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Exploring the potential of AR as a persuasive tool to encourage pro-environmental consumer behavior.

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Abstract

With sustainability taking center stage in today's world, businesses have embraced green marketing strategies to align with societal values and gain a competitive advantage. However, the prevalence of greenwashing and consumer skepticism poses a challenge to the credibility of environmental claims. Despite its significance, there is a shortage of studies exploring the dynamics of green consumerism and the effectiveness of advertising in promoting sustainable behavior. Hence, this study explores the potential of Augmented Reality technology as a persuasive tool in green advertising to bridge the intention-behavior gap and encourage pro-environmental behavior among consumers. Leveraging the interactive and immersive features of AR, this research investigates its impact on consumers' perceptions, intentions, and willingness to purchase sustainable products. A comprehensive review of relevant literature on sustainable consumption behavior, green advertising, and AR technology informs the development of several hypotheses, which are tested through a survey-based experiment using A/B testing. The findings demonstrate that AR technology significantly enhances the persuasive appeal of green ads and increases consumers' intention to buy sustainable products. Additionally, individuals with high environmental involvement exhibit more favorable responses to AR-enhanced green ads. The research provides valuable insights for marketers and advertisers, enabling them to leverage AR technology to capture consumer attention, increase engagement, and inspire sustainable behavior. By bridging the intention-behavior gap, AR-powered green advertising has the potential to shape consumer attitudes, promote environmentally conscious decision-making, and contribute to a more sustainable future.

Keywords: Augmented Reality, Green advertising, Green consumerism, Intention-behavior gap, Greenwashing.

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CHAPTER 1: Introduction and Research Context

In recent years, sustainability has emerged as a crucial societal value, leading to a paradigm shift in business operations. As a response to this shift, companies have been adapting their business models to align with sustainability principles and meet the expectations of their stakeholders. The adoption of sustainable practices and green marketing strategies reflects not only a company's commitment to social responsibility but also offers several benefits, such as enhancing brand image, gaining a competitive advantage, and bolstering economic performance (Eiadat et al., 2008; Fraj et al., 2011; Malakjan, 2022; Omdal, 2022; Tung et al., 2017). As society enters a new phase in the green transition, characterized by political goals and technological advancements, an increasing number of companies are offering sustainable alternatives. Moreover, the current global environmental crisis has intensified the need for sustainable consumption patterns. Consumers are increasingly aware of the potential environmental impacts of their purchases, resulting in a growing demand for products labeled as "eco-friendly", "organic", or "sustainable" (Baum, 2012; Russell et al., 2015; Schmuck et al., 2018). This heightened consumer awareness has given rise to a significant global trend known as green consumerism (Paul et al., 2016; Yeon Kim & Chung, 2011).

Green marketing refers to the promotion of products, services, or activities as environmentally safe or sustainable, demonstrating a company's commitment to social responsibility and environmental protection. Various green marketing strategies exist, including creating eco-friendly products, using packaging made from recycled materials, reducing greenhouse gas emissions, adopting sustainable business practices, investing profits in renewable energy or carbon offset initiatives, and highlighting a product's environmental benefits in marketing campaigns (Shopify, 2022).

In response to the growing focus on sustainability and environmental responsibility, companies worldwide have recognized sustainability as a competitive advantage, and adopted green marketing strategies. For instance, in Norway, TINE has emerged as the most sustainable company in the country. TINE demonstrates its commitment to sustainability through the use of 100% renewable milk cartons, which have a lower climate impact compared to traditional cartons. Additionally, the company's vehicles have adopted climate-friendly biogas, and are showcasing their dedication to animal welfare. TINE also places emphasis on reducing food waste, recognizing the significance of this issue in achieving sustainability goals (TINE, n.d). In Italy, South Tyrol, a company specializing in jams, juices, and food preserves stands out for its commitment to sustainable practices. They prioritize the use of seasonal fruits sourced from their own local crops or from small local producers. Furthermore, the company's packaging is 100% plastic-free, and they have also made strides in energy efficiency by powering their production plant with hydroelectric energy. Continuously striving for improvement, they actively explore new solutions from other renewable sources to further enhance their sustainability efforts (Green Marketing Italia, 2022).

By adopting green marketing strategies, companies can strengthen the emotional connection between consumers and brands, foster a more favorable public image and reputation, and increase brand loyalty

(Ginsberg & Bloom, 2004; Tung et al., 2017). However, green advertising faces challenges due to consumer skepticism and the prevalence of greenwashing, which undermines the credibility of environmental claims (Finisterra do Paço & Reis, 2012; Matthes & Wonneberger, 2014). Moreover, there is a intention-behavior gap in sustainable consumption, in which consumers fail to translate their positive attitudes and intentions into actual behavior (Carrington et al., 2014; Milovanov, 2015). The Nordic Consumer Sustainability Index 2022 revealed that a significant percentage of Norwegian consumers express skepticism toward companies' environmental claims. A survey found that 74% of consumers believe that companies overstate the environmental friendliness of their products, and that only 2 out of 10 trusts that products marketed as environmentally friendly, sustainable, or climate-neutral actually live up to those claims. Furthermore, 65% of consumers are often annoyed when they encounter green claims without proper explanations, and 46% observe greenwashing practices in cosmetics and other hygiene products (Kampanje, 2023).

Given this context, addressing the emerging trend in academic research has become a priority (Finisterra do Paço & Reis, 2012; Schmuck et al., 2018; Taylor, 2015). If the notion of skeptical green consumers holds true, advertisers are presented with a significant challenge that requires a fundamental rethinking of their green advertising campaigns. Overcoming this challenge necessitates the development of innovative and effective strategies that motivate and encourage consumers to engage in pro-environmental behavior. As such, creative advertising campaigns that encompass dimensions of originality, flexibility, elaboration, synthesis, and artistic value have demonstrated greater effectiveness (Reinartz & Saffert, 2013). In this context, immersive technologies, such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) have emerged as promising persuasive tools for influencing behavior change in various domains (Carmigniani et al., 2011).

AR overlays digital data and virtual objects onto the real world, creating an immersive and interactive experience that enhances user engagement and facilitates behavior change (Rauschnabel et al., 2022; Scholz & Duffy, 2018; Wagner & Cozmiuc, 2022). Major companies, including Coca-Cola, McDonald's, and General Electric, have successfully incorporated AR into their marketing strategies (Scholz & Smith, 2016). Empirical evidence indicates that AR technology has a greater cognitive and emotional impact than traditional advertising mediums (Wagner & Cozmiuc, 2022), making it a promising tool for bridging the intention-behavior gap in green consumption.

To the best of the author's knowledge, the potential of AR technology to promote sustainable consumption practices is an area that remains unexplored in research. For instance, AR-enabled product packaging can provide consumers with information on the environmental impact of the product and the company's sustainability practices, thereby empowering consumers to make more informed and environmentally conscious purchasing decisions. Additionally, AR technology can be utilized to create captivating and interactive advertisements promoting sustainable products or to develop immersive brand experiences that highlight a company's commitment to sustainability in a compelling way.

Therefore, this thesis aims to investigate the potential of AR technology as a persuasive tool for promoting pro-environmental consumption behavior. The research question driving this study is: "*How can Augmented Reality technology be leveraged in green advertising to bridge the intention-behavior gap and encourage pro-environmental behavior among consumers?*". To address this research question, the thesis will conduct a comprehensive literature review to identify the theoretical frameworks and empirical studies related to sustainable consumption behavior, green advertising, and AR technology. Additionally, a survey-based experiment using A/B testing will be conducted to examine the impact of AR as a persuasive tool in green advertising. In the current study, an immersive AR experience by the brand Herbal Essences in its partnership with TerraCycle was utilized for research purposes. This experience allowed consumers to delve into the narrative behind the innovative shampoo and conditioner bottles, which were crafted from plastic collected from polluted beaches.

By exploring the effectiveness of AR-based interventions in promoting pro-environmental behavior, this study aims to contribute to the existing literature on sustainable consumption and persuasive technology. Insights gained from investigating the design and implementation of AR-based interventions can help encourage sustainable consumption practices and address the negative environmental impacts of consumer behavior. Understanding consumer skepticism toward environmental claims holds significant implications for public policymakers, consumer researchers, and practitioners. Therefore, exploring this topic can provide a deeper comprehension of green consumers and contribute to enhancing knowledge in the field (Finisterra do Paço & Reis, 2012). As such, the findings of this study will have implications for marketers seeking to promote sustainable consumption behavior and contribute to the broader discourse on sustainability and AR technology. Ultimately, this master thesis aims to shed light on the strategic use of AR technology in promoting green consumerism and bridging the intention-behavior gap.

CHAPTER 2: Literature Review

2.1. Green Consumerism

Over the past two decades, the rise of environmentalism has fueled an increasing interest in sustainable consumption practices among consumers (Han et al., 2009; Paul et al., 2016). Rather than consumers basing purchasing decisions solely on brand loyalty or price, they are increasingly inclined to select products that align with their values, as evidenced by a growing preference for environmentally friendly products (Griskevicius et al., 2010; Han et al., 2009). Indeed, consumers are actively seeking out eco-friendly products and services, preferring companies that favor environmental practices (Han et al., 2009; Kalafatis et al., 1999; Paul et al., 2016). This group of consumers, referred to as "green consumers" prioritize social and environmental conservation efforts that benefit both present and future generations (Fontes et al., 2021; Haba et al., 2023; White et al., 2019). In general, they exhibit behavioral patterns characterized by avoidance of products that could harm health or the environment, waste resources, such as through excessive packaging or short life cycles, involve protected regions or species, contribute to animal cruelty, or negatively impact other countries or societies worldwide (Fontes et al., 2021; Katrandjiev, 2016).

