advertisers to assess the effectiveness of their campaigns through the lens of AIDA (Lebow, 2023). Questions regarding the influence of advertisements on foot traffic, in-store navigation and, ultimately, sales, underscore the need for a comprehensive understanding of consumer response. Marketers recognise the potential of advertisements to drive foot traffic, yet reliable data on this impact remains scarce (Hawaldar & Ullal, 2018:286, Fortenberry & McGoldrick, 2020:136). This highlights yet another key objective the research aims to bring to light, pertaining to the potential influence hologram technology has on both consumers and the potential ability to increase both in-store foot traffic and sales.

1.4.5 New Innovative Marketing Techniques to Increase In-Store Foot Traffic in Brick-And-Mortar Setting

According to Zumstein and Kotowski (2020:43), the brick-and-mortar retail sector has experienced a decline and a state of stagnation. This decline can be attributed to the relative lack of adoption of innovative techniques aimed at increasing in-store foot traffic, especially when compared to the rapid evolution in the e-commerce domain (Gupta *et al.*, 2023:201). Nevertheless, despite these challenges, the brick-and-mortar sector continues to employ a range of strategies to attract and engage potential customers into their physical stores. These strategies encompass leveraging the power of social media, the effective deployment of externally facing signage and the dissemination of aesthetically appealing brand messages (Venugopal & Akhila, 2023:12).

As highlighted by Mahfouz, Joonas, Williams, Jia and Arevalo (2017:188), social media has emerged as a pivotal marketing tool, with businesses actively using various social media channels such as Facebook, Instagram, YouTube and X to

engage with potential customers. Through these platforms, retailers entice social media users to click on links or to visit nearby physical stores, particularly during promotional events like sales and product launches. This active utilisation of social media marketing signifies a concerted effort by brick-and-mortar retailers to bridge the gap between the online and physical realms, with the goal of drawing customers into their brick-and-mortar establishments. Furthermore, brick-and-mortar retailers are employing diverse strategies beyond social media to drive in-store foot traffic. According to BDO Canada (2019), there is a growing trend of traditional physical signage losing its impact on consumers. Modern consumers have become desensitised to traditional signage and are increasingly seeking digital signage alternatives that incorporate dynamic movement and a vibrant array of colours to capture attention from a distance. Retailers are leveraging these digital displays to engage customers by using bright lights, movement and colour changes (Bakija, 2018:1; BDO Canada, 2019).

As suggested by Xie, Cai, Fang, Tang and Yamanaka (2022:2), utilising a diverse range of colours and dynamic imagery subject to continuous variation, can profoundly enhance individuals' mood states and cognitive focus levels. Similarly, bright and dynamic displays capture consumers' attention, drawing them to the store. While this technology represents a significant advancement compared to traditional signage, it may not be as captivating as the emerging hologram technology explored in this study. Hologram technology creates a unique visual experience by making images appear as if they are suspended in thin air, potentially exerting a stronger allure compared to other visual signage methods (Ramlie, Rani, Udang & Shuib, 2016).

1.4.6 Hologram Technology: A Conceptual Overview

Holography, a technology has existed since its inception by Dennis Gabor in 1947, may seem straightforward in concept but proves to be considerably intricate in practice (Johnston, 2006:14). Holography is a three-dimensional display technique that has the unique capability to project a lifelike 3D image that closely resembles an actual object. It distinguishes itself from other display methods because it does not require the scanning or synchronisation procedures typical of other 3D display technologies (Li, Yu, Wu & Wei, 2022:1–2). In contrast,

holography captures and rebuilds light waves emanated from the object using the principles of light interference and diffraction (Ortega, Ramírez, Castro, Carrión, Carvaja & Segarra, 2020). The core of holography lies in the interference between the light emanating from the object and a reference light source, resulting in the creation of an interference fringe pattern known as a hologram. This pattern creates an illusion of an object floating in thin air, with no visible source of power or origin (Ortega *et al.*, 2020). However, with older forms of holography being mentioned, a new form of hologram technology has been developed, which is simpler in nature, while still maintaining the same visual results. According to Salo, Virolainen and Saarela (2019), holographic fans are display devices that create a hologram-like image that appears to float in mid-air. They achieve this effect by incorporating strips of red, green and blue light emitting diodes (RGB LEDs) onto the fan blades, with a control unit illuminating pixels as the fan rotates to form the complete picture. This creates the illusion of the displayed object floating in the air, as the observer's brain integrates the rapidly spinning display to perceive the image as a cohesive whole.

While there is existing literature that explores the application of holograms in the field of education, as exemplified by the study conducted by Ortega *et al.* (2020), the aim is to add to the limited body of research on hologram technology within the field of retail.

Lastly, this literature review has examined the possibility of applying hologram-based displays for the purpose of the revitalisation of in store traffic and for the possible improvement of revenue generation in the field of physical retail business. It has presented both the TAM and AIDA model as the theoretical frameworks for examining user acceptance and consumer perceptions when they encounter the hologram-based displays. This review demonstrates the lack of studies conducted on hologram technology as a customer attraction tool to drive consumers into physical stores. Therefore, there is a need to conduct more research in this niche area. In addition, other related marketing techniques have also been suggested which include integrating and incorporating social media and dynamic digital signage technologies to maximise shopper attraction. Sparked by the technologies true to life display capabilities, the ability hologram technologies have to drive consumer behaviour and instore foot traffic is one more avenue that

needs to be pursued in the field of research and academia. This creates a foundation for future analysis of the effect of hologram displays on in-store traffic and the future of physical store environments.

1.5 RESEARCH DESIGN AND METHODOLOGY

This epistemological research project adopted a positivist philosophical standpoint to empirically investigate the impact of hologram technology on in-store foot traffic. Using a deductive approach, the study built on existing theories and literature. A quantitative methodology, specifically a survey-based strategy, was employed within a descriptive cross-sectional research design. Online questionnaires were distributed to a sample group to gather data, which were analysed to test and compare findings with established models such as the TAM and the AIDA model. This study offered an in-depth insight into how consumers perceive hologram technology in brick-and-mortar retail settings over a defined period (Bougie & Sekaran, 2021).

1.5.1 Target Population

The focus of this study's target population was any consumer aged 18 and above, from all ethnic backgrounds, residing in South Africa, who have access to the internet and/or any smart internet-compatible device.

The target population is defined as follows:

- **Element:** South African residents above the age of 18.
- **Sampling frame:** South African consumers with internet access.

1.5.2 Sample Method

The study utilised a non-probability convenience sampling technique to select 400 South African consumers with internet access. To address potential limitations associated with convenience sampling, demographic inquiries regarding respondents' country of origin, current residing province, age and gender were integrated into the questionnaire. These demographic variables aimed to assess the degree to which the sample reflects the larger population and consequently, the potential generalisability of the study's findings.

1.5.3 Sample Size

A total of 400 South African consumers aged 18 and older (with internet access) were selected for this study. To support the chosen sample size, previous validated studies of a similar nature were reviewed. The following studies were examined: Song *et al.*, (2013:4) (sample size:287), Abdelkader and Rabie (2019:1696) (sample size:738) and Moon, Lee, Shim and Hwang (2023:6) (sample size:379). Therefore, a sample size of 400 participants was deemed adequate to fulfil the objectives of the study. Furthermore, this sample size aligns with the needs of the statistical methods applied in the data analysis.

1.5.4 Data Collection Method

In this research study, the chosen method to collect the required data was done through an online survey approach. Respondents were shown a video that describes and demonstrates a functioning hologram device affixed to the outside of a retail store. After watching the video, they were directed to complete an online questionnaire. The questionnaire consisted of two sections: Section A for demographic questions and Section B for measuring of constructs related to consumer perceptions towards the adoption of hologram technology in the brick-and-mortar setting.

The questionnaire made use of validated scales adapted from previously published research by Song *et al.* (2013:5), Moon *et al.*,(2023:5) and Min, Min, Jie, Shuhao and Jie (2022:267). The measuring scale constructs included attention (ATT), interest (INT), perceived usefulness (PU), perceived ease of use (PEOU), attitude (AT), desire (DE) and behavioural intention (BI). The questionnaire utilised a Likert scale (4 point) to assess responses, ranging from strongly disagree (1) to strongly agree (4). This scale was selected intentionally to eliminate the option for a neutral response. Furthermore, in order to garner a considerable number of respondents, the study followed a snowball sampling method, encouraging participants to share the questionnaire and video link to encourage more respondents to complete the questionnaire.

The questionnaire was distributed through a myriad of social media platforms such as Instagram, WhatsApp and Facebook, accompanied by a brief video

illustrating the functionality of hologram technology and demonstrating its application in showcasing store marketing collateral and products.

1.5.5 Statistical Analysis

The data was meticulously analysed using a myriad of statistical techniques, including Mahalanobis distance analysis, reliability analysis, descriptive statistics, correlation analysis and tests of significance.

1.6 PROPOSED CHAPTER OUTLINE

Chapter 1 – Research Proposal – This chapter introduces the research focus on the impact of hologram technology on in-store foot traffic and consumer behaviour, outlining the study's objectives, problem statement, literature review, research design and ethical considerations.

Chapter 2 – Literature Review – This chapter examines the evolving retail landscape and the adoption of innovative technologies like augmented reality, digital signage and holograms to enhance customer engagement and increase foot traffic in brick-and-mortar stores. It explores how these technologies, supported by frameworks such as the TAM and the AIDA model, can effectively influence consumer behaviour while highlighting the need for further empirical research on the long-term impacts of hologram technology in retail marketing.

Chapter 3 – Research Methodologies – This chapter outlines the methodological framework for studying the influence of hologram marketing on foot traffic in brick-and-mortar stores, detailing the research philosophy, paradigm, approach, design and data collection strategies employed to ensure robust and replicable results. It emphasises the use of a positivist, deductive methodology with a survey-based strategy to gather quantitative data from a diverse sample of South African consumers, aiming to analyse consumer perceptions and behaviours related to hologram technology in retail settings.

Chapter 4 – Data Analyses and Data Findings – This chapter presents and analyses the empirical findings of the study on hologram marketing's influence on foot traffic in brick-and-mortar stores. It outlines the data collection process,

demographic characteristics of the sample and the various statistical analyses conducted using SPSS to interpret the data.

Chapter 5 – Findings, Recommendations and Conclusions – This chapter synthesises the study's examination of hologram technology's impact on foot traffic and consumer behaviour in brick-and-mortar retail stores, with a focus on South African consumers. It presents the main findings, contributions and actionable recommendations for retailers to enhance consumer engagement through holograms, while also addressing study limitations and suggesting avenues for future research.

1.7 ETHICAL CONSIDERATIONS

According to Knight (2019:13), research ethics has been built around the ideologies of medical research, not taking into account the research nuances associated with domains such as social science and business. Furthermore, Knight (2019:13) posits that research ethics are becoming more complex due to the involvement of social media and other media channels in qualitative research. Hence, it is vitally important to ensure that respondent anonymity, privacy and confidentiality are not breached.

In this scenario, the research title, 'The influence of new marketing techniques on brick-and-mortar foot traffic: The Hologram', at the master's level, adhere to strict ethical considerations, given that it involved human participants in the context of a business or marketing study. To ensure ethical compliance, the research adhered to established ethical principles. First and foremost, the study obtained ethics clearance from the institution, by presenting a detailed research proposal that outlines the methodology and ethical safeguards. The researcher issued online questionnaires to South African consumers. Throughout this process the researcher explained the purpose of the research, the nature of the respondents' participation, the potential risks and the voluntary nature of their involvement.

Additionally, the research ensured participant anonymity and confidentiality to protect overall privacy (Tripathi and Chaturvedi, 2023:41). The study also agreed not to pass on the information of the participants or respondents to any third party with regards to the principles of data protection set by the outlined guidelines and

law. With regards to the above-mentioned ethical considerations and by obtaining the relevant approvals, the study was successfully concluded without compromising the human participants' rights and welfare. Ethical compliance is a fundamental aspect of conducting responsible and rigorous research, ensuring the study's credibility and its contribution to the field (Knight, 2019:13).

1.8 CONCLUSION

Therefore, the purpose of this research was to identify the potential impact of hologram technologies on instore traffic and nuances of consumer buying patterns inside the brick-and-mortar retail industry. Following prior theories such as TAM and the AIDA Model, a quantitative survey approach was conducted with consumers in South Africa to gather empirical responses. The findings provided useful information on how feasible and effective it is to incorporate hologram technology in the marketing mix, which in turn expands the knowledge repository on emergent trends in retail. The ethical concerns were adhered to in this study to ensure that the study had a high level of credibility. Literature fundamental to the research study will now be discussed in chapter 2.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

In the modern world where technological innovations and rapid changes in the retail landscape have become increasingly more common, it has become essential for brick-and-mortar stores to adopt new cutting-edge technologies and strategies to encourage increased foot traffic into physical stores (Kirsten, 2024). Due to the competitiveness of online retail, traditional brick-and-mortar retailers are shifting from low-tech to high-tech stores, adopting several new innovative technologies and trends (Sheth, 2021:7). This shift is crucial for maintaining relevance and competitiveness in an increasingly digital marketplace, where online retailers have consistently set high standards for customer engagement and convenience.

According to Sagar (2024:7–14), some of these innovative technologies include augmented reality (AR), which maximises the consumer shopping experience by laying digital information onto the physical world, allowing customers to visually experience products in their environment before making a purchase decision. Smart mirror technology is another cutting-edge innovation that allows customers to try on clothes and accessories virtually, enhancing their shopping experience without the need for physical trials (Ogunjimi, Rahman, Islam & Hasan, 2021). Interactive display screens serve as dynamic touchpoints for customers, providing information, recommendations and personalised content, increasing engagement and time spent in-store. Additionally, adopting self-checkout systems encourages a more streamlined purchasing process, reducing consumer lag times which improves customer satisfaction levels. Robot assistance in stores is also gaining traction, offering services such as inventory management, customer assistance and even personalised recommendations, thus freeing up human staff for more complex tasks and improving operational efficiency (Sagar, 2024:7-14; Kirsten, 2024).

Moreover, this literature review explored the possible use of hologram-based advertising displays and their potential to influence the flow of customers into physical retail outlets by examining their perceptions of the technology. Hologram

technology presents a novel and captivating way to attract attention and engage customers. By creating three-dimensional images that appear to float in mid-air, holograms can create a unique and memorable shopping experience. This study sought to uncover consumer perceptions of hologram-based displays through the lens of established theoretical frameworks, specifically the Technology Acceptance Model (TAM) and the AIDA Model (Attention, Interest, Desire and Action).

2.2 NEW INNOVATIVE MARKETING TECHNIQUES TO INCREASE IN-STORE FOOT TRAFFIC AND ENGAGEMENT IN THE BRICK-AND-MORTAR SETTING

According to Zumstein and Kotowski (2020:43), the brick-and-mortar retail sector has experienced a notable decline and a state of stagnation in recent years. This decline can be attributed to the relative lack of adoption of innovative techniques aimed at increasing in-store foot traffic, especially when compared to the rapid evolution in the e-commerce domain (Gupta *et al.*, 2023:201). Traditional retailers have been adopting several tactics in the hope to capture attention and to encourage consumers to visit the physical stores. These strategies encompass harnessing the power of social media, the effective deployment of externally facing signage, augmented reality, the usage of artificial intelligence and the dissemination of aesthetically appealing brand messages (Venugopal & Akhila, 2023:12; Sagar, 2024:7–14).

2.2.1 Leveraging Social Media Marketing

As posited by Mahfouz *et al.*, (2017:188), the usage of social media has become one of the most effective promotional techniques for retailers. Companies effectively use the different social platforms like Facebook, Instagram, You Tube, and X in order to reach potential customers. By adopting these platforms, the retailers hope to lure the social media users to click links or to visit physical stores in their vicinity, especially during product promotions such as seasonal sales and product releases. The ability to target specific demographics and to create personalised advertisements has made social media an effective tool for bridging the gap between the online and physical realms. This strategy signifies a concerted effort by brick-and-mortar retailers to draw customers from the digital

world into their brick-and-mortar establishments, enhancing both visibility and foot traffic (Sagar, 2024:7–14).

2.2.2 Digital Signage and Dynamic Displays

Beyond social media, brick-and-mortar retailers are employing diverse strategies to drive in-store foot traffic. According to BDO Canada (2019), there is a growing trend of traditional physical signage losing its impact on consumers. According to Guo and Jiang (2024), modern consumers have become desensitised to traditional signage through over exposure and phenomenon referred to as ad fatigue. They are increasingly seeking digital signage alternatives that incorporate dynamic movement and a vibrant array of colours to capture attention from a distance. (Bakija, 2018:1; Canadian Retailer, 2019). Digital signage, with its bright lights, movement and colour changes, is more effective at capturing attention than static signs. As suggested by Xie, *et al.*, (2022:2), utilising a diverse range of colours and dynamic imagery, subject to continuous variation, can profoundly enhance individuals' mood states and cognitive focus levels. This effect is akin to how bright lights attract moths and other insects. Digital displays can also be used to showcase promotions, new arrivals and other engaging content that can lure customers into the store.

2.2.3 Augmented Reality and Virtual Reality

In addition to digital signage usage, retailers have begun adopting more immersive technologies, including augmented reality (AR) and virtual reality tools, to enhance customer engagement (Sagar, 2024:7–14). Augmented reality (AR) involves placing virtual objects in a live view of the physical environment, allowing users to visualise how these objects would fit into their real-world settings. Hayes and Downie (2024) assert that augmented reality enhances a user's perception of reality instead of replacing it. In retail, a key application of augmented reality is facilitating the product evaluation process by allowing customers to virtually experience products before making a purchase. This includes virtual clothing try-ons and product visualisations, which assist the user in making a purchase decision or in understanding how the product will look in a unique context (Tan, Chandukala & Reddy, 2022:26).

2.2.4 Artificial Intelligence

In early 2017, Amazon introduced its pilot version of a checkout-free grocery store, Amazon Go. This innovative store caters to customers who prefer to avoid standing in checkout lines. Utilising advanced artificial intelligence technology, the store tracks purchases, enabling customers to leave without going through a physical checkout process, with their accounts being automatically charged. After refining the concept and learning from the pilot, Amazon successfully rolled out a number of stores across the USA (Wingfield, 2018).

According to Polacco and Backes (2018:83), Amazon Go employs what it refers to as 'Just Walk Out Technology'. This system is designed to track items taken and sometimes returned to the store's shelves, as well as manages the individual's digital cart. To achieve this, Amazon utilises technology similar to that used in autonomous cars, which includes artificial intelligence, advanced computer vision technology and deep learning algorithms. Although specific details about their technological advancements have not been extensively disclosed, it is evident that cameras play a central role in their operational strategy. These cameras monitor both the products placement and the shoppers themselves. As posited by Garcia (2018), the emergence of artificial intelligence and computer vision technology in Amazon Go stores has led to increased levels of customer engagement and in-store customer foot traffic due to the new innovative technology. In contrast, Fedorenko (2018) posits that nearly a third (32%) of surveyed consumers indicated they would spend more at retailers offering an experience like Amazon Go compared to those with traditional checkout systems. This preference underscores the appeal of the seamless shopping experience provided by Amazon Go and the technology's ability to not only draw customers in-store but to influence consumer purchases and behavioural intentions.

2.2.5 Emerging Hologram Technology

While digital signage represents a significant advancement compared to traditional methods, it may not be as captivating as the emerging hologram technology. Hologram technology creates a unique visual experience by making images appear as if they are suspended in thin air, potentially exerting a stronger

allure compared to other visual signage methods (Ramlie *et al.*, 2016). Holographic displays have the ability to present three-dimensional images that can be viewed from multiple angles, creating a sense of depth and realism that traditional and digital signage cannot match. This innovative technology can be used to showcase products in a novel way, creating an interactive and memorable experience for observers (Loh & Shaharuddin, 2019:1038). Retailers can use holograms to demonstrate product features, provide virtual try-ons, or even create holographic sales assistants to guide customers through stores.

The use of social media, artificial intelligence (AI), augmented reality (AR), virtual reality (VR), dynamic digital signage; and the possibility of implementing hologram technology in retail environments has the ability to improve the probability of attracting consumers into brick-and-mortar stores. In addition, these technologies may have the ability to satisfy consumer needs and expectations within the shopping process. These technologies may very well be the new generation of shopping experiences that can grab consumers' attention while at the same time encourage consumers to visit the stores thus enhancing consumer behavioural intention. These strategies not only blur the gap between online and offline commerce but also provide strategies which develop fascinating and heuristic instore atmospheres which could prompt the consumers to change their movements and purchase intentions in store. The integration of these advanced marketing techniques represents a crucial step towards revitalising the brick-and-mortar retail sector in an increasingly digital world (Venugopal & Akhila, 2023:12; Ramlie *et al.*, 2016).

2.3 HOLOGRAM TECHNOLOGY: A CONCEPTUAL OVERVIEW

Holography, which is a visual technology that was developed by Dennis Gabor in 1948, may seem relatively simple as a concept but proves to be considerably complex in practice and implementation (Johnston, 2006:14). This form of display technology differs from other visual technologies as it has the unique ability to project 3D images and videos that closely resemble actual dynamic objects. Unlike traditional display devices that require scanning and synchronisation procedures, holography captures light waves emanating from an object by using light interference and diffraction techniques (Li *et al.*, 2022:1–2). The underlying

foundation of holography lies in the interference between light emanating from the object and a reference light source. This interaction produces an interference fringe pattern known as a hologram, which creates the illusion of an object floating in mid-air without any apparent source of power (Ortega *et al.*, 2020). This process involves complex physical principles, making the practical implementation of holography fascinating and challenging.

In recent years, however, a new form of hologram technology has been developed, which is simpler in nature while still maintaining the same impressive visual results. According to Salo *et al.* (2019), holographic fans are display devices that create a hologram-like image appearing to float in mid-air. These devices achieve this effect by incorporating strips of red, green and blue (RGB) LEDs onto fan blades. A control panel provides energy to the pixels as the blades of the fan rotates, forming a complete picture. This creates the illusion of an image or video floating in thin air, as the observer's brain integrates the rapidly spinning display to perceive the image as a cohesive whole (Barnes, 2023). This specific form of holography device has been used to conduct the study as fan-based hologram devices are more abundant and commonly used due to their practicality when compared to older classical and more bulky hologram devices.

With a substantial body of literature exploring holograms in the field of e-learning and education, exemplified by the studies conducted by Ortega *et al.* (2020) and Loh and Shaharuddin (2019), the technology in this instance is used to captivate the attention of students to potentially encourage deeper learning states and to potentially encourage more efficient memory recall. According to Jafari (2023:71), hologram technology is increasingly recognised as a powerful visualisation tool with significant potential in the field of education. It is considered an effective teaching aid that can reinforce the learning process by enhancing student engagement and understanding.

This visualisation tool is not only effective in the academic teaching space, but also in physical education classes. According to Hadda, Hani, Batayneh and Hani (2021:3709), the use of hologram technology in the classroom and physical education classrooms, such as the basketball court, can show favourable learning results. The application of hologram technology in schools has been

demonstrated to effectively boost learning abilities and cognition in children. This technology strengthens student motivation by using model-based learning and visual effects, thereby making the learning experience more dynamic and interactive. Additionally, hologram technology improves cognitive learning skills and concentration abilities in students, highlighting its growing importance and application in modern classrooms. Recent technological advancements have further accelerated the use of holograms in educational settings, demonstrating their value in enhancing the overall learning experience (Jafari, 2023:72; Hadda, Hani, Batayneh & Hani, 2021:3710).

In contrast, hologram technology use cases go far beyond the classroom. According to Poh and Colanzo (2023), hologram technology has been used by governments and, in most recent times, by presidents who cannot fulfil all their travel and conference obligations due to simultaneous meetings across the globe. Over an hour after giving a speech in California, Philippine President Ferdinand Marcos Jr. appeared at an event in Singapore using hologram technology. This allowed for a three-dimensional projection of his likeness to be presented. Marcos was the sole speaker at the Singapore Fintech Festival to employ this cutting-edge technology, which is currently being explored as a novel communication tool by both startups and major tech firms.(Yu, 2023).



Figure 2.1: *Philippine President, Ferdinand Marcos Jr., hologram at a Fintech conference in Singapore* (The Star, 2023).

The potential for holograms to revolutionise marketing strategies in retail is significant, given their ability to captivate and engage observers with dynamic, immersive visual experiences. The integration of holographic displays could offer retailers a novel way to stand out in a crowded marketplace, providing an engaging and memorable shopping experience that differentiates them from their online counterparts. Hologram technology used specifically within the brick-and-mortar retail setting will now be examined.

2.3.1 Sensory Stimulation

According to Xie *et al.* (2022:2), using a variety of colours and dynamic imagery that constantly changes can significantly improve one's mood and cognitive focus by capturing attention, much like how bright lights attract insects. This research explored whether novel hologram technology might have a similar impact, not only by capturing attention but also by encouraging consumers to explore the technology and the content it displays. Siraji, Spitschan, Kalavally and Haqu (2023:1) support this, indicating that dynamic bright lights from various spectrums can positively enhance memory recall, mood and overall cognition.

Moreover, Graham (2021) explains that normal vision involves capturing light through photoreceptors in the retina, converting it to neural signals and processing these signals through the thalamus and cortex, which are key areas for visual consciousness. However, the brain has a separate pathway for sensing general light levels, crucial in seasonal affective disorder (SAD). These light-level cells send signals to regions below the cortex, including the hypothalamus, which regulates circadian rhythms and related neurochemical systems (Bedrosian & Nelson, 2017). Decreased light exposure can alter hypothalamic activity, potentially affecting mood. It has been found that light exposure reduces blood flow to the amygdala, suggesting a reduction in vigilance rather than fear. The amygdala, involved in emotional responses and attention, is quieter in bright light, leading to a greater sense of well-being (Graham 2021; Bedrosian & Nelson, 2017:3).

Additionally, when people are exposed only to daylight and favourable light spectrums, they may experience conditions like seasonal affective disorder (SAD). SAD, often referred to as seasonal or winter depression, is a form of major depressive disorder that follows a seasonal pattern. People affected by SAD often undergo mood shifts and exhibit symptoms resembling depression, usually during the autumn and winter seasons when light is seemingly scarce. These symptoms tend to improve as spring arrives. SAD is linked to changes in the brain due to less daylight hours and less sunlight in winter, which can disrupt the biological internal clock or circadian rhythm, causing misalignment with daily schedules (Kamara, 2022). According to Pardini and Gupta (2023), there are a number of ways to remedy the SAD condition; one of which is putting patients in direct contact with high intensity light-emitting diodes (LEDs), which include RGB LEDs.

In support of this claim, a randomised, double-blind, placebo-controlled clinical trial by Desan, Weinstein, Michalak, Tam, Meesters, Ruiter, Horn, Telner, Iskandar, Boivin and Lam (2007:1–8) concluded that LED light therapy effectively alleviates the negative side effects of SAD. Out of 26 participants, 23 completed the trial. Initial SIGH-SAD scores were similar across groups. By the trial's end, a significantly higher proportion of participants in the active treatment group were in remission (SIGH-SAD score < 9) compared to the control group. Additionally, active treatment participants had significantly lower SIGH-SAD scores as a percentage of their initial scores. A longitudinal analysis revealed that the active treatment using LED outperformed the placebo.

Therefore, novel hologram technology shows promising outcomes when directly stimulating and capturing the attention of the human brain. However, with a lack of in-depth hologram advertising-based studies showcasing efficacy in increasing consumer behavioural intention, one can only speculate on the technology's true abilities to allure and drive consumer decision-making.

2.3.2 Hologram Technology in the Retail and Advertising Sector.

The use of hologram technology within the brick-and-mortar retail space is still relatively scarce; however, a few recent studies and implementations of hologram technology used by global brands have been uncovered. According to Wiley

(2023), the large fashion retail conglomerate H&M has implemented and trialled the use of hologram technology at the storefront to launch a new fitness and activewear line called “Move” in the Williamsburg suburb of Brooklyn, New York. The hologram advertising device displays life-size, full 4K videos and images of fitness instructors and influencers wearing the new Move fitness wear range.

According to Digital Signage Today (2023), this innovative advertising approach aims to captivate passersby and potential customers with dynamic, engaging content that showcases the clothing line in action. By featuring influential figures in the fitness community, H&M leverages the appeal and credibility of these personalities to create a compelling visual narrative highlighting the functionality and style of their new product line. In contrast to H&M's use of hologram technology, other world-renowned brands have also employed this novel technology to increase engagement and drive foot traffic to brick-and-mortar stores. According to Moss Corp–Sette Educato (2018), Mall of America and mixed reality and digital signage specialist organisation Ventana teamed up to create a unique festive season holographic concierge service. An animated character named Ellie assisted mall shoppers with appropriate gift selections and guided them to specific stores within the mall. This initiative aimed to positively benefit the shopping experience by providing customised and personalised assistance in an engaging and visually appealing manner. Ostuni (2018) posits that using the hologram advertising device within the mall increased consumer engagement, with average customer engagement time lasting more than four minutes. The hologram's allure and ability to hold one's attention engaged consumers of all ages. This indicates the potential of hologram technology to attract customers to maintain their interest and provide valuable assistance, thereby enhancing overall customer experience and satisfaction.

AI Screen, a leading holographic and dynamic technology provider, is leading the adoption of holographic advertising devices into retail spaces to create immersive and engaging consumer experiences. The organisation's advancements have significantly elevated the retail environment, capturing customer attention and boosting engagement. According to Sherbina (2024), AI Screen has captured several promising statistics that indicate the effects of utilising hologram advertising devices in retail environments. Statistics indicate that the

implementation of hologram devices can increase engagement and sales by up to 45 percent in different retail environments. Although these results sound promising, the volume of research within the field remains scarce, hence more research into hologram technology in the retail setting is needed. A discussion on the technological acceptance model (TAM) in conjunction with novel hologram technology will now be discussed.

2.4 TECHNOLOGY ACCEPTANCE MODEL (TAM)

The technology acceptance model (TAM), originally developed by Fred Davis in 1985, was the core theoretical framework of this study. It is an instrument aimed at predicting the users' attitudes and possible adoption of new technologies (Davis, 1985). TAM has been employed in a variety of contexts in an attempt to explain why some technologies are rapidly accepted, while others are not. According to Musa *et al.* (2024:3), TAM has been applied to numerous distinct sectors such as e-learning, e-government, marketing technologies, banking and various other technical-driven domains.

As for the current research, TAM acts as the theoretical lens through which to analyse potential consumers' perceptions when exposed to hologram-based technology. Hence, by employing TAM in this study, it was possible to develop a detailed picture of the factors that drove the acceptance or rejection of hologram technology in physical retail stores.

TAM comprises two primary components:

Perceived Usefulness (PU): This component evaluates consumer impressions on the likelihood that their everyday life and work productivity might change for the better by employing a given technology. It mainly focuses on the contingency and value that the technology provides to the user (Davis, 1985). Specifically, PU reflects users' beliefs regarding the efficiency and effectiveness of the technology in facilitating their tasks and improving overall productivity in both personal and commercial contexts (Gam *et al.*, 2017:6). For example, in a retail environment, consumers will perceive hologram technology as beneficial, if it provides subjectively perceived utility by providing additional information about the product,

or by offering aesthetically pleasing and attractive interfaces that influence consumers' purchasing and behavioural intentions.

Perceived Ease of Use (PEOU): This component regards the extent to which people trust that using the technology will be uncomplicated and easy. It categorises the technology based on the perceived difficulty of its adoption and usability by the target users (Davis, 1985). This perception encompasses factors such as the intuitiveness of the interface, the clarity of instructions and the overall simplicity of interacting with the technology (Puspitasari & Nugraha, 2023:1355). When applied to hologram technology in the retail setting, PEOU would focus on the degree of difficulty consumers would require to successfully engage with holographic displays without exerting significant energy or the requirement of technical knowledge about the solution.

Through these two key components, TAM offers a theoretical foundation for studying how individuals perceive and assess the benefits related to the use of hologram technology for enhancing the perceived value of entering and shopping at physical stores. Consequently, the goal of this research was to define the unique features of hologram technology, which impact the elements of PU and PEOU. This involves an understanding of how the use of display technology in the form of holograms can make shopping more enjoyable and informative (PU) and whether the interaction with the holographic display is seamless from a ease-of-use point of view (PEOU).

Moreover, TAM's applicability is not only limited to theoretical discussions; it also provides guidelines for hologram technology adoption to retail store owners and marketers. By considering the consumers' feedback with regards to PU and PEOU, retailers can decide which is the most suitable way to adopt the hologram technology for maximised acceptability and usefulness. For example, if consumers perceive that holograms are highly beneficial in offering product information (high PU) but they consider the level of PEOU to be low, then the retailers should work on developing better user interfaces (UI) and usability characteristics to boost acceptance tendencies.

Overall, TAM offers relevant theoretical support for the analysis of factors affecting the adoption of hologram technology in retail settings. Through

understanding PU and PEOU, this research intends to provide insights into how holograms can be deployed to enhance consumer attention and provide benefits to retail stores to advance one's knowledge of technological acceptance in the retail industry.

2.4.1 Consumer Attitudes and Behavioural Intentions in TAM

In addition to PU and PEOU, consumer attitudes play a critical role in TAM, as they act as a mediating factor between a consumer's perceptions of technology and their behavioural intentions (Mallizar, Almanthari & Maulina, 2021:3–6). An attitude refers to an individual's assessment of a psychological object, characterised by dimensions such as good or bad, favourable or unfavourable, or likeable or unlikable (Svenningsson, Höst, Hultén & Hallström, 2022:1533). Thus, perceptions and attitudes regarding technology can be described as an example of how an individual ultimately perceives the use of the technological tool in a given setting (Davis, 1985).

Perceived benefits refer to the extent of belief in the positive outcomes of the technology and ease of interactions; these enhance consumer attitudes and positively affect behavioural intention towards the increase or continuation of the technology interaction. TAM postulates that perceived attitudes have a direct impact on the consumers' intent to use a particular technology, thus promoting the likelihood of interactive or utilitarian use. By fostering positive attitudes, businesses can encourage greater user engagement and more frequent use, contributing to successful technology adoption (Suprawan, 2017:32–36). Consequently, consumer attitudes within TAM have the ability to influence behavioural intentions and businesses or organisations can leverage these attitudes to drive engagement and adoption of new technologies (Primaroni, Wijayanto & Samsir, 2024:309–321).