The drivers of green consumption have been examined numerous times in literature, in which researchers strive to understand and define it empirically (Fontes et al., 2021; Griskevicius et al., 2010; Han et al., 2009; Testa et al., 2021). Nevertheless, it is difficult to accurately define and segment "green" consumers due to the complex and multidimensional nature of their behaviors and beliefs (Testa et al., 2021). The literature on green marketing has extensively explored the relationship between consumers' environmental concerns and their consumption behavior, which includes exploring a wide range of variables ranging from socio-demographic factors to more complex factors such as motivation resulting from cognitive or affective stimuli (Milovanov, 2015).

Studies have consistently shown a prevalent gender gap in sustainable consumption, in which women tend to hold stronger positions towards environmental protection and engage in environmentally responsible behaviors. Indeed, they have a better perception of eco-friendly products, express higher pro-environmental attitudes, greater environmental commitment, and purchase intention, in comparison to men (Brough et al., 2016; Fontes et al., 2021; Han et al., 2009; Milovanov, 2015). Furthermore, the relationship between age and sustainable consumption behavior preferences is less clear. Some studies suggest that the older-age segment is more willing to act on environmental concerns than the young-age segment (Diamantopoulos et al., 2003; Fontes et al., 2021; Han et al., 2009; Milovanov, 2015). Conversely, other studies propose that younger generations, such as Generation Y and Millennials, express positive attitudes towards sustainability and green alternatives, and have the potential to lead the way in creating a sustainably based civilization (Hume, 2010; Milovanov, 2015; Sharma & Rani, 2003; White et al., 2019). Additionally, a higher educational level has been identified as an important characteristic of environmentally conscious consumers (Fontes et al.,

2021; Milovanov, 2015; Sharma & Rani, 2003). Lastly, income has been found to be related to ecological issues, with consumers who perceive higher well-being expressing stronger attitudes and concerns towards the environmental crisis (Jacob et al., 2009; Milovanov, 2015).

The definition of the green consumer segment adopted in this thesis is based on the work of Milovanov (2015), who describes them as "*consumers who, while purchasing, are primarily driven by environmental factors, choose green products and support socially responsible business practices*" (Milovanov, 2015). Despite the challenges in defining and segmenting green consumers, recent studies suggest that this market segment is becoming increasingly viable. The Global Sustainability study of 2022 indicates that there have been significant changes in the way consumers view pro-environmental matters on a global scale, in which consumers are increasingly inclined to prioritize green products and services (Jain, 2022). Indeed, certain product categories with sustainability claims have exhibited twice the growth of their traditional counterparts (White et al., 2019). Based on a study conducted by Microsoft Advertising and Denstu International, consumers attribute greater responsibility for decarbonizing advertisements to governments (51%), businesses/brands (43%), and the advertising industry (41%), while holding themselves accountable to a lesser extent (36%) (Huijboom & Cosley, 2021). As a result, consumers are becoming more selective with their purchases, evaluating what they buy, from whom they buy, and the impact of their decisions on their lives and the environment. These considerations are becoming increasingly important in purchase decisions; 3 out of 10 consumers are willing to pay a premium for more sustainable alternatives for products and services (Coelho, 2021).

2.1.1. The Green Consumption Intention-Behavior Gap

The intention-behavior gap, also referred to as the value-action gap, highlights how consumers often express positive attitudes towards green products, socially responsible practices, and the concept of sustainability in general, yet fail to consistently make environmentally conscious decisions or engage in sustainable behaviors (Carrington et al., 2014; Milovanov, 2015; Nguyen et al., 2019; Park & Lin, 2020). Indeed, the demand for environmentally sustainable products represents only a small portion of global demand (Gleim et al., 2013). Evidence for the gap has been recorded in different countries, including the UK (Young et al., 2009), China (Lee, 2008), Canada (Durif et al., 2012), and Portugal, where consumers display awareness of environmental issues and support pro-environmental policies, but struggles to translate concerns into tangible actions (Paço & Raposo, 2009, 2010).

Several explanations for the intention-behavior gap have been identified. First, a social desirability bias, where consumers overestimate the strength of their environmental attitudes or intentions due to the social acceptability of pro-environmental responses exists (Follows & Jobber, 2000). Another explanation is that self-reported behaviors may be exaggerated, as evidenced by Davies et al. (2002) study on recycling behavior, which through direct observation of curbside recycling, discovered that 84% claimed to recycle some to all

their household waste despite the direct observation indicating otherwise. Consumer constraints, including habits, financial constraints, or lifestyles have been proposed as additional explanations for the intention-behavior gap. Furthermore, specific types of purchases may reflect disincentives to pro-environmental behaviors, including brand loyalties, uncertainties, or perceived trade-offs between different ethical considerations (Chatzidakis et al., 2007; Kollmuss & Agyeman, 2002; Peattie, 2001, 2010). Additionally, research indicate the existence of a "sustainability liability" that could potentially discourage consumers from buying sustainable products within specific product categories (Luchs et al., 2010). In line with this, Ottman et al. (2006) suggest that the main reason consumers do not purchase green products is due to the common belief that such products require sacrificing convenience, costs, or performance without providing significant environmental benefits. This indicates that consumers may be reluctant to engage in pro-environmental behaviors if they perceive that there are significant trade-offs involved. Similarly, Olson (2012) argues that consumers may prioritize important attributes such as pricing, performance, and quality over environmental friendliness, leading to trade-offs between environmentally conscious products and less sustainable alternatives.

Nevertheless, it is noted that various barriers to the adoption of eco-friendly products have been identified across different product categories, including high prices, limited knowledge, quality uncertainty, trust in companies, and product availability. These obstacles indicate that many companies have not been successful in developing effective green marketing strategies or leveraging environmental innovations as competitive advantages (Gleim et al., 2013; Tung et al., 2017). The existence of an intention-behavior gap in green consumption, as observed by extensive research and real-world examples, implies that consumers' environmental commitment has not been adequately attained (Milovanov, 2015).

2.1.2 Green Marketing

The marketing discipline has been criticized for promoting unsustainable patterns of consumption and a hedonistic lifestyle that damage the environment (Abela, 2006; Christensen et al., 2007; Milovanov, 2015). The term ***green marketing*** is commonly associated with the promotion of products, services, and initiatives that are environmentally sustainable (Dangelico & Vocalelli, 2017). However, green marketing extends beyond the traditional scope of marketing, encompassing a wide array of activities aimed at satisfying consumer needs and desires, while minimizing adverse environmental effects. While the conventional marketing components still hold significance, the primary focus of green marketing is to address any negative repercussions that may arise from the interaction between customers and organizations (Ghoshal, 2011; Polonsky, 1994). As stated by Polonsky (1994), the objective of green marketing is to minimize the harmful effects of this exchange on the environment. Kilbourne (1998) defined green marketing as "*the greening of different aspects of traditional marketing, involving the production of green products for sale to green consumers*". As consumer demand for environmentally friendly products and services continues to rise, firms

have increasingly adopted green marketing strategies to showcase their commitment to corporate social responsibility and improve their corporate image (Zhang et al., 2018). A variety of green marketing strategies exist, including green product design, environmental packaging, green advertising and communication, eco-labeling and certifications, green supply chain management, environmental education and consumer awareness, and environmental differentiation (Polonsky, 1994).

According to Chen (2010), there are several reasons why companies should engage in green marketing, including compliance with environmental regulations, gaining a competitive advantage, exploring new markets, enhancing product value, and improving corporate reputation (Chen, 2010). The implementation of green marketing strategies has gained significant attention in recent years as companies strive to align their business practices with the principles of sustainability (Ghoshal, 2011). Indeed, proper implementation of green marketing strategies can strengthen the emotional connection between consumers and brands, generate a favorable public image, and ultimately increase sales and stock prices. Furthermore, a green image can increase consumer preference towards a company or product, leading to increased brand loyalty (Ginsberg & Bloom, 2004; Tung et al., 2017). Hence, green marketing has the potential to revolutionize marketing practices and build customer demand for environmentally sustainable products, leading to increased consumer inclination to purchase products from companies that demonstrate social and environmental responsibility (Chang & Chen, 2014; Chen & Chang, 2012; Chen & Chang, 2013). As consumers are increasingly expressing their intention to purchase from companies that prioritize these values, green advertising is becoming a critical component of any company's marketing strategy (Liu & Liu, 2020). However, companies must avoid "marketing myopia" by prioritizing consumer needs and expectations over "green" criteria (Milovanov, 2015; Ottman et al., 2006).

Green Advertising Skepticism

In response to a growing demand for environmentally friendly products among consumers, green advertising claims have become a crucial element in advertisements for various products (Schmuck et al., 2018). Scammon and Mayer (2013) define environmental claims as statements made by a seller regarding the impact of their brand attributes on the natural environment. These claims are often described using terms like "*green*", *"sustainable*", and "*environmentally friendly*" (Finisterra do Paço & Reis, 2012; Scammon & Mayer, 2013). Green advertising refers to commercial advertising that utilizes environmental themes to promote products, services, or corporate public images. Banerjee et al. (1995) suggest that it must meet one or more of the following criteria: (1) *explicitly or implicitly addresses the relationship between a product/service and the biophysical environment*; (2) *promotes a green lifestyle with or without highlighting a product/service*; (3) *presents a corporate image of environmental responsibility* (Banerjee et al., 1995; Liu & Liu, 2020). While traditional advertising serves the functions of informing, reminding, and persuading, Pranee (2010) explains that the purpose of green advertising is to inform customers about the environmental aspects of a company's

products and services. Similarly, as suggested by Carlson et al. (1993), green advertising is a way of promoting environmental awareness and stimulating demand for sustainable products.