2.4.2 Technology Acceptance Model (TAM) in the Retail Setting

TAM has been widely applied across various sectors to assess the adoption of new technologies by uncovering consumer perceptions (Gam *et al.*, 2017:4). Within the retail sector, TAM framework is frequently utilised to explore the acceptance levels of novel technologies. For instance, Patil (2016) employed

TAM to evaluate the consumer usage rates of Internet of Things (IoT) technology, which monitors processes and aspects within physical retail stores. Furthermore, Alam, Susmit, Lin, Masukujjaman and Ho (2021) assert that the uptake of augmented reality technologies in brick-and-mortar retail is also being examined using the fundamental constructs of TAM to determine its potential for comprehensive adoption and enhancement of the overall customer retail experience.

Despite these advancements, it remains uncertain whether hologram technology, as a means of attracting customers into the retail environment, aligns with the core principles of TAM due to a scarcity of research in this specific area. Hologram technology, with its ability to create lifelike 3D images, holds potential to transform customer engagement and in-store experiences. However, the application of TAM to hologram technology in retail settings necessitates further investigation to validate its relevance and efficacy in this new context.

To fill this gap, and to ensure a broad understanding of the factors that affect the acceptance of hologram technology in retail, other theoretical models need to be included in addition to TAM. The AIDA model which stands for attention, interest, desire and action is commonly utilised in the marketing and advertising field to indicate the consumer's journey before an ultimate purchase decision is made. By combining the AIDA model with TAM provides the field of study with a broader understanding of consumer perceptions and attitudes towards hologram technology.

2.5 AIDA MODEL (ATTENTION, INTEREST, DESIRE AND ACTION)

Elmo Lewis introduced the AIDA model in 1898, offering a framework to describe the hierarchical response of consumers during the selling process. Since its inception, the AIDA model has been widely used in various fields, particularly in advertising, to measure the effectiveness of advertisements (Abdelkader & Rabie, 2019:1694–1695). The model comprises four key elements: attention, interest, desire and action, each representing a distinct stage in the consumer decision-making process. Each element will be discussed in more detail below:

Attention: This stage represents the initial cognitive phase, where individuals first become aware of the advertisement. It is a crucial initial phase because it captures the consumer's focus amidst a plethora of competing stimuli (Lipska, 2023). According to Kung (2022:816), this phase can also be described as the recognition phase, where advertisers aim to captivate consumers' attention and, ultimately, spark interest in a product or service. In the modern retail environment, consumers are constantly bombarded with information from various sources—both online and offline. Therefore, grabbing and holding their attention is essential for any marketing campaign. Effective attention-capturing strategies often involve the use of striking visuals, bold colours, dynamic movements and engaging content that stands out from the clutter (Bakija, 2018:1). By successfully drawing the consumer's eye to the advertisement, retailers can ensure that their message is noticed, setting the stage for deeper engagement in subsequent phases of the AIDA model. For hologram technology, the dynamic and visually striking nature of holographic displays is instrumental in potentially grabbing consumer attention, setting the foundation for further engagement.

Interest: This stage marks the first affective phase, involving the gathering of additional information about the marketed products. During this phase, it is crucial for the content displayed to not only attract but also sustain the consumer's curiosity. This stage also invokes an emotional response from consumers and prompts the consumer to want to know more about the product or service on display (Song *et al.*, 2021:4). Effective content at this stage can answer potential questions, highlight unique features and demonstrate the benefits of the product, thereby fostering a genuine interest and motivating the consumer to seek more information. The goal is to transition the consumer from mere awareness into a keen interest, setting the stage for the subsequent desire and action phases (Kung, 2022:816). At this stage, the content displayed by the hologram must be engaging and informative enough to maintain the consumer's curiosity and encourage deeper exploration. Effective holographic presentations may have the potential to enhance interest by offering interactive and immersive experiences that traditional displays might lack.

Desire: This stage reflects the degree to which individuals intend and decide to buy the promoted products. At this point, the consumer's mindset shifts from mere

interest to a strong inclination towards the product, which is often driven by the perceived value and benefits highlighted during the interest phase (Song *et al.*, 2021:4). Kung (2022:816) asserts that consumers who reach the desire stage are significantly more likely to advance to the final stage of the AIDA model, known as the action stage. Effective marketing strategies at this stage focus on emphasising unique selling points, showcasing customer testimonials and presenting persuasive arguments that address potential objections. By reinforcing the product's desirability and demonstrating how it meets the consumer's needs and preferences, marketers can strengthen the consumer's resolve and move them closer to the decision to purchase (Song *et al.*, 2021:4; Kung, 2022:816). Therefore, holograms can potentially stimulate desire by lucidly showcasing the product's features and benefits in a way that resonates emotionally with the consumer.

Action: This stage signifies the behavioural phase, indicating the practical steps taken to purchase the product. It represents the culmination of the AIDA model, where the consumer moves from intention to actual purchase. The effectiveness of an advertisement or image displayed by hologram technology is determined by how well it narrows the gap between attention and action (Lee & Trim, 2022:9). At this stage, it is crucial for marketers to provide clear and straightforward pathways to purchase, such as easy-to-navigate checkout processes, in-store assistance and immediate call-to-action prompts (Song *et al.*, 2021:4; Kung, 2022:816; Bakija, 2018:1; Lipska, 2023). By ensuring that the transition from desire to action is seamless and frictionless, holographic displays may potentially enhance the likelihood of converting interest into actual sales, or in this case, increased instore foot traffic. This involves not only capturing the consumer's attention but also guiding them smoothly through their decision-making process to the final purchase step.

Thus, using AIDA as the theoretical framework to evaluate the effects of hologram-based marketing techniques on physical store traffic, researchers are capable of identifying the extent of attentiveness, interest, desire and actions which are elicited by these technologies. This analysis can provide critical information to retailers on consumer behaviour, which would allow them to better adapt their marketing strategies to improve involvement while in the store.

Hence, the combination of the AIDA model and the TAM is suitable for this study; whereas TAM enables one to understand the perceived usefulness (PU) and perceived ease of use (PEOU) of the hologram technology, the AIDA model elucidates the degrees of consumers' involvement and their decision-making process. Together, these models offer a comprehensive view of how consumers perceive and interact with hologram technology in retail settings (Gam *et al.*, 2017:6; Kung, 2022:816). For example, through TAM, it is possible to determine if consumers consider hologram technology easy to use to enrich their shopping experience. At the same time, the AIDA model can determine if the holographic displays indeed capture attention, interest, desire and action. This multifaceted approach makes it possible to gauge the adoption of the technology but also its applicability and impact on traffic generation towards physical shops.

2.5.1 AIDA Model in the Retail Setting

According to Hawaldar and Ullal (2018:285), in the domain of brick-and-mortar retail, the AIDA model is a crucial concept used to grasp consumer behaviour and advertisement effectiveness. With retail advertising expenditure reaching over 40 billion US dollars globally, brands must evaluate their advertising campaigns through the AIDA framework to maximise efficiency (Lebow, 2023). The monumental global spend on advertising enforces the need to assess the returns these expenses yield in terms of driving traffic, engagement and sales. The AIDA model provides a simple process to monitor and evaluate the advertisements effects on actions and behavioural intentions of the consumers in question. This model also assists marketers in understanding the flow of events whereby advertisements obtain the attention of the consumer, instil interest, stimulate desire for acquiring products and ultimately trigger behavioural activities like store visits or purchases. Retailers are becoming more interested in concepts related to advertisement recall, store traffic generation, and consumers' unique paths and behaviours inside the retail store environment. Such questions raise awareness of the importance of the evaluation of consumers' responses to advertisements. Although advertisements are recognised for their potential to drive foot traffic, reliable data on this impact remains scarce (Hawaldar & Ullal, 2018:286; Fortenberry & McGoldrick, 2020:136).

Furthermore, Kiran, Majumdar and Kishore (2012:38–39) note that while marketers are aware of the potential of advertisements to drive foot traffic, they face challenges in obtaining consistent and reliable data to confirm this impact. The lack of comprehensive studies and empirical data on the direct effects of hologram-based advertisements on consumer behaviour in physical retail settings presents a significant challenge. This highlights a critical area for research aimed at uncovering the mechanisms through which advertisements influence consumer actions and contribute to in-store engagement and sales.

2.6 CONCLUSION

This literature review has therefore explored the ability of hologram-based displays to reactivate in-store traffic and influence the consumer's behavioural intention in the brick-and-mortar retail business setting. It has presented TAM and the AIDA model as key theoretical models for analysing user acceptance and consumer behaviour during their interaction with hologram-based technologies. The review has shown that there is a dearth of literature on the use of hologram technology to drive customers into physical stores, which in this study calls for further investigation and research. Additionally, innovative marketing techniques, such as social media, virtual reality, artificial intelligence and dynamic digital signage, have been discussed as strategies to drive in-store traffic and foster positive behavioural intentions. The emergence of hologram technology, with its potential to captivate audiences, presents a promising avenue to explore.

Existing research indicates that dynamic colours and imagery produced by RGB LED light sources can enhance mood and cognitive focus by capturing attention. This study explored whether hologram technology can have a similar effect as it utilised the same technology to provide its unique illusion of floating images, however, in a different configuration. Evidence shows that bright lights improve memory recall, mood and cognition. Light exposure also influences mood by regulating brain activity, which is crucial for managing SAD. LED light therapy has been proven effective in alleviating SAD symptoms. While holograms show promise, further research is needed to confirm their impact on consumer behaviour. The research studies unique methodologies employed will now be discussed in chapter 3.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter aims to uncover the research methods that can be considered unique to the outlined study. A research methodology refers to the research technique applied when conducting research to obtain and categorise data pertinent to the highlighted area of focus. By following this process, researchers can design their studies in a way that aligns with the key objectives of the study and effectively utilises selected research tools, ultimately aiding in the generation of new insights (Chaturvedi, 2023:2–4). This includes all major aspects of research; the research approach, data collection method and procedure, method of data analysis and the holistic framework utilised to conduct the research study. Moreover, it is vital for one to understand what the concept of research methodology entails; however, it is equally important to understand the importance of choosing the right research methodology for a particular topic to ensure the research is a success (Sreekumar, 2023).

In the research study titled "The Influence of New Marketing Techniques on Brick-and-Mortar Foot Traffic: The Hologram," a fitting methodological framework was constructed by combining various research techniques. Specifically, the research aimed to evaluate the effects of hologram-based technology on brick-and-mortar retail stores. The primary question is whether this technology can significantly affect in-store foot traffic and behavioural intention or if it is merely a passing trend. The research seeks to provide valuable insights for store owners considering hologram technology adoption by conducting consumer surveys in South Africa. This chapter includes pertinent research methodology components, including the research philosophy, research paradigm, research approach, research design, population, sampling method, data collection and statistical data analysis.

3.2 RESEARCH PHILOSOPHY

Research philosophy pertains to the underlying beliefs about the nature of reality being studied. The choice of research philosophy for a given field of study is shaped by the type of knowledge being investigated (Chege & Otieno, 2020:36).

3.2.1 Epistemological vs Ontological

The term epistemology originates from the Greek word 'episteme,' signifying knowledge. Various researchers and methodologists have articulated definitions of epistemology that relate to this concept of knowledge. (Sol & Heng, 2022:82). According to Rehman and Alharti (2016), epistemology is a branch of philosophy that investigates the nature of knowledge, including how it is obtained and verified. It focuses on understanding the types and forms of knowledge, how it can be obtained and how it is communicated to others. According to Godwin (2021:17), researchers explore objectivity, subjectivity, causality, validity and generalisability within this field.

In contrast, ontology can be described as a division of metaphysics, which has a myriad of interpretations (Ugwuanyi, 2022:569). This is the part of metaphysics that looks at reality and existence. In addition, ontology reflects elements of reality more narrowly – for example, monism (the materialistic view of reality) or monadology (reality as a set of individual substances). Metaphysics also investigates realms beyond human experience to establish foundational principles of knowledge. Ontology also investigates the fundamental nature of existing entities. In this context, metaphysics pertains to the study of reality in its entirety. Ontology, therefore, deals with the essence of reality or existence, independent of any specific existing object (Rehman & Alharthi, 2016; Kant, 2014:69).

In this study, an epistemological research standpoint was adopted. An epistemological approach is more suitable for this study as it focuses on understanding and validating the impact of holographic advertising on consumer behaviour and in-store traffic. This approach allows for the exploration of objective phenomena and quantifiable factors, which is essential for interpreting the effects of holographic marketing on foot traffic (Godwin, 2021:17). In contrast to ontology, which focuses on the nature of hologram marketing itself, epistemology centres on how knowledge about its effectiveness is constructed and communicated.

3.3 RESEARCH PARADIGM

A research paradigm refers to the shared assumptions and principles among researchers about how to approach and understand problems. Essentially, a paradigm is a set of assumptions about how things function, often referred to as a 'worldview', that includes shared perceptions of reality. Clarifying one's research paradigm is crucial because it directs the methods used to solve problems (Brown & Dueñas, 2020:545). The interpretivist, positivist and pragmatist research paradigms will be discussed.

3.3.1 Interpretivism, Positivism and Pragmatism

With this research grounded in an epistemological philosophical standpoint, it becomes important to define the study's chosen research paradigm. Thus, three major paradigms emerge: interpretivism, positivism and pragmatism.

According to Alharashsheh and Pius (2020:41–43), interpretivism arose as a response to positivism, highlighting the importance of a subjective viewpoint. It emphasises the need to grasp the intricacies and richness of social phenomena within their specific contexts, recognising that humans are fundamentally different from physical phenomena due to their capacity to create intricate meanings (Junjie & Yingxin, 2022:11–12). Unlike natural sciences, social sciences necessitate this distinction, as human behaviour cannot be studied in the same manner as physical objects (Alharashsheh & Pius, 2020: 41–43; Junjie & Yingxin, 2022:11–12)

Key aspects of interpretivism include acknowledging cultural, situational and temporal differences that shape diverse social realities (Alborough & Hansen, 2022:11). This approach contrasts with the ideals of positivism, which seeks to establish universal laws applicable to all. Instead, interpretivism aims to gather rich, context-specific insights rather than generalising findings across different settings (Pervin & Mokthar, 2022:423).

In contrast to interpretivism, positivism is a research paradigm that emphasises understanding human behaviour through observation and reason, focusing on objective, observable facts (Alakwe, 2017:42). The positivist approach asserts

that true knowledge comes from sensory experiences obtained through observation and experimentation (Gemma, 2018:45). Furthermore, according to Nel (2016), positivism quantifies data to enhance precision and discern relationships, focusing on data that can be explained scientifically. This approach values real and objective data interpretation, relying on observation and quantifiable measurements for validity (Maksimović & Jelena, 2023:210). Positivist research postulates one objective reality, independent of the observer, governed by natural laws that research aims to uncover and describe. This approach emphasises experimentation, control, measurement, reliability and validity, leading to precise and generalisable answers. The scientific method in positivism aims to produce objective and generalisable answers to research questions (Purnamasari, 2016:190). In addition, positivism's advantage is the ability to reach a board range of situations in a little amount of time. Positivism emphasises experiential knowledge but can overlook more abstract concepts that are not directly measurable, such as cause, time and space (Park, Konge & Artino, 2020:691). It assumes all processes can be understood through individual actions or relationships and its focus on the status quo can result in descriptive findings that lack depth (Nel, 2016; Purnamasari, 2016:190).

Another research paradigm that is relevant to consider is pragmatism. Pragmatism as a research paradigm avoids debates over truth and reality, focusing instead on practical, empirical inquiry. It acknowledges multiple realities understood through human experience in context (Kelly & Cordeiro, 2020:3). Pragmatists see knowledge and reality as socially constructed and aligned with individual experiences. Pragmatism rejects the idea of a definitive reality, viewing truth as what works in practice and withstands scrutiny over time. Pragmatists value utility over intrinsic nature, emphasising outcomes and holding beliefs that effectively meet end goals (Kaushik, 2019:3–4). Pragmatism is a practical approach aiming to solve real-world problems. It moves beyond the objectivity-subjectivity dualism, integrating postpositivist and constructivist methods into a focus on empirical inquiry and practical results (Holtrop & Glasgow, 2022:426–427; Kaushik, 2019:3–4).

Therefore, in light of analysing all three proposed research paradigms, the positivist research paradigm had been chosen to execute this research study. The

positivist research paradigm suited the study because it emphasised objective measurement, hypothesis testing and quantitative data analysis. This approach allowed for precise, replicable and generalisable results by using controlled surveys to isolate the impact of hologram marketing and advertising. The positivist paradigm also supported data-driven insights and predictive analytics, ensuring scientific rigour and robust, reliable findings that can potentially guide strategic marketing decisions in a physical retail setting.

3.4 RESEARCH APPROACH

When assessing a study's unique research approach, two major components become evident, namely inductive and deductive research approaches (Barrett & Younas, 2024:6–7). An inductive research approach embraces a broad philosophical standpoint. This type of research is driven by novel, unexpected and contextually rich empirical observations, rather than gradual and incremental empirical developments (Proudfoot, 2022:311). A researcher's goal is not to determine the probability of certain phenomena but to elucidate the presence of a unique occurrence. An inductive researcher seeks to understand and explain unique occurrences or patterns that emerge from data. This anomaly serves as a catalyst for generating insights, not only about the anomaly itself but also about related subjects more broadly. The unexpected occurrence does not merely disprove an existing hypothesis; rather, it initiates a new avenue of exploration—one that is investigative, embraces qualitative data and offers fresh perspectives on the broader context (Corley, Bansal & Yu, 2021:163). Gabriel (2013) adds that an inductive research approach begins with the process of gathering data relevant to the subject at hand. Once a large amount of relevant data has been captured, the researcher takes a moment to examine it from a wider viewpoint. In this stage, the researcher recognises trends in the data and develops a theory to explain these patterns. Inductive research is essentially, a step-by-step progression from specific observations to general propositions based on those observations. In many cases, inductive research takes the form of qualitative research (Kara, 2024).

Conversely, researchers who employ a deductive approach reverse the inductive research process. Researchers begin by compiling a social theory and test its

implications using data, moving from a general concept to a specific application (Singh, 2024). This method is commonly linked with empirical based investigation. This is where the researcher conducts a review of prior research literature, reviewing established theories which are linked to the phenomenon in question and then examines hypotheses that are drawn from the outlined theories. (Mauldin, 2020:39). In addition, deductive research typically takes the form of more scientific and quantitative research as it tests specific hypotheses derived from existing theories using numerical data and statistical methods to confirm or refute these hypotheses. This approach relies on measurable, objective data to draw conclusions, ensuring results are precise and generalisable (Bingham, 2023:2).

With both research approaches being adequately defined and discussed, this research study followed a deductive and quantitative research approach, which lies firm in the research's positivist research standpoint. Therefore, a deductive approach is appropriate because it starts with established theories and tests their applicability in a specific context. TAM, which explains how users come to accept and use technology, provides a solid foundation for predicting how consumers may potentially react to hologram technology in retail environments. By applying TAM, researchers can formulate hypotheses about factors such as perceived ease of use, perceived usefulness and their impact on consumer attitudes and behaviours towards hologram technology.

Similarly, the AIDA model, which outlines the stages consumers go through from becoming aware of a product to taking action, can be used to predict and measure the effectiveness of holograms in capturing attention, generating interest and prompting behavioural intentions. Using these models, this research formulated specific hypotheses regarding the impact of hologram advertising on foot traffic and sales in brick-and-mortar stores. By applying these established theories, the deductive approach allowed the researcher to systematically test the hypotheses with empirical data, providing clear insights into the validity of TAM and AIDA in the context of hologram technology in retail marketing. This method not only validated the theoretical models but also offered practical insights for retailers considering the adoption of hologram-based marketing strategies.

3.5 RESEARCH DESIGN AND STRATEGY

According to Khanday and Khanam (2019:367), a research design is a logical plan for conducting a study. This plan aims to uncover the study's unique methodologies and techniques to achieve the studies outlined objectives. Acting as a framework, it guides the collection, measurement and analysis of data. It is the overall scheme that directs the researcher in gathering, analysing and interpreting observations, providing a systematic procedure to follow.

In this study, a conclusive research design was chosen. According to Arezina (2018:698), a conclusive research design can be categorised into descriptive and causal types. Descriptive research design aims to describe specific aspects of the phenomena under study, providing information about their current status. Causal research design, on the other hand, seeks to identify cause-and-effect relationships. It measures the impact of specific changes on existing theories, norms and assumptions and aims to find causal explanations by testing hypotheses.

In the conducted research, a descriptive research design was utilised. Descriptive studies aim to illustrate one or more variables and their distribution by considering any causal or other hypotheses. Descriptive studies are also segmented into two main designs, namely cross-sectional and longitudinal designs (Aggarwal & Ranganathan, 2019:34). In this specific study, a cross-sectional design was chosen. Cross-sectional studies can be regarded as observational research methods that aim to examine collected data from a population at one specific point in time (Wang & Cheng, 2020). Lastly, a cross-sectional design can be split into two distinct subsections: single cross-sectional and multiple cross-sectional.

Single cross-sectional research involves capturing data from a wider population at a predefined point in time. This approach provides a screenshot of the variables in focus, allowing the researcher to analyse and interpret the data as it exists at that moment. Multiple cross-sectional research entails the collection of data from a myriad of population samples at differing points in time. This method enables researchers to compare changes and trends over different periods, providing insights into how variables evolve over time (Aggarwal & Ranganathan, 2019:34; Wang & Cheng, 2020).

Therefore, the study followed a conclusive, descriptive, single cross-sectional design.

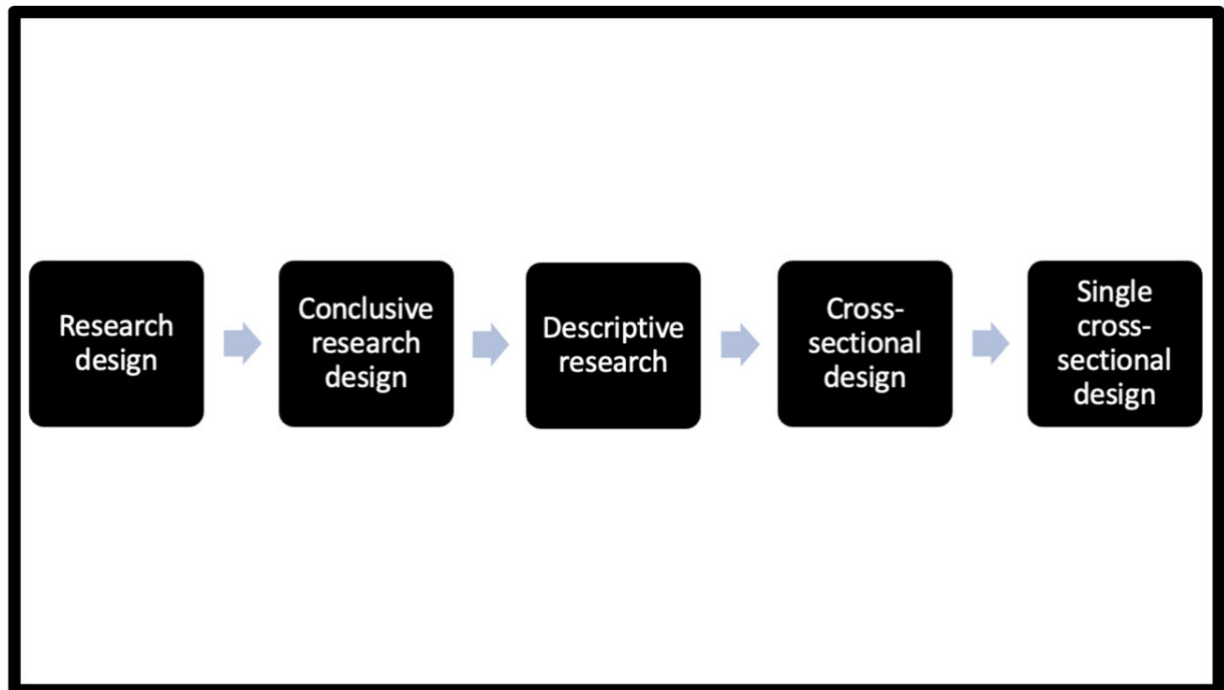


Figure: 3.1: Research Design Flow

3.5.1 Research Strategy

A research study can follow several different research strategies. These strategies include experimental research, surveys, case studies and action research.

Experimental research, according to Zubair (2023), involves conducting research objectively by controlling variables to maximise precision and to draw specific conclusions about a hypothesis. This method manipulates independent variables to observe their effects on dependent variables, aiming to control all factors influencing the experiment (Singh, 2021:1–2).

Survey research gathers information from a sample of respondents through unique responses to outlined questions. It uses various methods for participant recruitment, data collection and instrumentation (Zimba & Gasparian, 2023:1). It can be quantitative (e.g., numerical questionnaires), qualitative (e.g., open-ended questions), or mixed methods. Survey research ranges from simple, targeted questions to rigorous studies with validated instruments. Examples include marketing surveys and public opinion polls. Traditionally, surveys involved large-scale data collection to describe characteristics of large populations swiftly, such as census surveys and consumer feedback surveys (Ponto, 2015:168–169). Recently, survey research has become more rigorous, employing various strategies to ensure high-quality outcomes (Singh & Sagar, 2021:1). These include selecting representative samples, choosing distribution methods and implementing follow-up procedures to reduce non-response errors. Modern surveys serve various research purposes, using diverse sampling, recruitment strategies and data collection tools (Kennedy, Jensen & Jensen, 2022).

Another commonly employed research strategy is the case study approach. As noted by Priya (2021:95), a case study can be described as an empirical investigation which explores real-world phenomenon, utilising multiple data collection methods for a comprehensive analysis. It serves as a research strategy or design for examining a social unit, rather than simply being a method of data collection.

Case studies typically employ a qualitative research design where researchers aim to deeply investigate a programme, event, activity, process, or group of individuals. These cases are confined by time and activity, with detailed information gathered through multiple data collection procedures over an extended period (Takahashi & Araujo, 2020:101). Furthermore, action research can be described as a methodology that seeks to investigate and address a specific issue. Action research is, therefore, a type of research whereby one carries out analyses as points of action are implemented. Coined by MIT professor Kurt Lewin in 1944, this interactive approach is commonly adopted in the domain of social and educational sciences (Arora, 2017: 163–166).

Among all the available research techniques, survey research was deemed the most appropriate for this investigation. The survey method was effective since it can be used to gather large scale data from many respondents in the shortest time possible. Compared to the other field-based research methods, surveys can be used to gather customer perceptions, attitudes and behaviours with regards to hologram marketing techniques in terms of actual foot traffic. It makes this approach ideal for evaluating consumer responses in light of new marketing approaches and as a result, guarantees inclusive and stratified results.

In addition, surveys were a suitable option as they could be easily distributed via digital channels such as social media. This will be discussed in more detail within the chosen data collection strategy.

3.6 SAMPLING PROCEDURE

A sampling procedure is a method used to select a subset of individuals or items from a larger population to make inferences about the whole. It includes the identification of the study's population, sampling frame, selection of sampling methods and the calculation of the sample size (Taherdoost, 2016:18).

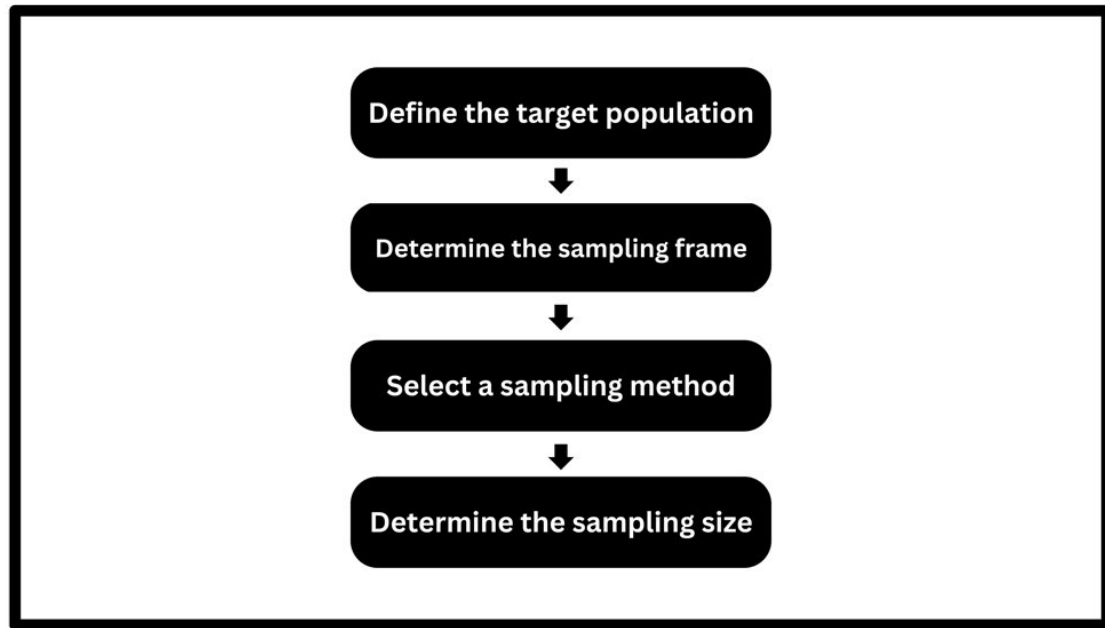


Figure 3.2: Sampling Procedure (Taherdoost, 2016:19).

3.6.1 Target Population

An essential component of the research involved selecting an appropriate target population. As discussed by Willie (2023:1) the target population can be described as a specific subset of individuals within a broader population that the study seeks to identify as the point of focus. According to Thacker (2020:3), this group comprises individuals who share traits or fulfil specific criteria. Determining the target population depends on the research problem, objective and the unique goals of a specific initiative. For instance, in a survey that aims to evaluate a new product or service, the target population would encompass the specific demographic or group of consumers that the product is intended for (Willie, 2023:1; Thacker, 2020:3).

In the case of the conducted research, the study's target population encompassed consumers aged 18 and above from diverse ethnic backgrounds residing in South Africa. This included individuals who have access to the internet. By focusing on this demographic, the study aimed to capture a wide spectrum of perspectives and consumer perceptions, ensuring that the findings were representative of the wider South African consumer population. Due to the study's broad target population, it was envisaged that respondents of all backgrounds and ethnicities would participate in the respective study. The internet's wide reach allowed this

to take place as no individuals were excluded from the study. Furthermore, the requirement for internet access ensured that participants were able to engage with the study's digital platform. This was particularly relevant since respondents were required to complete an online research survey. This comprehensive approach provided valuable insights into the behaviours, preferences and attitudes of a varied and digitally connected consumer base in South Africa.

In addition, the target population encompassed consumers above the age of 18 across all provinces in South Africa. Furthermore, a strategic decision to include consumers above the age of 18 ensured that the potential consumer was more likely to be part of the workforce of South Africa and could contribute to the country's economic landscape.

3.6.2 Sampling Frame

A sampling frame can be defined as a list of individuals or objects within the target population from which probability samples are selected. Hence, it may not include every individual within the target population out of which the sample is taken. (Mauldin, 2020:94).

In the case of this research, the sampling frame consisted of all South Africans 18 years and older, who have internet access. This survey included various questions pertaining to the potential influence hologram technology had on South African consumers in the physical retail setting. The online survey was distributed through various online channels, such as WhatsApp, Facebook, Instagram, X and any other widely distributed online platform. Respondents were free to choose whether to complete the survey. In essence, due to the internet's vast network, the survey reached respondents across all provinces and of varied demographics and backgrounds. The questionnaire utilised inputs from the researchers existing contacts and unknown contacts through paid advertising campaigns conducted on the relevant social media platforms.

3.6.3 Sample Method

Sampling methods or techniques are statistical approaches used to choose a sample that accurately represents the entire population, allowing researchers to

study the population's characteristics (Edwards, 2024). These methods are essential for gathering meaningful data and analysing it to identify the unique attributes of the population. Various sampling strategies are employed depending on the population's traits, the study's objectives and the resources available. The following sections review two main categories of sampling methods: non-probability sampling and probability sampling (Bisht, 2023).

According to Stratton (2023:147–148), non-probability sampling involves selecting units from a population through subjective (i.e., non-random) methods. This approach does not require a complete survey frame, making it a quick, simple and cost-effective way to gather data. However, to draw valid conclusions about the population from the sample, it is necessary to assume that the sample accurately represents the population. Non-probability sampling typically includes convenience sampling, judgmental sampling, quota sampling and snowball sampling methods (Elfil & Negida, 2017:2).

In contrast, probability sampling involves selecting a sample through random sampling, where each individual or unit in the population has a known, non-zero chance of being chosen. This method is considered the most reliable by statisticians because it minimises sampling bias and typically produces samples that accurately reflect the entire population (Rahman, Tabash, Salamzadeh, Abduli & Rahaman, 2022:44). With a representative sample, researchers can make valid inferences about the population. Types of probability sampling include simple random, stratified, cluster and systematic sampling (Frost, 2024).

With a broader understanding of sampling methods, the proposed research adopted non-probability sampling methods, specifically convenience and snowball sampling, due to their practical benefits of ease, cost-efficiency and quick data collection capabilities. Convenience sampling targeted South African consumers with internet access, while snowball sampling increased participation through referrals from initial respondents. To encourage respondent referrals, at the end of each completed questionnaire, respondents were asked to share the respective survey with friends, family or colleagues within South Africa. This message could be found at the end of the questionnaire, once the respondent had been thanked for their valuable participation in the study. This approach ensured

respondent confidentiality as each respondent shared the questionnaires' online link directly with other potential respondents.

To address limitations and to enhance the sample's representativeness, the study included demographic questions about respondents' country of origin, current residing province, current age and gender. This approach ensured a diverse sample and improved the generalisability of the findings.

3.6.4 Sample Size

A sample size means the number of individuals who act as subjects in a particular research investigation (Andrade, 2020:102). Typically, these participants are chosen from a diverse group of individuals and are meant to represent the broader population. Since it is impractical to include every person of a population in a study, having an appropriately sized sample is essential for producing reliable and valid results (Mauldin, 2020:98; Frost, 2024).