The growth of green marketing and communication efforts has raised concerns about skepticism toward environmental appeals. Finisterra do Paço & Reis (2012) assert that the credibility of green advertising is generally considered to be relatively low. Several factors contribute to this skepticism and confusion. First, green products are sometimes perceived as inferior in terms of performance or having a lower level of scientific research for product development (Finisterra do Paço & Reis, 2012; Grillo et al., 2008; Luchs et al., 2010; Olson, 2012; Ottman et al., 2006). Furthermore, there is a lack of clear meanings and generally accepted definitions for expressions like "*biodegradable*", "*environmentally friendly*", "*ozone friendly*", etc. Consumers often lack the technical or scientific knowledge required to understand the information behind environmental claims. If a green advertisement is perceived as too technical or manipulative, it may hinder the consumer's ability to comprehend the message, leading to a failure on the advertiser's part to effectively communicate with their target audience (Finisterra do Paço & Reis, 2012; Furlow, n.d.; Newell et al., 1998). As such, when combined with skeptical green consumers, green ads may not result in long-term market success (Matthes & Wonneberger, 2014).

Greenwashing

The rise of green markets has been accompanied by a corresponding increase in the occurrence of "greenwashing", defined as "the intersection of two firm behaviors: poor environmental performance and positive communication about environmental performance" (de Freitas Netto et al., 2020; Delmas & Burbano, 2011). In other words, greenwashing refers to the act of making misleading or false claims regarding the environmental practices and impacts of a company (de Freitas Netto et al., 2020; Schmuck et al., 2018). In situations where companies lack a foundation for legitimate green marketing, a typical strategy is to either remain silent regarding their environmental position or attempt to present unfavorable environmental performances in a favorable light (Delmas & Burbano, 2011). This strategy is often used for products that do not possess inherent environmental friendliness, such as airline flights, plastic bottles, and non-hybrid cars (Schmuck et al., 2018)**.**

Greenwashing practices can cause confusion among consumers, leading to uncertainty about purchasing green products, ultimately undermining the demand for green products, and thereby harming the market (Chen & Chang, 2012). Additionally, such practices can affect the legitimacy of green marketing and sustainability efforts. Therefore, is it imperative for companies to ensure that their green claims are authentic and transparent to avoid any potential backlash from consumers (Peattie & Crane, 2005). Schmuck et al. (2018) suggests that for green advertising to have a positive impact on consumers, it needs to be perceived as credible and authentic, and the company should demonstrate a genuine commitment to environmental sustainability. Empirical studies have demonstrated a negative relationship between consumer perceptions of greenwashing

and their intentions to engage in green purchasing behavior, particularly when considering the intention-behavior context (Zhang et al., 2018).

2.2. Immersive Technologies and Their Role in the Marketing Discipline

In recent years, digital technologies have undergone significant innovation, leading to transformative changes in business operations and consumer engagement. The adoption of these technologies has resulted in cost reduction and improved interaction with consumers, offering enhanced shopping convenience through novel purchasing channels (Duarte et al., 2018; Romano et al., 2020; van Doorn et al., 2017). One notable category of digital advancements is immersive technologies, encompassing computer-generated models that simulate physical worlds. These technologies have the potential to greatly transform consumers' interactions with content (Hall & Takahashi, 2017).

Extended Reality (XR) refers to the umbrella term that encompasses all immersive technologies that blend the physical and virtual worlds together, namely Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) (Alcañiz et al., 2019; Rauschnabel et al., 2022). These technologies aim to influence individuals' perceptions, attitudes, and behaviors by seamlessly integrating various technologies into everyday life (Wang et al., 2023). The implementation of XR technologies is revolutionizing the way people experience physical and virtual environments, thus significantly impacting the customer experience across various touchpoints (Hall & Takahashi, 2017). Further, XR applications have the potential to improve the customer experience and facilitate decision-making across the pre-purchase, purchase, and post-purchase stages of the customer journey, ultimately improving the overall customer experience (Flavián et al., 2019; Wagner & Cozmiuc, 2022; Wedel et al., 2020). Consequently, industries are embracing XR as an innovative medium to provide added value propositions and create captivating and insightful experiences (Accenture, 2020; Carmigniani et al., 2011; Flavián et al., 2019; Lemon & Verhoef, 2016; Mütterlein, 2018). For example, in the highly competitive retail industry, XR technology has been acknowledged for its significant impact on driving customer experience improvements through innovative approaches (Grewal et al., 2017; Romano et al., 2020; Shankar et al., 2011).

Research indicates that immersive technologies have found primary applications in advertising, brand management, and product design, demonstrating positive effects on consumer engagement, attitudes, and behaviors (Alcañiz et al., 2019). By leveraging immersive technologies to provide customers with more information, options, and personalized recommendations, companies can cultivate more meaningful customer relationships (Scholz & Duffy, 2018). Reports suggest that the use of immersive technologies fosters a sense of connectedness with products and increases customer satisfaction, repeat purchases, and brand advocacy (Accenture, 2020). For instance, interactions with products featuring AR content have exhibited higher conversion rates, enabling better product assessments and brand connections (Papagiannis, 2020). Consequently, marketing academics are increasingly recognizing the potential of immersive technologies as

promising tools for creating satisfying consumer experiences that rival those found in physical retail stores (Alcañiz et al., 2019; Wedel et al., 2020).

2.2.1. Augmented Reality Marketing: A Strategic Concept

AR technology integrates virtual elements with real-world settings, offering users alternative perceptions of reality. This technology utilizes sensors and object recognition capabilities in input devices, such as cameras, to scan physical environments, identify features, and superimpose virtual objects, such as 2D or 3D images, animations, text, and sounds onto a live real-world view. By seamlessly integrating virtual elements into physical environments in real time, AR enhances users' audiovisual perceptions of reality, creating an interactive experience that responds to user movements or gestures (Carmigniani et al., 2011; Huang & Liao, 2015; Olsson et al., 2013; Tan et al., 2022).

AR marketing, as defined by Rauschnabel et al. (2022) involves "*the strategic integration of AR experiences, alone or in combination with other media or brand-related cues, to achieve overarching marketing goals by creating value for the brand, its stakeholders, and societies at large while considering ethical implications*". The layer/world metaphor effectively illustrates the primary concept of augmented reality, where marketers overlay digital information, such as text, pictures, and videos over objects and physical spaces, including product packaging, advertisements, and street scenes. Consumers can then experience these hybridized realities through various means, such as digital screens like smartphones, video installations, or holograms (Scholz & Smith, 2016). In terms of the AR customer journey, common objectives are introduced under the BICK FOUR framework, which includes branding (e.g., building awareness, product knowledge, and brand image), inspiration (e.g., triggering new needs and wants), convincing (e.g., driving purchases or other decisions), and keeping (e.g., loyalty and re-usage intention) (Rauschnabel et al., 2022; Scholz & Duffy, 2018; Wedel et al., 2020).

The popularity of AR is growing due to its ability to enhance customer experiences, such as through interactive advertisements, product demonstrations, and games that allow consumers to try products virtually before making a purchase (Scholz & Smith, 2016; Wagner & Cozmiuc, 2022). AR marketing encompasses multiple business functions and is relevant throughout the marketing mix, as it aims to add value to customers in terms of utilitarian, inspirational, hedonic/experimental, eudaimonic, edutaining, and other aspects (Scholz & Duffy, 2018). The usage of AR in online settings significantly affects customer engagement, behavior, and sales (Tan et al., 2022). Indeed, the online shopping experience has been transformed from a traditional 2D website to a real-time, immersive experience, where users can navigate virtual shops, and interact with virtual product versions and sellers, similar to physical stores (Alcañiz et al., 2019). By allowing consumers to seamlessly interact with virtual products, the AR shopping experience enhances their visualization of the product and, ideally, their perception of the brand, positively influencing their purchase intentions (Bonetti et al., 2018; Wagner & Cozmiuc, 2022).

Customers enjoy utilizing AR applications and increasingly rely on them to make purchasing decisions (Chandukala et al., 2022). This growing demand has been observed across various industries, particularly in the creative economy, including gaming, live events, video entertainment, and retail (Hall & Takahashi, 2017). Notably, more than 100 million consumers have already engaged in shopping experiences that incorporate AR, either online or in-store. Furthermore, a substantial majority of 94% of consumers express their intention to maintain or increase their usage of AR when shopping in the coming years. It is worth mentioning that companies that provide branded AR experiences have a 41% higher likelihood of being considered by consumers compared to those without AR offerings. Moreover, approximately three-quarters of consumers express their willingness to pay a premium for products that assure the transparency that AR can provide (Allan, 2021).

AR have the potential to enable consumers to connect more deeply with global issues, including humanitarian crises, by creating a form of telepresence that generates empathy comparable to physically being present. AR stands out from other mediums due to its unique ability to "provide a layer of authenticity to the experience" (Hall & Takahashi, 2017). In the academic discourse, AR is regarded as the most important within XR technology and is expected to make noteworthy contributions across various functional domains, one of which is marketing (Wagner & Cozmiuc, 2022).