A sample size of 400 South African consumers above the age of 18 (with access to the internet) was chosen for this study. To justify the selected sample size for this study, prior validated works similar in nature were examined. The following studies were examined: Song *et al.* (2013:4) (sample size:287), Abdelkader and Rabie (2019: 1696) (sample size:738) and Moon, Lee, Shim and Hwang (2023:6) (sample size: 379). Hence, a sample size of 400 participants was considered sufficient for the study's objectives. Additionally, this sample size met the requirements of the statistical techniques used for multivariate data analysis.

3.7 DATA COLLECTION METHOD

Data collection methods are divided into primary and secondary data collection. Primary data refers to unpublished, first-hand information gathered for specific purposes, often offering greater control over validity, reliability, objectivity and authenticity compared to secondary data (Costa, 2024). This is essential in research methods like statistical surveys, where specific problem-related information is needed. Although secondary data can be useful, reliable results often require primary data due to concerns over biases or alterations in secondary sources (Wickham, 2019:396). Primary data collection provides high-quality data

and allows for the addition of new information during research; however, it can be challenging and expensive. Common primary data sources include experiments, surveys, interviews and questionnaires (Taherdoost, 2021:12; Cleave, 2023).

In this research study, the chosen method to collect the required data was an online survey approach. Respondents who engaged with the online survey through channels such as Instagram, Facebook and WhatsApp were shown a video that described and demonstrated a functioning hologram device affixed to the outside of a retail store. Thereafter, the respondent was directed to participate in the online questionnaire. Once the questionnaire was completed by the respondent, the data was automatically captured via a Google sheet which worked in conjunction to the Google form platform which was used to create the questionnaire. The data captured was then exported into an Excel or CSV format. The data was stored on the researcher's laptop and in a Google cloud environment for backup.

3.8 QUESTIONNAIRE DESIGN

The questionnaire included three distinct sections, namely the cover page, section a: demographic questions and section b: the measuring constructs pertaining to consumer perceptions towards the adoption of hologram technology in the brick-and-mortar setting. The cover page of the research study contained a brief message to all potential respondents outlining the nature of the study and the purpose of the research. The cover page also indicated to respondents that the proposed questions may take approximately 10 minutes to complete. In addition, a consent clause was included that stipulated that the research was a low-risk study and that by completing the proposed questionnaire all respondents automatically consented to being part of the study. No direct personal data such as name, surname, email address was collected throughout the questionnaire process.

Section a gathered essential demographic data, such as age and gender and a question pertaining to where respondents resided in South Africa, according to provincial status. This information helped to contextualise the responses and comprehensively analysed how different demographic groups perceived hologram technology. The measuring constructs were placed in section b. This

section focused on consumer perceptions regarding the adoption of hologram technology in brick-and-mortar stores. The measurement scale's constructs included attention, interest, perceived usefulness, perceived ease of use, desire, behavioural intention and sensory stimulation.

3.8.1 Questionnaire Content

The questionnaire made use of validated scales adapted from previously published research by Song *et al.* (2013:5), Moon, Lee, Shim and Hwang (2023:5) and Min, Min, Jie, Shuhao and Jie (2022:267). The measuring scale constructs included attention (4 items), interest (4 items), perceived usefulness (3 items), perceived ease of use (4 items), attitude (4 items), desire (3 items), behavioural intention (3 items), sensory stimulation (3 items). The questionnaire utilised a four-point Likert-type scale to assess responses, ranging from strongly agree (4) to strongly disagree (1). In addition, each independent construct provided between a minimum of three and a maximum of four items. This scale was selected intentionally to eliminate the option for a neutral response. Furthermore, to gather a considerable number of respondents, the study used snowball sampling in addition to the initial convenience sampling approach, which encouraged the sharing of the questionnaire and video link.

3.8.2 Questionnaire Administration

The questionnaire was disseminated through social media platforms like Instagram, WhatsApp and Facebook. Initially, the respondents read the questionnaire's cover letter, which provided a detailed brief about the study and the questions that followed, as well as a consent clause for all respondents. Thereafter, they watched a brief video illustrating the functionality of hologram technology and demonstrating its application in showcasing store marketing collateral and products. The data collection for this study was conducted using an online survey approach. Participants first viewed a video that describes and demonstrated a functioning hologram device installed outside a retail store. This visual introduction aimed to give respondents a clear understanding of the technology being studied before any related questions were answered. The link to the online survey is provided below:

https://docs.google.com/forms/d/e/1FAIpQLSdmyiEYdFgmG0TUKynVZmCBiFgSKPOvbxHaEf2rJn9Wf9Lyw/viewform?usp=sf_link

The formal questionnaire including a respondent consent section can be found in Annexure A.

3.9 DATA PREPARATION

After the respective fieldwork had been completed, the raw data from the online survey was processed before it could be analysed. This process included data editing, coding and tabulation (Kulkarni, 2016: 657–658).

3.9.1 Step 1: Editing

Editing entailed verifying that the collected data was accurate, complete and aligned with the research objectives (Marušić, 2023). Questionnaires typically undergo multiple rounds of editing before the data is processed. In essence, editing involved reviewing the questionnaires for mistakes, readability issues, and inconsistencies (de Waal, 2013: 475).

3.9.2 Step 2: Coding

According to Maher, Hadfield, Hutchings and de Eyto (2018:6), the data can be coded once the questionnaire editing has been completed. Coding involved the action of assigning a unique identifier or code to each response to the provided questions (Coates, Jordan & Clarke, 2021:3). This process involved transforming data which was still raw in format into symbols by organising responses into a myriad of different categories and classifications. The coding table can be found in chapter 4.

3.9.3 Step 3: Tabulation

The last step was tabulation, which involved systematically organising the data by tallying the number of responses associated with each question. Two main forms of tabulation exist, namely univariate and multivariate tabulation. This study employed univariate tabulation, where data was tabulated individually, with one response recorded for each question. This contrasts with multivariate tabulation, where data is tabulated in groups, which often includes three or more variables (Zhang, 2016:4; Kulkarni, 2016:659).

3.10 STATISTICAL ANALYSIS

The data and information utilised in undertaking this research was coded and analysed by the help of the Statistical Package for Social Sciences (SPSS) software version 29 for Microsoft Windows. The study used a number of statistical methods to create meaningful results:

3.10.1 Internal-Consistency Reliability Analysis

Internal-consistency reliability assesses the uniformity of results across items that are being tested. Cronbach's alpha, the most common measure, is derived from the average of all possible split-half reliability coefficients, improving on earlier methods. This test evaluates how well all items relate to each other when measuring different aspects of the same concept. More items lead to more reliable data (Hajjar, 2018:31).

As posited by Sideridis, Saddaawi and Al-Harbi (2018:4), Cronbach's alpha shows internal-consistency reliability, reflecting the number of items and their inter-correlations, ranging from zero to one. A high alpha indicates items measure the same attribute, while a low alpha suggests they measure different attributes. The primary source of measurement error is sampling content. When using summated scales, internal-consistency reliability is assessed to ensure a scale's reliability. Cronbach's alpha coefficient is a widely used indicator for this purpose. It is calculated by averaging all possible split-half correlations of the scale items, with values ranging from 0 to 1. Higher values indicate better internal consistency. For a scale to be considered reliable, Cronbach's alpha values between 0.60 and

0.70 are marginally acceptable, values between 0.70 and 0.80 are acceptable and values between 0.80 and 0.90 or higher are ideal (Daud, Khidzir, Ismail & Abdullah, 2018:1030).

3.10.2 Validity

Validity focuses on whether a measuring instrument adequately reflects the actions or characteristics it is meant to evaluate, which is an assessment of how the instrument performs its intended function (Heale & Twycross, 2015:66). It is determined by the meaningful and fitting interpretation of the data obtained from the instrument. Validity ensures that the measurements align with the research purpose, making it essential to confirm that the scale's items accurately reflect the research objectives. Assessing validity can often be more challenging than evaluating reliability, but both are essential for meaningful research. Using a validated instrument ensures that the analysis findings are accurate and valid (Sürücü & Maslakci, 2020:2696; Heale & Twycross, 2015:66).

This involves using a well-validated instrument that accurately assesses the intended behaviour and qualities, with the meaningful interpretation of data being paramount. The validity tests confirmed that the scale's measurements align with the research objectives, ensuring that the results are both accurate and relevant. This thorough validation process was crucial for producing meaningful and reliable findings from the study.

Furthermore, according to Roebianto, Savitri, Aulia, Suciyan and Mubarakah (2023:6), researchers can evaluate validity using content validity, criterion validity, and construct validity. Content validity, also referred to as face validity, involves an experienced researcher evaluating items for clarity and relevance to ensure they measure the intended construct. Criterion validity tests the correlation between constructs of existing and current instruments, with higher correlations indicating greater validity. Construct validity determines if the constructs measure what they are intended to, linking the scale to the theory. Construct validity consists of convergent validity and discriminant validity.

According to Nickerson (2023), convergent validity, also known as congruent validity, refers to how strongly responses on a test or instrument are related to

responses on similar tests or instruments. A construct should correlate with related variables but show little to no correlation with unrelated ones. In this particular study, a Pearson correlation test was utilised to uncover these relationships.

Discriminant validity measures how much a test is unrelated to other tests that assess different constructs, which represent behaviours, attitudes, or concepts not directly observable. Tests for different constructs should show low correlation; otherwise, it suggests they may be measuring the same thing. Discriminant validity, often assessed alongside convergent validity, indicates the distinctiveness between constructs (Ronko & Cho, 2020). In this case, the research analysed the heterotrait-monotrait (HTMT) ratio. This method was used to measure the discriminant validity outcome.

3.10.3 Correlation Analysis

Correlational studies aim to determine the degree of relationship between two variables, without manipulating them. In this case, one measures naturally occurring events, behaviours, or characteristics. It's crucial to note that correlation does not imply causation. While you cannot infer a causal relationship from the data, you can assess the size, strength and direction of the connection between the variables (Aggarwal & Ranganathan, 2016:187). This particular study utilised the Pearson correlation coefficient.

The Pearson correlation coefficient, ranging from -1 to +1, measures the strength and direction of the relationship between two continuous variables:

- 0.0: No correlation
- 0.1 to 0.3: Weak positive correlation
- 0.3 to 0.5: Moderate positive correlation
- 0.5 to 0.7: Strong positive correlation
- 0.7 to 0.9: Very strong positive correlation
- 0.9 to 1.0: Extremely strong positive correlation
- -0.1 to -0.3: Weak negative correlation
- -0.3 to -0.5: Moderate negative correlation
- -0.5 to -0.7: Strong negative correlation
- -0.7 to -0.9: Very strong negative correlation

- -1.0: Perfect negative correlation

For example, in analysing the effect of hologram technology on retail foot traffic, a coefficient close to +1 indicated a very strong positive relationship, suggesting that more holograms are associated with increased foot traffic and positive consumer behavioural intention (Schober, Boer & Schwarte, 2018:1765). A coefficient close to -1 would indicate that more holograms are associated with decreased foot traffic.

3.10.4 Descriptive Statistics

Descriptive statistics offer a summary of the sample under investigation without making any predictions or drawing conclusions. They characterise the population through various tools, including frequency distribution tables, percentages, and measures of central tendency such as the mean, median, and mode. Descriptive statistics can be utilised for a single variable (univariate analysis) or multiple variables (bivariate or multivariate analysis), providing a concise overview of the data that quantifies attributes like averages and proportions within the dataset (Kaliyadan & Kulkarni, 2019:83). In this study, the primary parameters examined included the mean, standard deviation, skewness, and kurtosis.

3.10.5 Independent-Sample T-Test

The concept behind the two-sample t-test is to compare the means of two populations using two independent samples. A typical experimental setup involves having test and control conditions, with subjects randomly assigned to one of these groups. One variable is measured and compared between the two conditions (samples) (Skaik, 2015:1558; Xu, Fralick, Zheng, Wang, Tu and Feng, 2017:186)

3.10.6 Cohens D-statistic

According to Maher, Markey and Ebert-May (2013:349), Cohen's d statistic is a measure of effect size, representing the extent to which a null hypothesis is incorrect. It quantifies the magnitude of differences between two (or more) groups on a specific variable, with larger values indicating greater differentiation between the groups. In scientific studies, reporting Cohen's d alongside statistical

significance tests is considered complementary, providing a fuller picture of the results.

Cohen's d scale:

0.2: Small effect - Indicates a small difference between groups, which might be noticeable but not substantial.

0.5: Medium effect - Represents a moderate difference, which is often considered meaningful in practical terms.

0.8: Large effect - Signifies a substantial difference between groups, typically indicating a strong and notable impact (Brydges, 2019:1).

3.10.7 Mahalanobis Distance Statistic

The Mahalanobis distance statistic, introduced by Mahalanobis in 1936, is a statistical method used to determine the distance between a specific point and the mean of a multivariate normal distribution (Etherington, 2019:1). According to Prabhakaran (2024), this metric is highly valuable and has excellent applications in detecting anomalies within multivariate data, classifying instances in heavily imbalanced datasets and performing one-class classification.

Furthermore, the Mahalanobis distance statistic was utilised within the research study to isolate respondent outliers. Mahalanobis values that exceeded 26.125 (chi-square value for $\alpha=0.001$ at 8 df) were removed from the study.

3.11 SYNOPSIS

This chapter discusses the major building blocks of the methods used in the research study.

The study was conducted within a positivist epistemological perspective. This philosophical approach assumed that knowledge and information was measured and obtained from observable phenomenon. As a result, the study employed a deductive research approach that comprised of hypothesis testing and by applying knowledge to guide the research process. This deductive approach

prompted the collection of quantitative data, which made the research highly empirical in nature.

The study therefore utilised a conclusive, descriptive, single cross-sectional research design that made use of survey-based research methods. This is a process where electronic and online surveys were administered which included the studies 28 key questions. This online survey method was selected based on its effectiveness and its ability to reach a large number of individuals.

After the data was gathered, the data was analysed thoroughly using different statistical methods. Effective data interpretation was achieved through this statistical analysis in order to make conclusions that identified patterns for the research. With these methodological components the research yielded accurate, credible and valuable findings. In-depth data analysis of the studies data will now be discussed in chapter 4.

CHAPTER 4: DATA ANALYSES

4.1 INTRODUCTION

This chapter aims at providing and discussing the findings derived from the empirical data of this research. It comprises the identification of the findings that arose from the data gathering activities and is supplemented by information about the demographic variables of the sample provided in section 4.4. In addition, the outcomes of the Mahalanobis distance statistic, internal consistency reliability analysis, descriptive statistical analysis, correlation analysis and independent sample t-test are presented in Section 4.5, Section 4.6, Section 4.7, section 4.8 and section 4. 9 respectively. The statistical analyses for this research were performed using SPSS version 29.0 for Windows.

4.2 DATA GATHERING PROCESS:

The questionnaire used to conduct the data collection process consisted of 28 items, divided into two sections (refer to Chapter 3, Section 3.8.1). Data were collected from South African consumers aged 18 and older with internet access. The questionnaire was distributed across various online platforms, including Facebook, Instagram, LinkedIn, and instant messaging services. Participants were informed that their participation was completely voluntary. As per the sampling strategy outlined in Chapter 3, a total of 322 responses were gathered out of the target of 400, leveraging the broad reach of social media and utilising snowball sampling to encourage respondent referrals Song *et al.* (2013:4) (sample size: 287).

4.3 PRELIMINARY DATA ANALYSES

Before conducting the main analysis, a preliminary analysis was carried out. This process included coding, data cleaning, and tabulation, as described below.

4.3.1 Coding

In the coding process, numerical values were assigned to each potential response in the questionnaire (Coates *et al.*, 2021:3). This study's questionnaire was divided into two sections: Section A, which focused on the demographic

information of the participants, while Section B covered the measuring scales' constructs and related questions. Each respondent completed the same questionnaire. The variable codes and their corresponding values are displayed in Table 4.1.

Table 4.1 Coding

Section A: Demographical data			
Question	Code	Variable	Value assigned to responses
Question 1	A1	Province of origin	KwaZulu-Natal (1); Eastern Cape (2); Gauteng (3); Free State (4); Western Cape (5); Limpopo (6); Mpumalanga (7); Northern Cape (8); North West (9) Other (10)
Question 2	A2	Age	
Question 3	A3	Residency	Yes = 1; No = 2
Question 4	A4	Gender	Male = 1; Female = 2; Prefer not to say = 3
Section B: Attitudes and knowledge towards the environment:			
Item	Code	Construct	Value assigned to responses
Item 1	B1	Attention (ATT)	Strongly disagree (1), Disagree (2), Agree (3), Strongly Agree (4)
Item 2	B2		
Item 3	B3		
Item 4	B4		
Item 5	B5	Sensory Stimulation (SS)	Strongly disagree (1), Disagree (2), Agree (3), Strongly Agree (4)
Item 6	B6		
Item 7	B7		
Item 8	B8	Interest (INT)	Strongly disagree (1), Disagree (2), Agree (3), Strongly Agree (4)
Item 9	B9		
Item 10	B10		
Item 11	B11		

Item 12	B12	Perceived	Strongly disagree (1), Disagree
Item 13	B13	Usefulness (USE)	(2), Agree (3), Strongly Agree
Item 14	B14		(4)
Item 15	B15	Perceived ease of	Strongly disagree (1), Disagree
Item 16	B16	use (EASE)	(2), Agree (3), Strongly Agree
Item 17	B17		(4)
Item 18	B18		
Item 19	B19	Attitude (AT)	Strongly disagree (1), Disagree
Item 20	B20		(2), Agree (3), Strongly Agree
Item 21	B21		(4)
Item 22	B22		
Item 23	B23	Desire (DE)	Strongly disagree (1), Disagree
Item 24	B24		(2), Agree (3), Strongly Agree
Item 25	B25		(4)
Item 26	B26	Behavioural	Strongly disagree (1), Disagree
Item 27	B27	Intention (BI)	(2), Agree (3), Strongly Agree
Item 28	B28		(4)

4.3.2 Tabulation of Variables

After the data was coded, the next step was tabulation. In this process, response frequencies were provided for each construct. Due to space constraints and the prescribed length of the mini dissertation, the table has been omitted from this document. Readers interested in accessing the table and data may request it directly from the researcher.

4.4 DEMOGRAPHIC ANALYSIS

The study aimed to achieve the 400-response target; however, once the data collection process was completed, 322 questionnaires in total were gathered for the specified time frame. The collected questionnaires then underwent data-

cleaning initiatives to encourage more reliable data; this left 308 viable responses for analysis.

The Mahalanobis distance statistic was used to detect any outliers present within the data set. The analysis revealed that 12 cases had Mahalanobis statistic values greater than 26.125. This will be discussed further in section 4.5. Additionally, two other respondent responses were removed due to incomplete submissions. This totalled 14 responses that were removed from the study to give a final respondent response count of 308.

In Figure 4.1 the sample included respondents from all nine provinces of South Africa, except the Northern Cape. The majority of participants were from Gauteng (41,90%), followed by the Western Cape (24,70%) and KwaZulu-Natal (21,40%). Other provinces represented include Eastern Cape (4,20 percent), Free State (3,2%), Mpumalanga (1,3%), Limpopo (1%), North West (1%), Northern Cape (0%) and 1.3 percent of respondents choice to select 'other'.

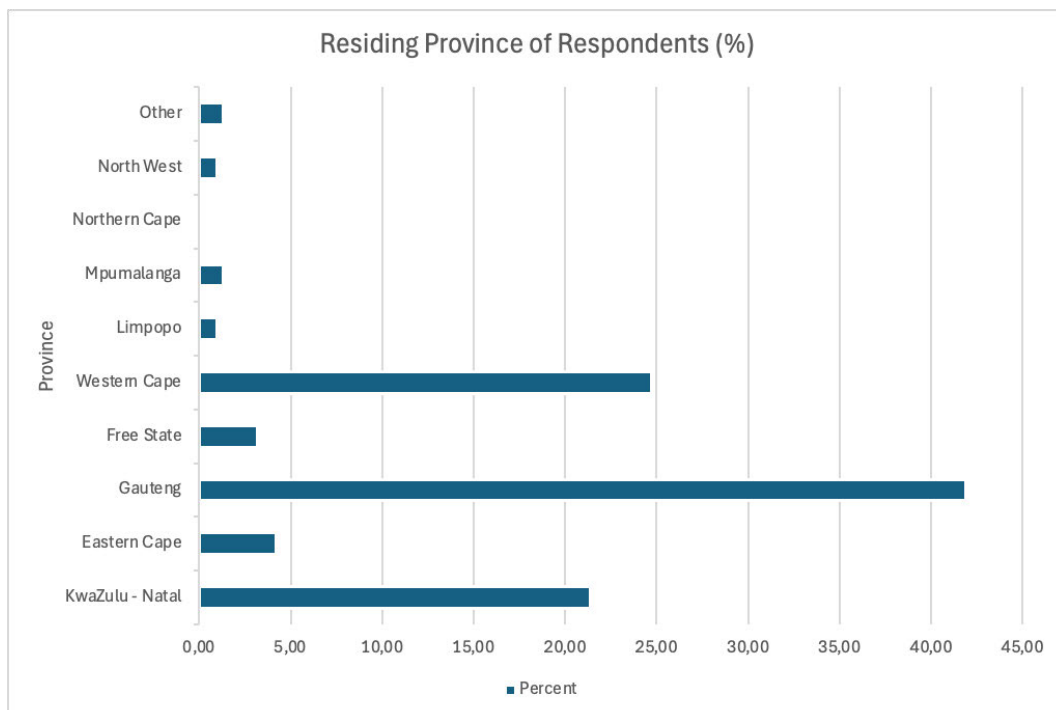


Figure 4.1: Residing Province of Respondents

In Figure 4.2, the gender distribution among the participants was nearly balanced, with 49.7% identifying as male and 50% as female. A very small percentage, 0.3%, chose not to disclose their gender.

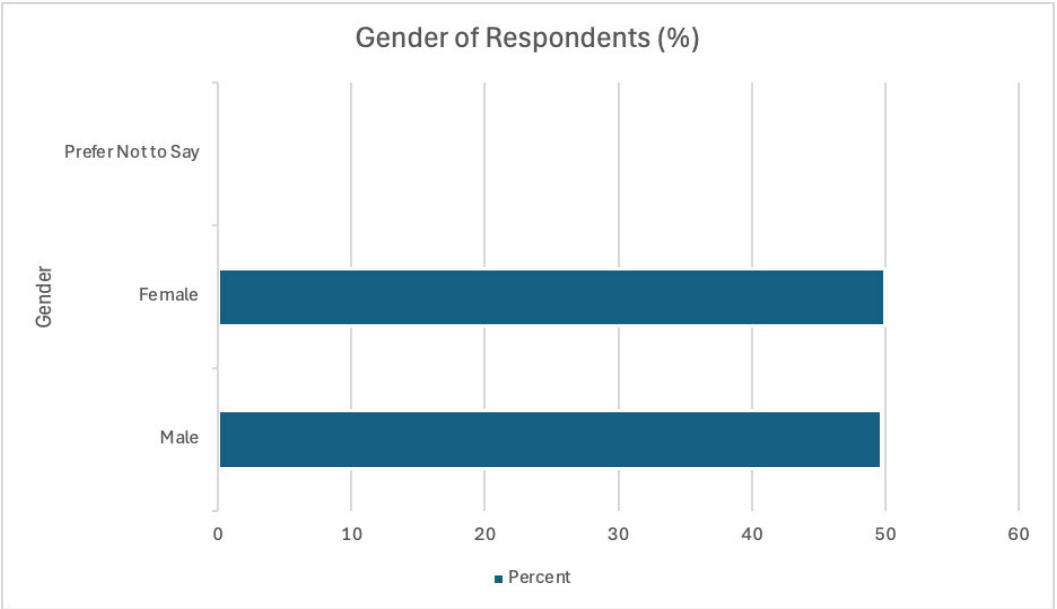


Figure 4.2: Gender of Respondents

The age distribution of the participants showed that the majority (67.4%) were 20 to 29 years old. The next largest groups were those aged 30 to 39 (15.1%), 50-59 (4.2%) and 40-49 (3.8%). Smaller percentages were found in the 60-69 age range (3.4%) and those aged 70 and above (0.6%). The age groups 18-19 and 70+ each represented 0.6 percent of the participants.

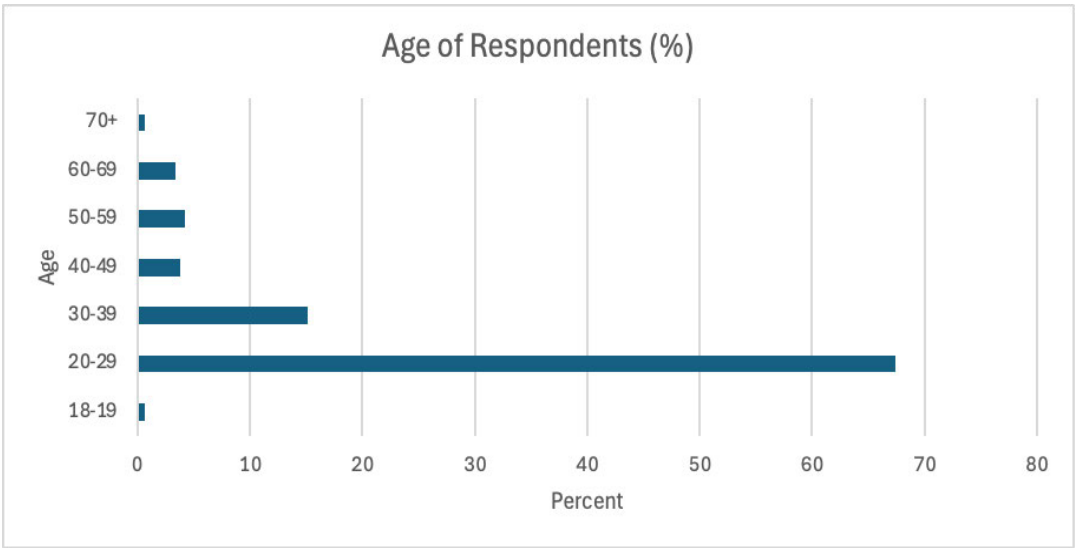


Figure 4.3: Age of Respondents

4.5 MAHALANOBIS DISTANCE STATISTIC

Table 4.2 Mahalanobis Outlier Statistics

		Case Number	Statistic
Mahal. Distance	1	73	97.06
	2	37	86.92
	3	33	74.53
	4	212	62.21
	5	176	55.97
	6	187	53.10
	7	152	43.75
	8	35	42.55
	9	150	40.87
	10	156	40.44
	11	159	34.78
	12	51	31.81
	13	69	24.97
*Note bold cases were deleted			

The results presented in the table highlight the Mahalanobis distances for specific cases in the dataset, which were used to detect outliers. The Mahalanobis statistic is a method commonly used for identifying outliers by measuring the distance of a data point from the centre of a multivariate distribution (Etherington, 2019:1). In this study, a threshold value of 26.125 (chi-square value $\alpha=0.001$ with 8 degrees of freedom) was used to identify outliers. Any Mahalanobis distance larger than this threshold was flagged as an outlier and was subsequently removed from the dataset.

This eliminated extreme values that could otherwise affect the overall interpretation of the results. Consequently, it was anticipated that excluding such outliers would generate a more accurate picture and a statistically firmer case. The fact that the Mahalanobis distance test had been used also strengthened the study because, unlike simple procedures for identifying outliers based on univariate criteria, including the Mahalanobis distance meant that the study had taken into account correlations between variables. Consequently, the Mahalanobis method enhanced the desired level of accuracy in the predictive

models and regression analysis, which was carried out on the rest of the data collected (Prabhakaran, 2024).

4.6 INTERNAL-CONSISTENCY RELIABILITY ANALYSIS

Cronbach's alpha assesses internal consistency reliability by evaluating the number of items and how well they correlate with each other, with values ranging from zero to one. A higher alpha signifies that the items measure the same underlying attribute, whereas a lower alpha suggests they assess different attributes (Sideridis *et al.*, 2018:4). Cronbach's alpha values for this study are presented in table 4.3.

Table 4.3 Internal-Consistency Reliability Analysis of Hologram Constructs.

When analysing Table 4.3, the attention (ATT) construct has a Cronbach's alpha

Construct	N of Items	Cronbach's Alpha
Attention (ATT)	4	0.496
Sensory Stimulation (SS)	3	0.835
Interest (INT)	4	0.703
Perceived Usefulness (USE)	3	0.693
Attitude (AT)	4	0.729
Perceived Ease of Use (EASE)	4	0.681
Desire (DE)	3	0.804
Behavioural Intention (BI)	3	0.618

of 0.496, indicating unacceptable reliability as it falls significantly below the acceptable threshold of 0.6. This suggests that the four items may have not consistently measured the same concept and may require revision to improve reliability. It is important to note that the attention construct might have been negatively influenced by the method of visual presentation. Respondents viewed the hologram advertising device via video, rather than experiencing it in person, which could have impacted their ability to engage with the hologram device fully. Additionally, when a hologram is filmed, distortions in the frame rate occur due to the spinning blades of the device, which may have affected the perceived quality of the hologram and, consequently, the respondents' attention (Salo *et al.*, 2019). As a result, attention had been omitted from the rest of the analysis as it could not

be seen as a reliable measuring construct and, thus, the null hypotheses H_{01a} , H_{02a} and H_{03a} were accepted, and their corresponding alternatives were rejected.

In contrast, the sensory stimulation (SS) construct showed good reliability with a Cronbach's alpha of 0.835, well above the threshold, indicating that the three items were highly consistent and effective in measuring the intended concept. The interest (INT) construct had acceptable reliability with a Cronbach's alpha of 0.703, suggesting that the four items were adequately consistent and aligned with the measured concept, requiring no immediate revisions. Perceived usefulness (PU) and perceived ease of use (PEOU) showed moderate reliability, with Cronbach's alphas of 0.693 and 0.681, respectively. desire (DE) exhibited strong reliability with a Cronbach's alpha of 0.804, demonstrating that the three items were highly consistent and effective at capturing the intended concept, requiring no further revisions. The attitude (AT) construct showed good reliability with a Cronbach's alpha of 0.729, indicating that the four items were fairly consistent and effectively measured the underlying concept, with no immediate need for revisions. Lastly, behavioural intention (BI) had acceptable reliability with a Cronbach's alpha of 0.618, suggesting reasonable consistency but also indicating the potential for improvement to enhance reliability.

4.7 DESCRIPTIVE STATISTICS

Table 4.4 Descriptive Statistics of Hologram Technology Constructs

	N	Mean	Std. Deviation	Skewness	Kurtosis
SS	308	3.4805	0.46130	-0.026	-1.521
INT	308	3.4562	0.39245	0.171	-1.363
USE	308	3.4134	0.40812	0.282	-1.330
EASE	308	3.3937	0.36636	0.440	-1.120
AT	308	3.4083	0.38007	0.268	-1.183
DE	308	3.4275	0.42558	0.243	-1.498
BI	308	3.4394	0.42061	-0.177	-0.218

Note: SS = Sensory Stimulation, INT = Interest, USE = Perceived Usefulness, EASE = Perceived Ease of Use, AT = Attitude, DE = Desire, BI = Behavioural Intention

SS scored a mean of 3.48 with a standard deviation of 0.46, indicating general effectiveness with relatively low variability. Interest (INT) had a mean of 3.46 and a standard deviation of 0.39, reflecting consistent engagement. Perceived usefulness (USE) scored a mean of 3.41 and a standard deviation of 0.41, showing moderate consistency in responses. Perceived ease of use (EASE) had a mean of 3.39 with a standard deviation of 0.37, indicating a generally positive but varied perception. Attitude (AT) scored a mean of 3.41 with a standard deviation of 0.38, reflecting an overall positive attitude. Desire (DE) had a mean of 3.43 and a standard deviation of 0.43, showing strong but varied desire. Behavioural intention (BI) scored a mean of 3.44 with a standard deviation of 0.42, suggesting positive intention. Overall, all constructs scored above the midpoint, indicating a generally favourable perception of hologram advertising technology.

Since all skewness and kurtosis values fall within the typical range of -2 to +2, this suggested that the data followed a generally normal distribution across all constructs. No construct showed significant deviations from normality.

4.8 ONE SAMPLE T-TEST

In order to respond appropriately to the first of the empirical objectives outlined in chapter 1, a one-sample t-test was implemented to determine if South African

consumers had statistically significant positive affirmations towards hologram technology in terms of the chosen constructs. The expected mean was set at $X > 2$. Below are the formulated hypotheses:

H₀₁: South African consumers do not have inclinations of positive attention_{1a}, sensory stimulation_{1b}, interest_{1c}, perceived usefulness_{1d}, attitudes_{1e}, perceived ease of use_{1f}, desire_{1g} and behavioural intentions_{1h} towards hologram technology.

H_{a1}: South African consumers do have inclinations of positive attention_{1a}, sensory stimulation_{1b}, interest_{1c}, perceived usefulness_{1d}, attitudes_{1e}, perceived ease of use_{1f}, desire_{1g} and behavioural intentions_{1h} towards hologram technology.

The results of the calculated t-values and p-values are detailed in Table 4.5.

Table 4.5 One-Sample T-Test of Hologram Technology Constructs

	Mean	Std Deviation	Std Error	t-value	p-value
SS	3.4805	0.46130	0.026	56.326	0.000*
INT	3.4562	0.39245	0.022	65.118	0.000*
USE	3.4134	0.40812	0.023	60.779	0.000*
EASE	3.3937	0.36636	0.020	66.762	0.000*
AT	3.4083	0.38007	0.021	65.029	0.000*
DE	3.4275	0.42558	0.024	58.867	0.000*
BI	3.4394	0.42061	0.023	60.058	0.000*
*Significant at the 0.05 level (1-tailed)					
Note: SS = Sensory Stimulation, INT = Interest, USE = Perceived Usefulness, EASE = Perceived Ease of Use, AT = Attitude, DE = Desire, BI = Behavioural Intention					

Table 4.5 indicates that each measuring construct recorded p-values of $p < 0.05$. Therefore, the null hypotheses H_{01b-h} are rejected, and alternative hypotheses H_{a1b-h} are concluded. This indicates that South African consumers exhibit statistically positive inclinations of sensory stimulation, interest, perceived usefulness, attitudes, perceived ease of use, desire and behavioural intentions towards hologram technology.