2.3. Conceptual Framework and Hypothesis Overview

2.3.1. The Effect of AR-enhanced Green Ads on Purchase Intention

To maximize the potential of AR technology in marketing, strategic integration into an overall marketing program is crucial, providing unique benefits to an integrated marketing communications campaign (Scholz & Smith, 2016). AR marketing revolves around the concept of developing digital affordances that enhance customer experiences. These digital cues, integrated into the physical environment, aim to facilitate customer actions and interactions. By implementing digital affordances in AR marketing, customers can engage in a contextual and experientially rich manner, promoting situated cognition. This cognitive process prompts customers to rely on and actively interact with a virtually enhanced environment as they make decisions (Chylinski et al., 2020). For instance, studies have demonstrated that AR technology can be used to promote physical activity and improve learning outcomes in educational settings (Kesim & Ozarslan, 2012; Ng et al., 2019), suggesting its potential to revolutionize behavior change. Additionally, studies have demonstrated that AR experiences can assist consumers in predicting and understanding the performance of a product, ultimately leading to increased purchase intention (Whang et al., 2021).

In the context of green advertising, which is often characterized by vague and ambiguous messaging, and low credibility, the effectiveness of AR-enhanced green advertisements remains an area of limited research. Consumers may experience confusion and find it challenging to understand green advertisements

that are excessively manipulative or technical (Finisterra do Paço & Reis, 2012). However, when done well, green marketing efforts can help companies build brand loyalty, increase the intention to buy the product and enhance customer engagement (Flavián et al., 2019).

Building upon existing empirical findings, this study proposes that consumers exposed to AR-enhanced green ads will exhibit a higher willingness to buy sustainable products compared to those who are not exposed to AR technology. This hypothesis is grounded in the notion that AR technology has the potential to enhance the attractiveness of sustainable products and positively influence consumer behavior. By creating immersive and interactive experiences, it is proposed that AR ads have the ability to increase the perceived persuasiveness of green advertisements (H1a) and generate a higher intention to purchase sustainable products (H1b) when compared to regular green ads. Hence, the first hypothesis read as follows:

H1a: *Consumers exposed to an AR-enhanced green ad will perceive the ad as more persuasive than those exposed to a regular green ad.*

H1b: *Consumers exposed to an AR-enhanced green ad will demonstrate a higher intention to buy sustainable products than consumers without an AR experience.*

Additionally, it is hypothesized that there is a significant overall effect of green ads enhanced by immersive AR experiences on consumers' willingness to buy sustainable products (H2). Thus, the second hypothesis reads as follows:

H2: *Green ads enhanced by immersive AR experiences have a main effect on consumers' willingness to buy sustainable products*.

These hypotheses reflect the need to explore the potential of AR technology as a persuasive tool in green advertising and its impact on consumers' purchase intentions in the context of sustainable consumption.

2.3.2. The Moderating Effect of Environmental Involvement

Consumer behavior involvement is a fundamental construct in the field of marketing and advertising and has been extensively studied in academic literature. Despite the various conceptualizations of involvement, a consistent definition among scholars is that it refers to the perceived significance of a stimulus (Mitchell, 1979). For instance, Zaichkowsky (1994) defines involvement as "an individual's perceived relevance of the object based on intrinsic needs, values, and interests", while Bloch & Richins (1983) uses the notion of "perceived importance" as a substitute for involvement. In the context of green advertising, empirical evidence suggests that the level of environmental involvement is a crucial determinant of the effectiveness of persuasive communication (Matthes et al., 2014).

According to the Elaboration-Likelihood Model, (ELM), individuals who exhibit high involvement tend to engage in motivated processing of information, resulting in message elaboration. Conversely, individuals who exhibit low involvement may rely more on heuristic cues such as emotions or feelings to form their opinions (Matthes et al., 2014; Petty & Cacioppo, 1990). This implies that arguments related to the

environmental impact of a product or service are expected to have a greater impact on consumers' opinions compared to emotional appeals. In the context of green advertising, individuals with high involvement are more likely to engage in cognitive processing of the arguments presented in an advertisement and evaluate the brand based on functional green arguments. On the other hand, individuals with low involvement are less motivated to process such arguments, and may instead rely on heuristic cues, such as emotional appeals featuring picturesque natural scenery, to form attitudes (Schuhwerk & Lefkoff-Hagius, 1995). Given the limited insight provided by the existing literature on the levels of environmental involvement that moderate the effectiveness of green advertising, it is proposed that the effect of green advertising will be stronger for consumers who exhibit higher levels of environmental involvement. To test this idea, the following hypothesis will be examined:

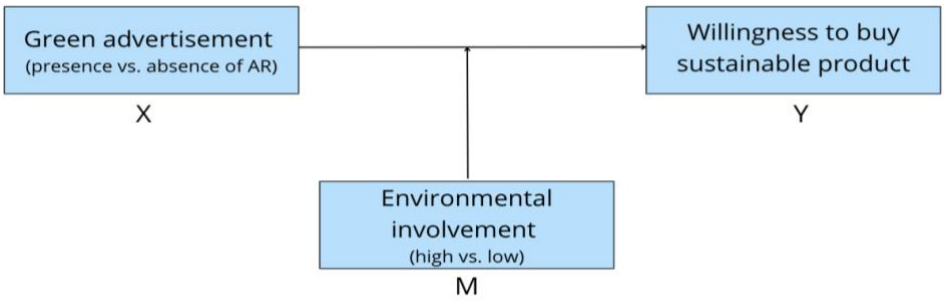
> **H3:** *Environmental involvement moderates the effect of green ads such that, under high involvement (vs. low), the effect of the ad is higher on willingness to buy.*

This hypothesis is based on the expectation that highly environmentally involved consumers, due to their greater attention and motivation, will respond more positively to green ads, leading to a higher willingness to buy sustainable products. By understanding the moderating role of green involvement, marketers can better target and tailor their AR-enhanced green ads to specific consumer segments, maximizing the persuasive impact of their advertising efforts.

2.4. Conceptual Model

A conceptual model for investigating the impact of AR technology on consumers' willingness to buy sustainable products was created (Figure 2.6). The model was developed based on previous research and the developed hypotheses of the literature review. Specifically, it is proposed that the presence of AR technology in green advertisements will positively impact consumers' willingness to buy sustainable products. Moreover, it is suggested that the strength of this relationship may vary depending on the level of environmental involvement of the consumers. Overall, this conceptual model seeks to investigate the potential of AR technology to bridge the intention-behavior gap and promote pro-environmental behavior among consumers by examining the moderating role of environmental involvement.

***Figure 2.6**: Conceptual model*



CHAPTER 3: Methodology

3.1. Research Design

To examine the effect of AR as a persuasive tool in green advertising on consumers' willingness to purchase, an experimental method was employed through A/B testing (Kuhfeld et al., 1994). The study compared the effects of two types of ads from the same brand: presence versus absence of AR. The randomized experimental design divided the sample into two equal groups, each presented with a different treatment condition (Malhotra, 2010). An online questionnaire was used to collect data from the participants, a method that enabled a rigorous examination of the difference and impact that each scenario had on willingness to buy (Kuhfeld et al., 1994). The collected data from the questionnaire were then statistically analyzed to determine the impact of the independent variable on the dependent variable while exploring the moderating role of environmental involvement.

3.2. Sample and Data Collection

To ensure the validity and reliability of the results in the study, the sample and data collection methods were carefully considered (Malhotra, 2010). To address the financial- and time constraints for this thesis, a convenience sampling technique was employed, which included selecting available and cooperative sampling units that were easy to measure. While this non-probability method offers some advantages, including generating initial ideas and insights, it also has significant limitations that must be acknowledged. Potential sources of selection bias may exist, and the resulting sampling may not be representative of the population. As a result, it is critical to proceed with caution when interpreting the data (Malhotra, 2010).

To ensure the validity of the data collected and protect the respondents' privacy, the questionnaire began with an introduction explaining the purpose of the study and the participants' privacy rights. In order to minimize potential bias, the true purpose was not revealed, and participants were informed that the survey aimed to investigate their response to sustainable products and green marketing.

It is noted that the data collected is subject to several threats in terms of validity (Malhotra, 2010). First, sampling biases may occur, as the study may not be representative of the population given the convenience sampling method. Second, the study is prone to response biases, where participants may intentionally or unintentionally provide inaccurate answers. To minimize this risk, the questions were carefully designed, using objective measures. Limitations, such as a small sample size, lack of diversity in the sample, and potential confounding variables that could not be controlled for, can also impact the validity and reliability of the results. These limitations are important to acknowledge and consider when interpreting the findings and results of the study.

3.3. Survey Design

Based on the research question, a true experimental survey design was selected as the appropriate method to investigate the relationship between the independent variable "green advertisement" and the dependent variable "willingness to buy" (Malhotra, 2010). A 2x1 factorial design was utilized to manipulate the presence or absence of AR in the ad and examine its effect on willingness to buy (WTB). Moreover, the study employed a between-participants design where each participant was randomly exposed to only one type of ad, and their willingness to buy the product was measured as the dependent variable (Malhotra, 2010).

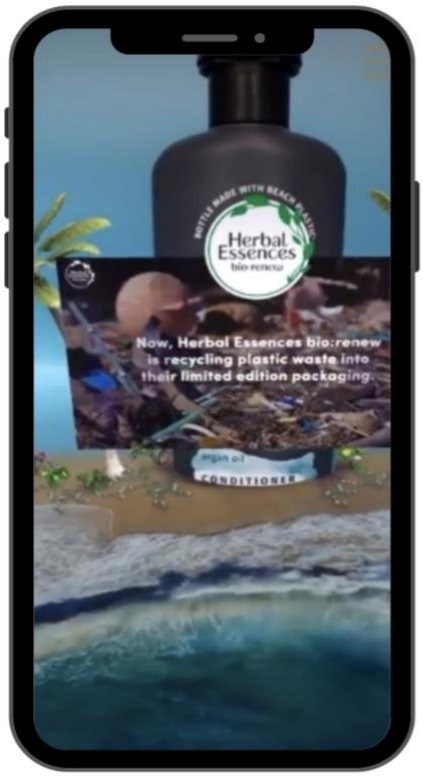
To establish a baseline of the participants' pro-environmental behaviors, a series of inquiries were posed before they were exposed to the advertisements. These inquiries focused on ***environmental involvement***, including concerns, attitudes toward green products, and purchasing behaviors, and the respondents were asked to consider the context of purchasing household products when answering. This approach was adopted to prevent respondents from taking the ads into consideration when answering the questions. After viewing one of the randomized ads, respondents were asked questions regarding the ***perceived persuasiveness*** of the ad, and their ***purchase intentions***. Finally, the questionnaire collected demographic information, including gender, age, education, and income, to identify respondent patterns and provide additional information to support the research analysis. By following this data collection procedure, the study aimed to obtain reliable and unbiased data that could be used to generate meaningful insights about the effectiveness of adopting immersive technologies in green marketing (Appendix 1). The data obtained from the experiment was transferred to SPSS for further analysis.

3.4. Stimulus Manipulation

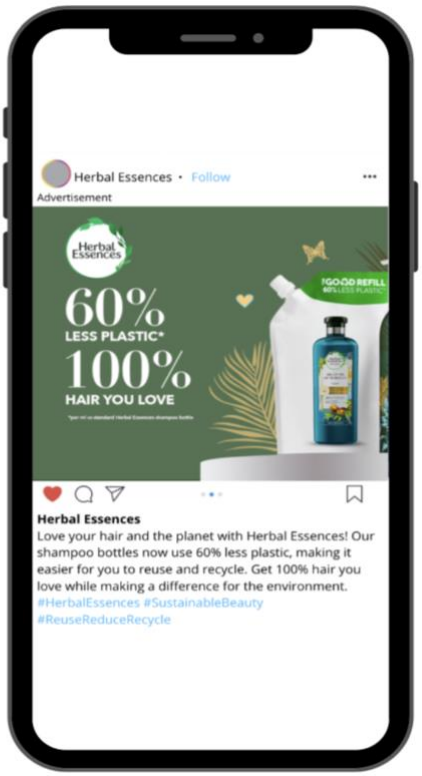
The independent variable, the green advertisement, was manipulated by creating differentiations in similar ads in terms of the presence or absence of AR technology to examine the impact of AR on pro-environmental consumer behavior. For this purpose, two ads from the brand "Herbal Essences" were utilized, both featuring environmental claims. The first ad, which was AR-enhanced, showcased the company's efforts in reusing plastic in their product packaging to help clean up the oceans, featuring the message "*Waves of chance*". This was designed to provide an immersive experience for the viewer, allowing them to interact with the product in a virtual environment. (https://www.youtube.com/watch?v=gmWFxZzV3pQ). The second ad featured the message "*I love nature, I reuse"*, and emphasized the importance of environmental responsibility through reuse (Figure 3.4). Manipulation of the stimulus provided a means of testing the effect of AR on pro-environmental consumer behavior and helped to determine whether the inclusion of AR in advertisements could serve as a successful strategy for promoting environmental responsibility.

***Figure 3.4**: Illustration of stimulus materials*

Condition 1
Green AR ad



Condition 2
Green ad



It is worth emphasizing that the respondent who saw the AR-enhanced advertisement were not truly immersed in the virtual environment, as they only viewed a video of it. This may have influenced the effectiveness of the ad. To mitigate this potential weakness, participants were encouraged to use their mobile devices to respond to the survey. This approach served to increase their involvement with the ad and may have offered a more accurate depiction of their reaction to it.

3.5. Scale Development

To test the hypotheses presented in this thesis, the questionnaire was carefully designed to measure three key variables: *environmental involvement*, *perceived persuasiveness*, and *purchase intention.* To ensure accuracy and reliability, the questionnaire employed established measures or adapted from similar scales to measure each variable effectively. This approach was taken to enhance the survey's construct validity (Malhotra, 2010). To obtain scales with good internal consistency, each factor was composed of at least three items, as advised by MacCallum et al., (1999) This allowed for increased reliability and validity of the measurements, as it ensured a more comprehensive and accurate assessment of the construct being measured. In other words, by using multiple items to measure each factor, the questionnaire was able to obtain more robust and reliable data, which could be used to achieve accurate insights about the research question. The specific items used in the questionnaire can be found the table below.

Table 3.5: *Overview of variables*

Variables	**Questions**	**Scale**	**Reference**
Environmental Involvement	<u>Environmental concern:</u> ● "I think about the impact of my daily activities on the environment" ● "I feel informed about environmental issues in my community" ● "I actively seek out information on environmental issues" ● "I'm concerned about the long-term effects of climate change on the environment" ● "I'm concerned about pollution in my local community" ● "I'm concerned about the loss of biodiversity"	*7-point semantic differential scale (1=Strongly disagree, 7=Strongly agree)*	Matthes et al., 2014; Matthes & Wonneberger, 2014; Zaichkowsky, 1994
	<u>Attitudes towards green products:</u> To me, environmentally friendly products are…: ● Important/unimportant* ● Boring/interesting ● Relevant/irrelevant* ● Means nothing/means a lot to me ● Worthless/valuable ● Not needed/needed *****Reverse scored	*7-point semantic differential scale*	
	<u>Green purchase behavior:</u> Over the past year, how frequently have you…: • Looked for ways to reuse things • Switched products for environmental reasons • Paid more for an environmentally friendly product even though there is a cheaper alternative	*7-point semantic differential scale (1=Strongly disagree, 7=Strongly agree)*	
Perceived Persuasiveness	"This ad makes me more aware of my behavior in terms of sustainability" "This ad will cause changes in my behavior in terms of purchasing environmentally friendly products" "This ad has a positive influence on my environmental attitudes"	*7-point semantic differential scale (1=Strongly disagree, 7=Strongly agree)*	Thomas et al., 2019
Purchase Intention	"I'm likely to seek more information about this product in the future" "I intend to try this product in the future" "If I were to purchase shampoo, I would consider purchasing it from this brand"	*7-point semantic differential scale (1=Strongly disagree, 7=Strongly agree)*	Agag & El-Masry, 2017

3.6. Justification for Variables

The justification of variables is an important aspect of research design, as it ensures that the study is measuring the appropriate constructs to answer the research questions. Three variables, namely environmental involvement, perceived persuasiveness, and purchase intention were chosen based on their theoretical and empirical relevance to the research topic, and their ability to provide insights into the key factors driving sustainable consumption in the context of green advertising. Perceived persuasiveness and purchase intention and intends to combine measure the overall willingness to buy.

Environmental involvement was measured to evaluate the general level of environmental involvement of the respondents when buying household products and to understand their "motivational state of involvement" as suggested by (Zaichkowsky, 1994). This assessment provides valuable insights into the respondents' experiences and backgrounds, which may influence their response to the message communicated in the ad (Matthes et al., 2014; Zaichkowsky, 1994). By expanding the scope to measure the involvement state, the study seeks to obtain a comprehensive and nuanced understanding of the factors that drive consumers to adopt environmentally friendly practices (Zaichkowsky, 1994). Based on Matthes et al. (2014) conceptualization of environmental involvement, three items are included; environmental concern; attitudes toward green products; and green purchase behavior. These three items are interrelated but have distinct antecedents and outcomes. Thus, any investigation of the moderating effect of involvement on green advertising effectiveness should consider all three (Matthes et al., 2014). *Environmental concern* reflects awareness of environmental problems and a perceived need to protect the environment, and it plays a crucial role in green purchasing decisions (Matthes et al., 2014; Schwartz & Miller, 1991). Moreover, *positive attitudes toward green products* indicate high involvement, and these attitudes relate to perceptions of the advantages, favorability, or quality of green products (Chan, 2001; Matthes et al., 2014; Roberts, 1996). Finally, actual *green purchase behavior* or behavioral intentions serve as indicators of environmental involvement (Chang, 2011).

Perceived persuasiveness was measured to gain insight into the effectiveness of AR in advertising as a persuasive intervention. Measuring actual persuasiveness can be challenging due to various reasons, including time and resource constraints, confounding factors, and ethical issues (Thomas et al., 2019). Therefore, researchers often use perceived persuasiveness as a proxy or initial measure of actual persuasiveness, which is easier and less resource-intensive to measure. Additionally, it can provide a useful starting point for investigating actual persuasiveness and determining effective intervention strategies. To evaluate the persuasive impact of the advertisements on consumers' willingness to purchase a sustainable product, three items were included in the variable: awareness, behavioral change, and attitudes.