4.9 CORRELATION ANALYSIS

Table 4.6 Correlation Analysis of Hologram Technology Constructs

	SS	INT	USE	EASE	AT	DE	BI
SS	1						
INT	0.547**	1					
USE	0.481**	0.474**	1				
EASE	0.380**	0.532**	0.596**	1			
AT	0.467**	0.606**	0.569**	0.602**	1		
DE	0.436**	0.494**	0.457**	0.515**	0.574**	1	
BI	0.235**	0.421**	0.353**	0.489**	0.501**	0.456**	1

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

Note: SS = Sensory Stimulation, INT = Interest, USE = Perceived Usefulness, EASE = Perceived Ease of Use, AT = Attitude, DE = Desire, BI = Behavioural Intention

Correlational analysis aims to evaluate the strength of the relationship between two variables without altering or influencing them (Aggarwal & Ranganathan, 2016:187). Table 4.6 shows the relationships between several constructs measured in the study. All correlations were found to be significant at the 0.01 level (two-tailed). As such, the null hypotheses H_{02b-h} were rejected, and alternative hypotheses H_{a2b-h} were accepted.

Sensory stimulation (SS) had significant positive relationships with all other constructs, the strongest being Interest (INT) ($r=0.547$), suggesting that as sensory stimulation increases, interest in hologram advertising also increases. Moreover, there was a moderate yet still positive and significant correlation with perceived usefulness (PU) ($r=0.481$) and weaker correlations with behavioural intention (BI) ($r=0.235$), indicating a weaker link between sensory stimulation and future purchase intentions. Interest (Int) was significantly positively and moderately correlated with all other constructs. The strongest relationship is with attitude (AT) ($r=0.606$), indicating that as interest in hologram advertising grows, so does the positive attitude towards it. The correlation with perceived ease of use

(PEOU) was also strong ($r=0.532$), showing that increased interest is associated with a perception of hologram technology being easier to use (Moreira, Fortes & Santiago, 2017:77).

Perceived usefulness (PU) showed a strong, significant positive correlation with perceived ease of use (PEOU) ($r=0.596$), suggesting that the easier users find the hologram technology to use, the more useful they perceive it to be. PU was also positively correlated with attitude (AT) ($r=0.569$), indicating that perceptions of usefulness are closely tied to positive attitudes toward the hologram advertising device. Perceived ease of use (PEOU) correlated strongly with attitude (AT) ($r=0.602$), implying that ease of use significantly affected positive attitudes. EASE also had a moderate correlation with desire (DE) ($r=0.515$) and behavioural intention (BI) ($r=0.489$), suggesting that as ease-of-use increases, desire and the intention to engage with the hologram device by entering the store also increases (Song *et al.*, 2021:3).

Consumer attitude (AT) had a strong positive significant correlation towards desire (DE) ($r=0.574$) and behavioural intention (BI) ($r=0.501$). This indicated that a positive attitude towards the hologram advertising device increases the desire to engage with it and the intention to enter the store. Desire (DE) shows moderate correlations with behavioural intention (BI) ($r=0.456$), meaning that as desire increases, so does the intention to enter the store. It also correlates moderately with most constructs, especially with attitude (AT), reinforcing that desire and attitude are closely connected (Song *et al.*, 2021:3).

Behavioural intention (BI), which reflects the intention to enter and purchase from a store using hologram advertising technology, had its strongest correlation with attitude (AT) ($r=0.501$), suggesting that a positive attitude towards the hologram advertising device strongly influences future engagement intentions. It also had moderate correlations with perceived ease of use ($r=0.489$) and desire (DE) ($r=0.456$), indicating that ease of use and desire also played a role in shaping behavioural intentions (Song *et al.*, 2021:3).

As each measuring construct recorded significant positive coefficients below 0.90 between all constructs at the $p = 0.01$ level, it may be inferred that nomological validity was present within the data set. The study's data set yielded acceptable

discriminant validity as each of the HTMT ratio values were below the 0.90 threshold (Voorhees, Brady, Calantone & Ramirez, 2016; Fornell & Larcker, 1981). Furthermore, the dataset showed no signs of multicollinearity, as none of the Pearson correlations were above 0.90.

In summary, the constructs in the study are positively correlated, with significant relationships between sensory stimulation, interest, ease of use and attitudes contributing to perceptions of usefulness, desire and behavioural intention. The strongest connections appeared between attitude and interest, as well as attitude and ease of use, indicating that these factors are crucial in influencing how people engage with the hologram advertising device (Schober *et al.*, 2018:1765). The following section describes the independent samples t-test analysis performed for the study.

4.10 INDEPENDENT-SAMPLES T-TEST

The independent samples t-test is designed to compare the average values of two samples by analysing data from two independent samples (Xu *et al.*, 2017:186). In this case, gender comprises the two independent samples being examined

Table 4.7 Independent samples T-Test: Gender Differences

Constructs	Gender Differences						
	Male Mean	Male SD	Female Mean	Female SD	t-value	p-value	Cohen's D
Male = 153							
Female = 154							
SS	3.5011	0.43950	3.4610	0.48387	0.759	0.008	0.087**
INT	3.4690	0.40385	3.4432	0.38297	0.574	0.320	*****
USE	3.4183	0.39833	3.4091	0.42012	0.197	0.245	*****
EASE	3.3807	0.36056	3.4075	0.37372	-0.638	0.386	*****
AT	3.4167	0.37609	3.4026	0.38488	0.324	0.679	*****
DE	3.4379	0.41442	3.4199	0.43754	0.370	0.180	*****
BI	3.4118	0.42019	3.4675	0.42184	-1.160	0.332	*****

*Statistically significant at $p < 0.01$

** small effect, practically non-significant

*** Medium effect and moving toward practical significance

**** Large effect, practically significant

***** Cohen's D-statistic not calculated as the variable was not statistically significant

Note: SS = Sensory Stimulation, INT = Interest, USE = Perceived Usefulness, EASE = Perceived Ease of Use, AT = Attitude, DE = Desire, BI = Behavioural Intention

As Table 4.7 shows, there was no statistical difference between INT ($p = 0.320 > 0.01$), PU ($p = 0.245 > 0.01$), PEOU ($p = 0.386 > 0.01$), AT ($p = 0.679 > 0.01$), DE

($p = 0.180 > 0.01$) and BI ($p = 0.332 > 0.01$) of male and female respondents. Therefore, the null hypothesis H_{03c-h} was accepted. However, sensory stimulation amongst participants showed a statistical difference ($p = 0.008 < 0.01$). As such the alternative hypothesis H_{a3c} cannot be rejected at the 5 percent significance level. The statistical significance indicates that male students may have a slightly stronger positive attitude towards sensory stimulation compared to female students. However, the small effect size (Cohen's D of 0.087) suggests that while the difference is statistically significant, it is not practically significant. This means that although the result is unlikely to have occurred by chance, the difference between male and female perceptions of sensory stimulation may not be meaningful in a practical context.

4.11 SYNOPSIS

This chapter provides a detailed examination of the data collected from the 308 viable responses in the study. After data-cleaning and applying the Mahalanobis distance statistic to remove outliers, the final dataset represented respondents from eight South African provinces, with Gauteng contributing the largest percentage (41.9%). The gender distribution was nearly even, and most respondents (67.4%) fell between the ages of 20-29.

The Mahalanobis distance statistic was used to eliminate 14 responses identified as outliers based on their calculated distance values, enhancing the study's accuracy by removing extreme values that could distort the results.

Cronbach's alpha was calculated for several constructs to assess their internal consistency. Most constructs displayed acceptable reliability, with SS showing a high alpha (0.835), indicating strong consistency. In contrast, ATT was omitted from further analysis due to its poor reliability ($\alpha = 0.496$). Other constructs, such as INT, USE and BI, exhibited moderate to good reliability, suggesting effective measurement of their intended concepts.

Descriptive statistics revealed generally positive perceptions of the hologram advertising technology. All constructs scored means above 3.4 on a five-point scale, with SS and desire showing some deviations from normal distribution.

Despite this, the data was mostly well distributed, indicating a favourable response to the technology.

The correlation analysis found significant positive relationships between all constructs. SS had the strongest relationship with INT ($r = 0.547$) and INT was closely linked with ATT ($r = 0.606$). Perceived ease of use also showed strong correlations with usefulness and attitude, highlighting ease of use as a key factor in shaping perceptions of the hologram device.

An independent-sample t-test comparing male and female responses found no statistically significant differences in most constructs, except for sensory stimulation, where males exhibited a slightly stronger positive attitude. However, the effect size was small, indicating that the difference, while statistically significant, is not practically meaningful.

Overall, this chapter demonstrated a positive reception to hologram advertising technology, with significant relationships between sensory stimulation, interest and attitude driving perceptions of ease of use and usefulness. Gender differences were minimal, reinforcing the broad appeal of the technology across different demographics. Therefore, hologram technology may indeed have a strong positive influence on both consumer perceptions and the ability to increase in-store foot traffic by captivating the attention of consumers. A detailed discussion of the research's final outcomes will be discussed in chapter 5.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION AND STUDY OVERVIEW

This study investigated the impact of hologram technology on foot traffic and consumer behaviour in brick-and-mortar retail settings, addressing the crucial need for physical stores to innovate amidst increasing competition from online retailers. In recent times, digital marketing strategies such as SEO and paid advertisements have become dominant, and traditional retailers are on the lookout for more efficient ways to capture customers' attention to ensure that they enter their physical retail stores (Husain *et al.*, 2020). The study of South African consumers above the age of 18, helps to isolate their perceptions toward the state-of-the-art technology and how it can enhance the shopping experience in physical outlets.

Additionally, looking at the existing authoritative data concerning the study, it becomes clear that traditional retailers are required to integrate advanced solutions, including holograms, augmented reality (AR) and artificiality intelligence (AI). Existing research, although scarce, indicates that these technologies can create immersive and captivating experience, potentially leading to increased consumer engagement and satisfaction (Sagar, 2024:7–14; Tan *et al.*, 2022:26). Furthermore, this study makes use of two key theoretical frameworks: TAM and the AIDA model. The perceptions of the users concerning the technology are measured by TAM whereby the relative usefulness and ease of operation influences the uptake of the new technologies while the AIDA model anticipates the consumer's unique cycle of purchase behaviours and intentions ranging from awareness to action (Davis, 1985; Gam *et al.*, 2017; Abdelkader *et al.*, 2019). When incorporated into the research, both the frameworks work towards seeking to understand how holograms could be used in attracting the attention of consumers and encouraging them to visit the retail stores.

Methodologically, the study employed a deductive, quantitative approach, utilising surveys to gather data from a target sample of 400 South African consumers. The survey was designed to assess demographic information and consumer

perceptions towards hologram technology. After data cleaning, a total of 308 valid responses were analysed, revealing that the majority of respondents were young adults primarily from Gauteng, with a near-equal gender distribution.

Chapter 4 presented detailed analyses of the empirical findings, demonstrating that constructs related to hologram advertising scored above the midpoint, indicating a generally favourable perception of this technology. The study also employed a one-sample t-test, which confirmed that South African consumers hold statistically significant positive inclinations toward hologram technology across several key constructs, such as sensory stimulation, perceived usefulness and behavioural intentions. Additionally, significant positive correlations were identified, particularly highlighting sensory stimulation's strong relationship with interest. An independent-sample t-test further revealed minimal gender differences in attitudes toward hologram technology, suggesting that its appeal transcends demographic boundaries. Overall, the findings imply that hologram technology can enhance consumer attention and enrich shopping experiences, ultimately having the ability to increase foot traffic in physical retail environments. A more detailed discussion of these outcomes is provided in the section below.

5.2 MAIN FINDINGS OF THE STUDY

5.2.1 Demographic Findings

The demographic analysis of the study underscores the promising potential of hologram advertising technology in South Africa's retail sector. With a sample of 322 collected questionnaires, ultimately yielding 308 viable responses, the research captured a diverse demographic landscape. Notably, significant representation came from key provinces such as Gauteng (41.9%), the Western Cape (24.7%) and KwaZulu-Natal (21.4%), suggesting a wide geographical reach for potential market impact. The nearly balanced gender distribution (49.7% male and 50% female) combined with the predominance of respondents aged 20-29 (67.4%) indicate a tech-savvy, youthful consumer base likely to be receptive to innovative advertising strategies (Lippert, Koetter, Cheris & Heck, 2023). This demographic profile highlights the strategic alignment of hologram technology with the preferences and behaviours of South African consumers, reinforcing its

viability as a compelling tool for enhancing in-store engagement and driving consumers into stores by way of captivation.

5.2.2 Statistical Findings

Internal Consistency Reliability

The reliability assessment of the study revealed a high internal consistency of some major constructs of hologram advertising technology such as sensory stimulation (SS), interest (INT), desire (DE) and attitude (AT). The results showed that SS is an effective research tool in measuring consumer interest based on human sensations as it yielded a Cronbach's alpha of 0.835. This internal consistency increases the credibility of hologram advertising as a persuasive method of captivating a consumers' attention. With the attention (ATT) construct yielding a reliability score of only 0.496, it implies that it was difficult to capture true consumer engagement through video representation of the technology due to a number of visual distortions (Salo *et al.*, 2019). It is possible that the effective management of this challenge can also add to the strength of hologram advertisement's ability to influence consumers to engage more actively with physical stores, and may have a positive impact on consumer behaviour and intent.

Descriptive Statistics and Positive Perceptions

The study's findings revealed that all measured constructs related to hologram advertising technology scored above the midpoint, demonstrating a generally favourable perception among respondents. Specifically, sensory stimulation (Mean = 3.48), interest (Mean = 3.46), perceived usefulness (Mean = 3.41), perceived ease of use (Mean = 3.39), attitude (Mean = 3.41), desire (Mean = 3.43) and behavioural intention (Mean = 3.44) reflect positive consumer sentiment towards this innovative advertising medium. These means are statistically significant, as confirmed by the one-sample t-test results, which recorded p-values of $p < 0.05$ for each construct, leading to the rejection of the null hypothesis H_{01b-h} . This indicates that South African consumers exhibit statistically positive inclinations towards sensory stimulation, interest, perceived usefulness, attitudes, ease of use, desire and behavioural intentions regarding hologram technology.

These encouraging perceptions provide compelling evidence supporting the alternative hypothesis (H_{a1b-h}), which posits that hologram technology enhances in-store foot traffic by engaging and attracting consumers. This strong endorsement from consumers highlights the potential of hologram advertising to become a transformative tool for attracting and engaging shoppers in the retail sector.

Correlation Analysis

The Pearson correlation analysis of the study revealed significant relationships among various constructs, underscoring the effectiveness of hologram advertising technology in influencing consumer behaviour. Notably, a strong positive correlation was observed between sensory stimulation and interest ($r = 0.547$), as well as between interest and attitude ($r = 0.606$). As a result, the null hypothesis H_{2b-h} were rejected and their respective alternatives accepted. These findings emphasise the critical role that sensory engagement plays in fostering consumer interest and shaping positive attitudes towards hologram advertising. Such relationships align seamlessly with the study's objectives of assessing consumer perceptions and their potential implications for purchase intentions, further validating hologram technology as a powerful tool for driving customer engagement and increasing foot traffic in retail environments. This underscores the importance of incorporating sensory elements in advertising strategies to enhance consumer interactions and drive purchasing decisions (Krishna, Cian & Sokolova, 2016:142–147).

Independent Samples T-Test

While the study did not reveal any clear variations between male and female respondents for most constructs, the notable difference in attitudes towards sensory stimulation ($p = 0.008$) reveals subtle gender-based disparities in how hologram advertising is perceived. Specifically, the higher mean for female respondents suggests that sensory stimulation holds greater importance for women compared to men. This finding is significant as it addressed the empirical objective of exploring potential gender differences in attraction, interest and behavioural inclinations towards hologram technology. This resulted in only

accepting the alternative hypothesis H_{a3b} and subsequently rejecting hypothesis H_{a3c-h} .

By recognising these distinctions, marketers can tailor their advertising efforts to more effectively engage female consumers by focusing on sensory-driven elements. This targeted approach allows retailers to optimise hologram technology, creating personalised advertising strategies that appeal to different demographic groups, thereby enhancing its overall effectiveness in driving foot traffic and improving customer experiences in-store.

5.3 CONTRIBUTIONS OF THE STUDY

The study provides valuable contributions to the retail sector, especially for store owners, consumers and the broader body of knowledge regarding digital advertising technologies like holograms.

For store owners, the findings present a strong rationale for integrating hologram advertising into their marketing strategies. The demographic analysis reveals that the sample captures a diverse and predominantly youthful consumer base. This demographic insight is crucial because it indicates that younger consumers, are often more receptive to technological innovations, and are likely to engage positively with hologram displays (Lippert *et al.*, 2023). By embracing this technology, retail owners can enhance in-store experiences, transforming traditional shopping into an engaging journey that captivates shoppers' attention and encourages them to explore products more thoroughly. The strong internal consistency found in constructs like sensory stimulation and Interest suggests that these holographic experiences can effectively capture consumer attention and drive positive behaviours, leading to increased foot traffic and, potentially, higher sales within stores. Moreover, the study's results highlight that consumers generally perceive hologram technology favourably, with positive attitudes towards constructs such as PU and BI. For consumers, this means that their shopping experiences could be significantly enhanced by introducing hologram advertising, making them feel more engaged and connected to the brands they encounter. According to Cachero-Martínez and Vázquez-Casielles (2017:473-486), consumers seek novel and stimulating experiences in a crowded retail environment. Hologram technology can provide an immersive shopping

atmosphere that stands out from conventional advertising methods. This enriches their overall shopping journey and fosters positive emotions toward the brand, potentially leading to greater customer loyalty and repeat visits.