Purchase intention was measured to assess the impact of the different ads on consumers' willingness to buy sustainable products. Behavioral intention is central to numerous theories on behavior/action, such as the reasoned action approach, protection motivation theory, and social cognitive theory (Ajzen & Fishbein,

1977; Bandura, 1997; Conner & Norman, 2022; Rogers et al., 1983). As strong intentions provide better predictions from behavior, it may contribute to bridging the intention-behavior gap in sustainable consumption (Conner & Norman, 2022). Therefore, measuring purchase intention is considered an important factor in evaluating the effectiveness of advertisements in influencing consumers' willingness to engage in sustainable purchasing behavior.

3.7. Reliability and Validity

3.7.1. Reliability Test

In order to ensure that all survey items were accurately aligned with the variable of interest, a reliability test was conducted. This allowed for the examination of the scale's ability to produce consistent results when measurements are repeated. High reliability is an indicator of consistency across multiple measurements using the same instrument, reflecting true scores. However, while reliability is essential, it is not sufficient for ensuring instrument validity (Malhotra, 2010).

To verify consistent respondent answering, reverse coding was applied to positively and negatively phrased items. The internal consistency and reliability of the data were evaluated using Cronbach's alpha coefficient. A score of over 0.6 for Cronbach's alpha indicates strong internal consistency and reliability for the variable in question (Malhotra, 2010). As demonstrated in Table 3.7.1, all survey items scored above the recommended threshold of 0.6, thereby confirming their high level of reliability.

Table 3.7.1: *Overview of reliability*

Construct	Cronbach's Alpha	N Of Items
Environmental concern	.842	6
Attitudes toward green products	.899	6
Green purchase behavior	.801	3
Perceived persuasiveness	.941	3
Purchase intention	.938	3

3.7.2. Factor Analysis

To assess the convergent and divergent validity of the measurements and scales utilized in the current study, the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were performed. These tests measure the appropriateness of factor analysis (Malhotra, 2010). The KMO statistic yielded a value of .903, indicating satisfactory suitability. Bartlett's test suggested a significant correlation among the variables, with p=<.001. Hence, it is suggested that there is a substantial correlation in the data.

Table 3.7.2: *KMO and Bartlett's test*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.903
Bartlett's Test of Sphericity	Approx. Chi-Square	3125.077
	df	210
	Sig.	<.001

To determine the factor structure and remove inadequate items, a principal components analysis (PCA) with Varimax rotation was conducted. This technique enables the exploration of the factor structure of the constructs by considering the total variance in the dataset (Malhotra, 2010). Kaiser's rule, which states that components with eigenvalues less than 1 should be excluded from the model, along with the criterion that each factor contains at least three items, was used to determine the appropriate factor retention. Additionally, the following retention criteria were employed: each item must have a primary factory loading of .50 or greater and not cross-load on any other factor at .32 or greater, and the extracted components should account for at least 60% of the total variance explained (Costello & Osborne, 2005; Malhotra, 2010). The results of the PCA supported the retention of four factors, which contained between three and six items, for a total of 21 items. All factors had eigenvalues greater than 1, accounting for 70.60% of the total variance in the items (Appendix 2). Additionally, as visualized in the scree plot, a distinct breakpoint in which the scree flattens confirms that a four-factor solution is suitable (Appendix 3). The analysis revealed no empirical overlap, as the items of each concept had significant loading on their respective factors.

Table 3.7.3: *Factor analysis*

Variable	Initial Eigenvalues	Items	Factor 1	Factor 2	Factor 3	Factor 4
Environmental concern	1.606	Q1			.698	
		Q2			.538	
		Q3			.618	
		Q4			.761	
		Q5			.590	
		Q6			.806	
Attitudes toward green products	3.724	Q7		.698		
		Q8		.538		
		Q9		.618		
		Q10		.761		
		Q11		.590		
		Q12		.806		
Green purchase behavior	1.117	Q13				.858
		Q14				.735
		Q15				.742
Perceived persuasiveness (WTB)	8.380	Q16	.876			
		Q17	.910			
		Q18	.910			
Purchase intention (WTB)		Q19	.890			
		Q20	.904			
		Q21	.876			

The results suggest that the selected measures demonstrate good validity for the concept under investigation, thus warranting their use in subsequent analysis. This step was crucial in ensuring that the items chosen adequately to represent the construct being measured by the independent variables. The establishment of convergent validity is an essential step in the analysis, as it determines the validity of the findings based on the extent to which the selected items accurately reflect the underlying concept. Failure to establish convergent validity could result in misinterpretation of the data, ultimately invalidating the analysis and compromising the insights gained from it. As such, the assessment of convergent validity is a fundamental element in establishing the validity and reliability of the research instrument and is considered an essential aspect of any confirmatory factor analysis (Malhotra, 2010).

3.8. Pre-test

Conducting a pre-test is an important step in ensuring the validity and reliability of the data obtained in a survey. A pre-test can help minimize response errors, clarify any potential misunderstandings regarding survey statements, and evaluate the nature of the data that can be expected from the final survey. Additionally, it can help to identify and rectify any potential errors in the survey design or administration thereby increasing the accuracy and quality of the final data (Malhotra, 2010). For this purpose, a small group of individuals with diverse backgrounds was employed to test the clarity, relevance, and comprehensibility of the questions in the survey. The participants were selected to represent the target population based on demographic criteria such as age, gender, and level of education. The pre-test consisted of distributing the questionnaire to the sample group and collecting their responses. A thorough examination of the responses was conducted in order to identify any areas of misunderstanding or ambiguity in the questionnaire. Based on the findings, the questionnaire was modified to ensure that it was clear, relevant, and easy to comprehend for the target population. The pre-test was beneficial in refining the questionnaire and ensuring that it appropriately reflected the research objectives, hence improving the quality of the data acquired.

3.9. Ethical Considerations

The research was conducted in an ethical and responsible manner in compliance with current regulations, following BI's "Checklist for use of personal information in a student assignment". To ensure that participants were fully informed about the study and their rights before giving their consent to participate, the introduction of the survey clearly stated the purpose and procedure of the study. Anonymity was guaranteed, and all responses were treated with confidentiality to protect the participants' privacy. The author's contact information was included in case participants had any further questions regarding the survey.

CHAPTER 4: Results

4.1. Descriptive Statistics

The present study involved a sample of 263 individuals, out of which 61 participants did not complete the survey and were thus excluded from further analysis. Among the remaining 201 participants, 101 were exposed to the ad without AR, while the remaining 100 were exposed to the AR-enhanced ad.

43.8% of the participants identified as male and 56.2% as female. Notably, the age distribution of the sample was characterized by the largest proportion (29.4%) of respondents falling into the age group 5 (50-59), followed by group 2 (20-29) which constituted 23.9% of the participants. Regarding the educational background of the participants, a majority of the sample reported having attained a high level of education, with 43.3% holding a bachelor's degree and 28.4% having completed a master's degree. In terms of income, the average reported income ranged between 400,000 to 700,000 NOK, which aligns with the average salary range in Norway (SSB, n.d.) (Appendix 4).

In order to obtain a comprehensive understanding of the sample, categorical groups were derived to evaluate the levels of environmental involvement among the respondents. Based on the average levels of environmental concern (M=5.07, SD=1.05), attitudes toward green products (M=5.40, SD=1.19), and green purchase behavior (M=3.50, SD=1.37) (Appendix 5), each participant was categorized as demonstrating either a low or high level of environmental involvement, where low indicated a score below the respective mean and high indicated a score above the mean (Table 4.1).

Table 4.1: *Respondents in each category*

Variable	**Group**	**Frequency**	**Percent**
Environmental concern	Low High	79 122	39.4 60.6
Attitudes toward green products	Low High	89 112	44.3 55.7
Green purchase behavior	Low High	113 88	56.2 43.8
Total		201	100

Remarkably, a majority of the respondents fell under the high-level category for both environmental concern and attitudes toward green products, while the results for green purchase behavior showed the opposite outcome, with the majority of respondents falling under the low category. This observation confirms the existence of an intention-behavior gap, in which the respondents fail to translate their concerns and attitudes into actual behavior.

4.1.1. Normal Distribution Analysis

In order to proceed with the analyses, it is necessary to ensure that all variables in the dataset adhere to the assumption of normal distribution. To examine the normality of the variables, the corresponding skewness and kurtosis values of each variable were examined. A normal distribution has skewness and kurtosis values of zero (Malhotra, 2010), and values between -1.96 and 1.96 are generally considered indicative of normality (Finch et al., 1997). After conducting these assessments, it was found that all variables fell within the acceptable range, thereby meeting the assumption of normality and enabling proceeding with further analyses (Table 3.2.1.).