In terms of contributing to the broader body of knowledge, the study addresses existing gaps in the literature on digital signage technologies in retail, where research and the application of hologram advertising devices is still particularly scarce (Coleman, 2017). By focusing specifically on the impact of hologram advertising on consumer behaviour, this study opens the doors for further investigation into this promising field. The research provides empirical evidence supporting the idea that sensory engagement is critical in influencing consumer perceptions and behaviours, offering a foundational understanding of how these technologies can transform the retail experience (Cardoza, 2024).

This study contributes to TAM and the AIDA model. Regarding TAM, the research provides valuable insights into how perceived usefulness (PU), perceived ease of use (PEOU) and consumer attitudes (AT) influence consumer acceptance of hologram technology. The findings highlight the role of sensory engagement, adding an emotional and experiential layer to the traditionally functional focus of TAM. This sensory dimension deepens our understanding of how holograms can enhance consumer satisfaction and drive engagement. Furthermore, the strong correlations identified between sensory stimulation, interest and attitude also contribute to the AIDA model by empirically validating how hologram technology moves consumers through the stages of interest, desire and action. The study confirms that holographic displays capture attention, sustain interest and foster pro-behavioural intention. Moreover, by exploring gender differences in attitudes, the research underscores the importance of segmented marketing strategies, allowing retailers to fine-tune their holographic advertising to resonate more effectively with diverse demographic groups.

This research fills a critical gap in understanding the effectiveness of holograms in retail and it paves the way for future studies to explore additional dimensions, such as long-term impacts on consumer behaviour, sales and brand loyalty. This will allow retailers and scholars alike to uncover the full potential of hologram technology and its role in shaping the future of in-store marketing.

Overall, the study reinforces the potential of hologram advertising technology as a transformative force in the retail sector and lays a foundation for future research and practical applications. By providing actionable insights for store owners and enhancing the shopping experience for consumers, the findings advocate for a shift towards more innovative, engaging and personalised advertising strategies in brick-and-mortar retail. This transition could lead to a new paradigm in consumer engagement, positioning hologram technology as a key driver of success in an increasingly competitive retail landscape.

5.4 RECOMMENDATIONS

Based on the study's findings, several practical recommendations can be made for marketers and retailers, focusing on the adoption and strategic implementation of hologram technology to enhance customer engagement, increase foot traffic and positively impact consumer behavioural intentions.

5.4.1 Adopt Hologram Technology to Drive Foot Traffic and Consumer Engagement

Emerging hologram technology can be recommended as a practice that retailers can adopt in a bid to lure consumers into physical stores. The conducted research indicates that consumers have positive attitudes towards hologram technology with regard to its ability to prompt sensory appeal and attention-grabbing capabilities. All these qualities make the holograms suitable to be used as an effective means of providing a high sensory appeal which is well suited to capture the attention of the target audience and provide a break from traditional advertising techniques. By utilising holograms at store entrances or in window displays, retailers can create an innovative and captivating experience that draws customers in, encouraging them to enter the store out of curiosity and excitement (Baltezarevic & Baltezarevic, 2023:788).

5.4.2 Utilise Holograms to Highlight Key Areas in Stores

Retailers can place hologram devices in areas of the store that contain products with higher profit margins, and to guide consumers to promotional offers. In this case, the allure of the hologram device may prompt customers to linger around

these specific areas of the store encouraging the introduction to new products, which may have the ability to drive potential impulse and general purchases. Additionally, holograms may be used as navigation aids to guide consumers through the store, encouraging the customer to explore the entirety of the store's layout where exposure to new products is inevitable.

5.4.3 Capitalise on the Perceived Usefulness and Ease of Use

The study shows that from the consumer's perspective, the hologram technology is conceived as helpful and easy to interact with. This is a highly promising for retailers since the emergent technology may bring major positive change to retail environments. Hologram technology should also be marketed in a way that demonstrates how it will benefit both retailers and consumers by emphasising that the technology is easy to use and functions as a tool instead of acting like a barrier. Holograms are an excellent embodiment of information about products or promotions without putting pressure on consumers with large amounts of information; therefore, it is effective to apply the technology to the retail environment.

5.4.4 Enhance Consumer Engagement Through Sensory Stimulation

The study found that sensory stimulation, such as the visual and immersive nature of hologram displays, is a key factor in driving customer interest. Retailers should focus on enhancing the overall sensory experience of shoppers by integrating holograms that provide vivid, dynamic visuals that captivate their senses. In addition to the visual impact, hologram machines can also play music and sound effects, which contribute to a multi-sensory experience. This combination of sight and sound can create a more immersive atmosphere that encourages customers to linger in the store, explore products more closely and feel a stronger connection to the brand.

Retailers can further customise hologram displays to align with their brand's identity, blending visual, auditory and emotional cues to create a cohesive and engaging environment. By strategically combining these sensory elements, retailers can not only enhance brand perception but also create a unique shopping

atmosphere that encourages deeper consumer interaction and improved customer experiences.

5.4.5 Leverage Holograms to Strengthen Brand Identity and Loyalty

Retailers can utilise hologram technology to engage with customers but also to reinforce brand identity and foster customer loyalty. The interactive and innovative nature of hologram displays has the ability to create memorable brand experiences that can set a retailer apart from its close competitors. When customers associate a brand with cutting-edge technology and immersive in-store experiences, they are more likely to develop a positive attitude toward the brand, increasing the likelihood of repeat visits and long-term loyalty (Wang, 2023:201). Hologram technology is in essence an effective method to increase customer brand loyalty as it can be utilised as one of the tools that make the brand recognisable and provides the ability for the brand and store to stand out from its competitors.

5.4.6 Future Refinements for Maximising Attention and Engagement

While the study indicates overall positive perceptions, there were challenges with the attention construct. Retailers should experiment with different content types or display formats to maximise consumer engagement. For example, incorporating interactive elements such as gesture-controlled or personalised holograms might deepen consumer interaction and engagement levels. Unlike passive viewing, gesture-controlled technology empowers consumers to actively navigate and manipulate holographic displays using simple hand movements or body gestures (Gupta, 2024). This interactive approach grabs attention and fosters a deeper connection with the content, as consumers feel more involved in the experience. Retailers can also explore further customisations to tailor the holographic content more effectively to their target demographics.

5.5 LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES

Every study has its limitations, and this research is no exception. A non-probability sampling technique was utilised to select participants, introducing some constraints. While demographic questions were included to assess the sample's

representativeness, it is important to be cautious when attempting to generalise the findings from convenience sampling to the broader population (Andrade, 2021:88). Additionally, the study used a single cross-sectional design, offering only a one-time view of data, as opposed to a longitudinal approach that would provide observations over a longer period.

One of the major sources of bias in this study is in the manner in which the hologram device was depicted to the respondents. The hologram device was viewed through a video; however, it is difficult to capture holographic depictions adequately through video recording. Firstly, most hologram devices use rotating LED blades in order to produce the respective 3D images. When these are filmed, the spinning movement causes visual distortions because the cameras frame rate does not correspond with the spinning rate of the blades. Such a synchronisation misalignment can cause flicker or blur on the screen that conceals the sharpness and the profound depth of 3D images on which the effectiveness of such a device highly depends (Salo *et al.*, 2019, Wright, 2024). Thus, the respondents might not have received the requisite sensory cues of the hologram, and this lack of sensory feedback may have led to poor reliability of the attention (ATT) construct in the present research. Another hindrance to the adoption of hologram technology is the level of noise produced by the spinning LED blades. While the blades are useful for creating the three-dimensional look needed for the hologram, they generate noise that might be difficult for store owners to overcome when considering the technology (Salo *et al.*, 2019). In somewhat less noisy environments such as retail shops, the spinning of the blades might be regarded as disruptive or invasive, thus narrowing the possible application areas of the hologram devices. Perhaps these are factors that need to consider in more detail; this practicality factor may act against the advantages of the use of the advertising technology.

In addition, further research needs to be carried out through live face-to-face studies to enable the participants to experience the real feel of the hologram technology. These studies should be carried out in different retail contexts including malls, retail shops and department stores to test how the technology performs in these disparate settings. Subsequent studies should be conducted to test different hologram technologies in a range of different settings, which will

prove useful to researchers to understand if the holograms perform differently from place to place and between differing consumer groups.

Moreover, future research should use a longitudinal design to achieve more significant outcomes of the hologram technology's usage on customers' behaviours after longer periods of time (Singh, 2022). Some forms of electronic people counting devices can be used to ascertain precise data pertaining to traffic flow in the stores and the effectiveness of live holograms as a method of customer attraction. Additionally, the capturing of foot traffic data should be complemented by actual sales figures in order to determine whether the use of hologram technology can influence the number of store entries as well as sales rates among customers.

5.6 CLOSING REMARKS

In conclusion, this study offers significant insights into the impact of hologram technology on foot traffic and consumer behaviour in brick-and-mortar retail environments. The research demonstrates a positive correlation between sensory stimulation and consumer interest, substantiating the hypothesis that holograms can effectively attract and engage shoppers. The empirical data from the survey of 308 South African consumers validated the perceived usefulness of hologram advertising and illuminated the dynamics of consumer interactions with this innovative technology. The positive perceptions expressed by respondents underscore the potential for holograms to transform traditional retail experiences into immersive journeys that captivate attention and foster deeper connections with brands.

The findings of this research are particularly relevant for retailers seeking to revitalise their marketing strategies in an era of increasing competition from online platforms. As the demographic analysis reveals a predominantly young, tech-savvy consumer base, retailers have a unique opportunity to leverage hologram technology to appeal to this audience. By integrating holographic displays into their marketing mix, retailers can create visually stimulating environments that draw customers in-store and guide them through an immersive shopping experience.

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Word Count: 30295

ANNEXURE A - QUESTIONNAIRE



The influence of new retail marketing techniques on brick-and-mortar foot traffic: The Hologram

Dear Participant

My name is Michael Bradley Greer and I am a student at The IIE's Vega brand. I am currently conducting research under the supervision of Prof. Costa Synodinos about; "The influence of new retail marketing techniques on brick-and-mortar foot traffic: The Hologram" The study aims to investigate consumers' perceptions of hologram-based technology and its potential impact on in-store foot traffic and purchase intentions in the context of South Africa.

I hope that this research will enhance ones understanding of whether, new innovative advertising technologies will have the ability to allure consumers into physical retail stores and potentially increase store sales and purchase intentions. The outcome of this study aims to provide retail store owners with a holistic overview on whether to invest in hologram advertising devices or not, depending on their overall influence on consumer perceptions.

For access to the full consent form please click the link below:

[Full respondent consent notice](#)

Hologram Technology Definition:

Recent advancements in hologram technology have led to the development of highly practical yet visually impressive holographic fans. These devices create floating hologram-like images by using RGB LED strips on rotating fan blades. As the control unit lights up the pixels, the spinning motion forms a complete picture that appears to float in mid-air. This illusion is due to the brain integrating the rapidly moving display into a cohesive image. These fan-based hologram devices are preferred for studies due to their practicality and abundance compared to traditional, bulkier hologram devices.

Your help and valuable contribution will be greatly appreciated.

By continuing to the next section of the questionnaire, you consent to the following:

I have read the above description of this research study. I have been informed that it is a low risk study and I am aware of the purpose of the study. I voluntarily agree to take part in this study and by continuing and completing this questionnaire, I consent for the information being used in aggregate form.

Please watch the hologram advertising device in the following section. It is imperative that you watch the full video, which is approximately 1 minute.

MCOM Student

Michael Bradley Greer

Email: [REDACTED]
[REDACTED]

Research Supervisor

Prof Costa Synodinos

[REDACTED]
[REDACTED]
School of Management Sciences
North-West University

PLEASE WATCH THIS VIDEO SHOWING THE HOLOGRAM TECHNOLOGY.

https://docs.google.com/forms/d/e/1FAIpQLSdmyiEYdFgmG0TUKynVZmCBiF_qSKPOvbxHaEf2rJn9Wf9Lyw/viewform?usp=sf_link

SECTION A: Demographical Information

Please mark the appropriate box with a cross (X).

A1.	Province of origin:	Eastern Cape	Free State	Gauteng	KwaZulu-Natal
		Limpopo	Mpumalanga	Northern Cape	North West
		Western Cape			
	Other:				

A2.	Age at your last birthday:	Enter Response:
-----	-----------------------------------	-----------------

A3.	Do you permanently reside in South Africa?	Enter Response:
-----	---	-----------------

A4.	What is your gender:
	Male
	Female
	Prefer not to say

SECTION B: Attitudes and knowledge towards the environment:

Please indicate the extent to which you disagree/agree with each of the following statements by placing a cross (X) in the appropriate box; 1 being strongly agree and 4 strongly disagree.

	Attention (ATT)	Strongly Agree	Agree	Disagree	Strongly Disagree
B1	I have seen hologram advertising before.	1	2	3	4
B2	I have seen retail stores advertising products using hologram technology.	1	2	3	4
B3	Hologram advertising captivates my attention.	1	2	3	4
B4	If I see hologram advertising, it will grab my attention.	1	2	3	4

	Sensory Stimulation (SS)	Strongly Agree	Agree	Disagree	Strongly Disagree
B5	Hologram advertising excites my visual senses.	1	2	3	4
B6	Hologram advertising engages my visual senses.	1	2	3	4
B7	Hologram advertising pleasantly stimulates my visual senses.	1	2	3	4

	Interest (INT)	Strongly Agree	Agree	Disagree	Strongly Disagree
B8	I like the idea of hologram advertising.	1	2	3	4
B9	I become positive when I see/think of hologram advertising.	1	2	3	4
B10	I like the advertisements displayed on the hologram device in the video.	1	2	3	4
B11	I have become interested in hologram advertising.	1	2	3	4

	Perceived Usefulness (USE)	Strongly Agree	Agree	Disagree	Strongly Disagree
B12	Hologram advertising is useful to the stores that use them.	1	2	3	4
B13	Hologram advertising would help store owners to increase the number of customers who enter their store.	1	2	3	4
B14	Hologram advertising is useful as it informs me of the latest specials and in-store promotions.	1	2	3	4

	Perceived Ease of use (EASE)	Strongly Agree	Agree	Disagree	Strongly Disagree
B15	It is easy to get information from the hologram advertisement.	1	2	3	4
B16	Hologram advertising makes it easy to purchase items from the store.	1	2	3	4
B17	Hologram advertising provides customers with the ability to evaluate promotional products.	1	2	3	4
B18	Hologram advertisements contain useful information.	1	2	3	4

	Attitude (AT)	Strongly Agree	Agree	Disagree	Strongly Disagree
B19	I have a positive attitude towards hologram advertising.	1	2	3	4
B20	The use of hologram advertising is beneficial to me.	1	2	3	4
B21	From the consumer's perspective, using hologram advertising is beneficial to the store owner.	1	2	3	4
B22	Using hologram advertising makes the store attractive to consumers.	1	2	3	4

	Desire (DE)	Strongly Agree	Agree	Disagree	Strongly Disagree
B23	My hope is for more retail store owners to adopt hologram advertising technology.	1	2	3	4

B24	I hope to see hologram advertising at my local store in the near future.	1	2	3	4
B25	I want to see hologram advertising at my local store right now.	1	2	3	4

	Behavioural Intention (BI)	Strongly Agree	Agree	Disagree	Strongly Disagree
B26	I would go to a store in the future to see hologram advertisements.	1	2	3	4
B27	I am likely to purchase products from stores that use hologram advertising.	1	2	3	4
B28	I would invest money in stores that use hologram advertising.	1	2	3	4

Thank you.

ANNEXURE B – ETHICAL CLEARANCE LETTER



Our Ref: M. 410824
Enquiries: research@iie.ac.za

28 August 2024



Outcome of Ethics Clearance Application for Master of Commerce in Strategic Brand Leadership.



Student name: Michael Bradley Greer
Student number: [REDACTED]
Brand and campus: IIEVega



Dear Michael,

Thank you for submitting the ethics clearance application for the study: *The influence of new retail marketing techniques on brick-and-mortar foot traffic: The Hologram.*



We are pleased to inform you that after implementing the requested revisions, your ethical clearance application has been approved. This means that you may proceed with data collection. If you are collecting data from a specific organisation, ensure that you have a gatekeeper's letter that confirms their approval of the data collection being done.

You are reminded to inform the IIE's Higher Degrees Committee of any changes made to the research methodology or title of the research prior to examination. Kindly ensure that all ethical considerations are duly applied whilst collecting, analysing and interpreting the data for the completion of your research. If you have any questions, please feel free to contact your programme team or supervisor directly.

All the best with your research.



Dr Reza Hosseini
Deputy Dean: Research and Postgraduate Studies
The Independent Institute of Education



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