Table 3.2.1: *Skewness and kurtosis*

	Mean	**Std. Dev.**	**Skewness**	**Kurtosis**
Environmental concern	5.0746	1.04892	-.876	.387
Attitudes toward green products	5.4046	1.11873	-.782	.522
Green purchase behavior	3.4959	1.37239	.371	-.739
Perceived persuasiveness	4.33	1.58867	-.254	-.695
Purchase intention	3.96	1.64506	-.089	-.859

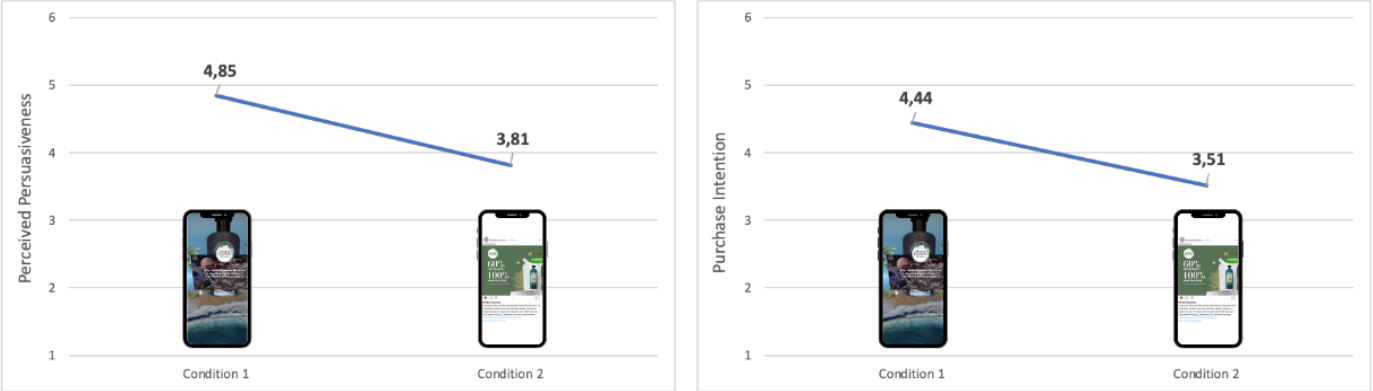
4.2. Independent Samples T-tests

To test for differences in perceived persuasiveness and purchase intention between respondents that were exposed to condition 1 (Green AR ad) vs. condition 2 (Green ad), an independent samples t-test was employed. As the two ad conditions were drawn from different populations, this was considered a suitable approach (Malhotra, 2010). Moreover, this allowed for investigation of how the participants responded to the AR-enhanced ad, specifically whether it was most efficient in terms of facilitating cognitive processing and eliciting positive attitudes, or in converting consumers' intention to engage in sustainable behaviors regarding purchasing green products.

The results showed a significant difference in means between condition 1 (M=4.85, SD=1.59) and condition 2 (M=3.81, SD=1.42), under t(199)=4.890, p=<.001. This indicated that respondents exposed to an AR-enhanced green ad perceive it as more persuasive than those exposed to a regular green ad. Moreover, the group statistics for the items included in the perceived persuasiveness variable suggest that the AR-enhanced green ad was particularly effective at positively influencing environmental attitudes and increasing awareness of behavior in terms of sustainability. Hence, H1a is supported, and the results suggest that the use of AR in green advertising is likely a more efficient persuasive tool, as it appears to be particularly effective at shaping consumers' attitudes and behaviors in a positive way.

Following the same procedure, the results showed a significant difference in means between condition 1 (M=4.44, SD=1.75) and condition 2 (M=3.51, SD=1.39), under t(199)=4.177, p=<.001. This indicated that the respondents exposed to AR expressed significantly higher purchase intentions compared to those who were not. Furthermore, the group statistics for the items included in the purchase intention variable indicate that the AR-enhanced ad had a positive impact on participants' perception of the brand and thus their likelihood to make a purchase (Appendix 6). Hence, H1b is supported, and the results suggest that the use of AR in green marketing is more likely to drive purchase intention compared to regular green advertising. Finally, based on the mean values, it is evident that the AR-enhanced ad demonstrated a higher level of influence on perceived persuasiveness compared to the purchase intention. The results suggest that the AR technology effectively enhanced the persuasive impact of the ad, capturing participants' attention and engaging them in a compelling manner. However, it is noteworthy that the effect on purchase intention, while still positive, was comparatively less pronounced.

Figure 4.2: *Visualization of mean perceived persuasiveness and purchase intention*



4.3. Main Effect of Green Advertising on Willingness to Buy

A univariate ANOVA was conducted to examine the main effect of green advertising (AR-enhanced vs. regular) on consumers' willingness to buy (WTB) sustainable products. The WTB variable consist of the items in perceived persuasiveness and purchase intention, and item correlation have been confirmed in the factor analysis. This analysis is appropriate for testing the difference in means between groups (Malhotra, 2010).

The primary objective is to determine if there is a significant difference between the means of the WTB scores for the two ad conditions (i.e., presence vs. absence of AR). Specifically, the analysis tests the hypothesis that green ads enhanced by immersive AR experiences have a main effect on consumers' willingness to buy sustainable products.

Levene's test of Equality based on mean was significant (p=.013), indicating that the assumption of homogeneity of variances was violated. Thus, the t-test results are reported with and without the assumption of equal variances. The t-test showed that there was a significant difference in mean scores between the two

groups, with and without assuming equal variances (t=4.724, p<.001 and t=4.719, p<.001, respectively. Hence, it emerged that the respondents exposed to the AR-enhanced ad expressed a higher willingness to buy, in comparison to the respondents exposed to the ad without AR (Table 4.2.1). The results (Appendix 7) revealed a statistically significant difference (F=22.318, p=<.001) between the mean scores of the group exposed to the AR-enhanced ad (M=4.654, SD=1.62) and the group exposed to the advertisement without AR (M=3.66, SD=1.32). Hence, H2 is supported, and the results suggest the implementation of AR in green advertising is likely to increase consumers' willingness to buy sustainable products.

Table 4.2.1: *Means of green advertising on willingness to buy*

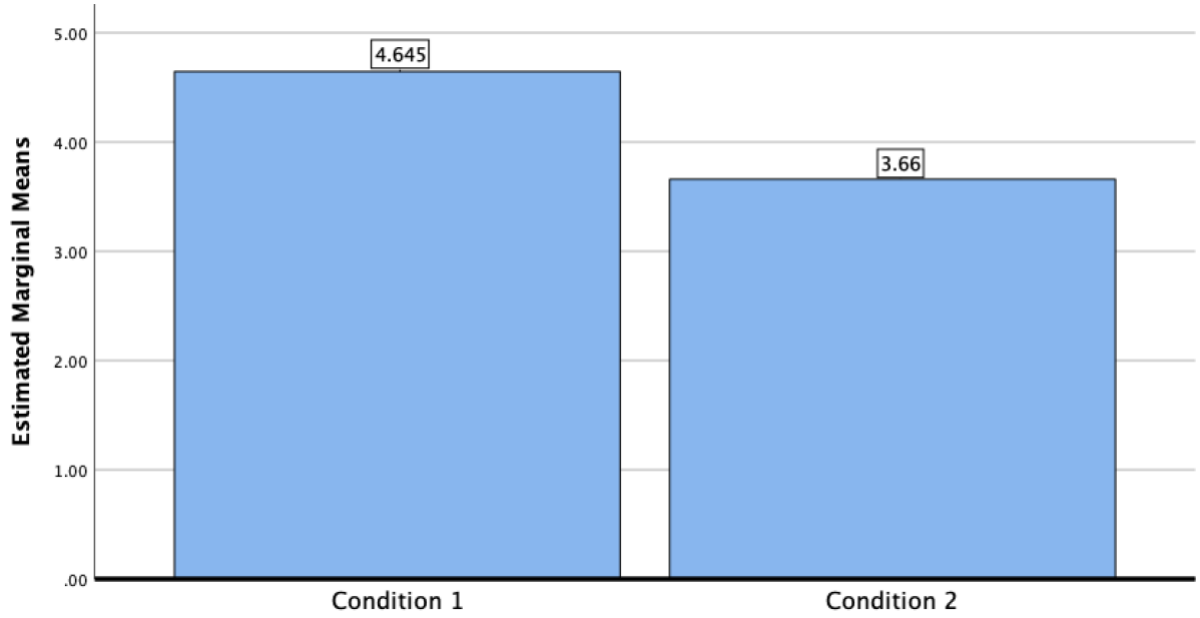


Table 4.2.2: *Test of between-subject effects for green advertising*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Condition	48.746	1	48.746	22.318	<.001
Error	434.643	199	2.184		

4.4. Moderating Effect of Environmental Involvement

To further investigate the effect of AR in green advertising, a regression analysis was conducted. Specifically, a moderation analysis was utilized to understand the effect of green advertising (Cond) on consumers' willingness to buy sustainable products, with a moderating effect of environmental involvement (Env_inv). This was accomplished using the PROCESS analysis method, which enables the investigation of the direct effect of an independent variable on a dependent variable while controlling for the moderating effect of another

variable. Model 1 in PROCESS was employed, utilizing a bootstrap sample of n=5000 and a 95% confidence interval. The independent variable green advertisement is coded (1 = green AR ad vs. 2 = green ad).

Table 4.3.1: *Model summary*

R	R-sq	MSE	F	df1	dDf2	p
.4855	.2358	1.8753	20.2566	3.0000	197.0000	.0000

Table 4.3.2: *Overview of PROCESS model*

	coeff	se	t	p	LLCI	ULCI
constant	2.5020	1.4755	1.6957	.0915	-.4077	5.4117
Cond	-.7155	.9490	-.7540	.4517	-2.5870	1.1559
Env_inv	.7132	.3141	2.2704	.0243	.0937	1.3327
Int_1	-.0850	.1994	-.4261	.6705	-.4781	.3082

The PROCESS analysis revealed that the overall model had a significant improvement over the null model (F=20.2566, p=<.0001), indicating that the model as a whole was statistically significant. The R^2 value of .2358 indicated that the model accounted for 23.58% of the variance in WTB. For the purpose of this thesis, this is considered satisfactory. After controlling for the effect of the green advertising, the results indicate that environmental involvement did moderate the effect of the ad on WTB. Specifically, environmental involvement had a significant positive effect on WTB, with a coefficient of .7132 and p=.0243, indicating that the effect of the green advertising on willingness to buy sustainable products was stronger from consumers reporting high levels of environmental involvement compared to those with low environmental involvement. On the other hand, green advertising was not a significant predictor of WTB, with a coefficient of -.7155 and p=.4517. Hence, the type of green advertising, i.e., whether the ad was enhanced by an immersive AR experience or not, was not a significant predictor of the participants' willingness to buy sustainable products, after accounting for the moderating effect of environmental involvement. In other words, green advertising did not have a direct effect on WTB, but its effect was influenced by environmental involvement.

Therefore, the H3 is supported, and the results suggest that green ads are more effective for promoting a willingness to buy sustainable products among consumers who are highly environmentally involved. The specific interaction effect (Int_1) is not statistically significant.

CHAPTER 5: Conclusion

5.1. Discussion

In response to the increasing global demand for a more sustainable world, businesses worldwide constantly grapple with the dilemma of implementing effective green strategies. As the pursuit of sustainability has become increasingly prominent, green advertising has emerged as a powerful marketing approach to foster differentiation. However, as green advertising has become a mainstream tactic for businesses to gain a competitive edge, it has also created a challenge for consumers to discern between authentic claims and exaggerated ones (Chen & Chang, 2012; Schmuck et al., 2018). Given this prevailing skepticism towards green advertising, advertisers are presented with the need to fundamentally rethink their strategies. Addressing this challenge calls for the development of innovative and effective approaches that can inspire and empower consumers to actively participate in pro-environmental behavior, thereby bridging the pervasive intention-behavior gap in sustainable consumption (Carmigniani et al., 2011; Reinartz & Saffert, 2013).

Immersive technologies have emerged as promising tools for driving behavior change and shaping consumer attitudes (Carmigniani et al., 2011). In this context, consumers are increasingly drawn to the interactive and immersive experiences offered by AR, holding tremendous potential for promoting sustainable consumption practices. This realm remains relatively unexplored in research, presenting an exciting opportunity to delve into the untapped possibilities of leveraging AR technology in green advertising. Hence, the primary objective of this thesis was to answer the research question "*How can Augmented Reality technology be leveraged in green advertising to bridge the intention-behavior gap and encourage pro-environmental behavior among consumers?*"

The findings of this study provide valuable insights into the effectiveness of AR technology in promoting pro-environmental behavior and driving sustainable consumption practices. The hypotheses put forth in this research have been supported, indicating the positive impact of AR-enhanced green advertising on consumers' perceptions, intentions, and willingness to purchase sustainable products. This contributed to the understanding of how AR can be leveraged to bridge the intention-behavior gap in sustainable consumption and address skepticism toward green advertising.

The first hypothesis (H1a and H1b) suggested immersive AR-enhanced ads would be perceived as more persuasive and elicit a higher intention to buy sustainable products compared to a regular green advertisement. The findings provided robust evidence supporting these hypotheses, revealing a significant main effect of AR ads on consumers' willingness to buy sustainable products (H2). AR technology demonstrated the potential to enhance the persuasiveness and impact of ads, shaping consumers' attitudes and behaviors in a positive way. Furthermore, by enabling consumers to visually and comprehensively understand the environmental benefits of sustainable products, AR enhances their connection to the products, which in turn increases their intention to purchase them. Additionally, the sense of involvement and emotional

connection fostered by AR experiences fosters a stronger desire to support sustainability and make pro-environmental purchase decisions (Ginsberg & Bloom, 2004; Tung et al., 2017). Ultimately, these findings align with the idea that AR technology can bridge the intention-behavior gap by increasing motivation and aligning consumers' intentions with sustainable consumption practices (Carrington et al., 2014; Milovanov, 2015; Nguyen et al., 2019; Park & Lin, 2020).

Moreover, the study explored the moderating role of green involvement in the effectiveness of green advertisements. The findings robustly support the hypothesis that highly environmentally involved consumers, already motivated by sustainability concerns, exhibit more favorable responses to the green ads. In the context of AR as a persuasive tool in advertising, it is suggested that these highly environmentally involved consumers may demonstrate a greater receptiveness to the immersive and interactive experiences provided by AR technology. The combination of their pre-existing commitment to the environment and the captivating nature of AR ads synergistically amplifies their willingness to embrace sustainable consumption behaviors. These results are in line with previous empirical evidence that highlights the pivotal role of environmental involvement as a crucial determinant of the efficiency of persuasive communication in the realm of green advertising (Matthes et al., 2014). This underscores the significance of targeting highly green-involved consumers with AR-enhanced green ads. By leveraging the immersive and interactive features of AR, marketers can effectively capture the attention and engagement of this specific group while reducing the prevalent skepticism towards green advertising by communicating authentic and transparent claims (Finisterra do Paço & Reis, 2012).

Overall, this study provides valuable insights into the potential of AR technology in the advertising industry, specifically in promoting sustainable behavior and products. The study demonstrated that by leveraging the interactive and immersive capabilities of AR, marketers and advertisers can captivate and engage consumers, resulting in more favorable perceptions of sustainable products and initiatives. In line with previous research, the findings of this study confirm the positive effect of AR experiences on consumer engagement, attitudes, and behaviors (Alcañiz et al., 2019). Additionally, as highlighted by Papagiannis (2020), the integration of AR technology in advertising campaigns enables better product assessments and brand connections. Furthermore, this study aligns with the aim of influencing individuals' perceptions, attitudes, and behaviors by seamlessly integrating various technologies into everyday life, as suggested by Wang et al. (2023). These contributions reinforce the notion that AR technology holds significant potential in bridging the intention-behavior gap in sustainable consumption, enhancing consumers' understanding and motivation to make pro-environmental choices. As the advertising industry continues to evolve, the strategic adoption of AR technology can play a pivotal role in promoting sustainable behavior and fostering a more environmentally conscious society.

5.2. Theoretical Implications

The findings of this study have important theoretical implications for the fields of advertising, consumer behavior, and sustainability. By empirically demonstrating the positive impact of AR technology on consumers' willingness to engage in sustainable consumption, this study contributes to the existing body of literature on persuasive communication and behavioral change. The conceptual model developed in this study, incorporating the moderating role of environmental involvement, provides a theoretical framework that advances our understanding of the complex dynamics between AR technology, consumer attitudes, and sustainable behavior. This study expands on the Elaboration-Likelihood Model by highlighting the potential of AR technology as a high-involvement persuasive tool, capable of facilitating cognitive processing and eliciting positive attitudes towards sustainable products. By bridging the intention-behavior gap, AR-enabled green advertising has the potential to convert consumers' intention to engage in sustainable behavior into actual pro-environmental actions. Moreover, the identification of environmental involvement as a significant moderator emphasizes the importance of considering individual differences and psychological factors in understanding the effectiveness of green advertising strategies.

5.3. Managerial Implications

The managerial implications of this study provide valuable insights for marketers and advertisers seeking to promote sustainable consumption and effectively leverage AR technology. The findings underscore the potential of AR as a powerful tool in green advertising campaigns, enabling marketers to communicate the environmental benefits of their products and initiatives in an immersive and engaging manner. By integrating AR into product packaging, interactive advertisements, and brand experiences, marketers can enhance consumers' understanding, emotional connection, and motivation to adopt sustainable behaviors, thereby addressing the intention-behavior gap. The study's findings highlight the importance of crafting AR experiences that align with consumers' level of environmental involvement, thereby increasing the persuasiveness and effectiveness of green advertising messages. Marketers should prioritize authenticity, transparency, and credibility in their AR-enhanced green ads to address consumers' skepticism towards green advertising. Furthermore, the study emphasizes the need for continuous innovation and experimentation in advertising strategies to keep pace with evolving consumer preferences and technological advancements. By incorporating AR technology strategically, marketers can effectively capture consumer attention, enhance brand perceptions, and promote sustainable consumption choices.

5.4. Limitations

It is important to acknowledge some limitations of this study. Firstly, the research focused on one particular application of AR technology in green advertising, and further research could explore the effectiveness of different types of AR experiences and their specific impacts on consumers' attitudes and behaviors. By

examining a broader range of AR applications, researchers can gain a more comprehensive understanding of the potential benefits and limitations of AR in the context of green advertising. Furthermore, it is essential to recognize that the study utilized a video of an AR advertisement rather than a fully immersive AR experience. While the study examined the effects of AR in the context of green advertising, the findings may not fully reflect the impact of actual AR experiences perceived persuasiveness and purchase intentions. Future research could explore the effects of more immersive and interactive AR experiences to provide a more ecologically valid assessment of AR's potential in the context of green advertising.

Additionally, the study's reliance on a survey-based experiment using A/B testing may not fully capture real-world consumer behavior. Participants' responses in a controlled experimental setting may differ from their responses in naturalistic settings. Longitudinal studies or field experiments could be valuable in examining the long-term effects of AR-enhanced green advertising on actual purchase behavior and sustainability outcomes, providing insights into the sustained impact of AR experiences in real-world scenarios. Moreover, the study employed a convenience sampling approach, which potentially can cause sampling bias and limit the generalizability of the study. Future research could benefit from using more diverse and representative samples to enhance the external validity of the results and increase the generalizability to broader populations. Furthermore, there is a potential limitation concerning the high correlation between participants' attitudes and behaviors due to the survey-based approach. Participants may exhibit socially desirable responses or be influenced by demand characteristics, leading to inflated associations between variables. Future research could employ alternative research designs and methodologies to address this limitation and establish a more robust understanding of the causal relationship between AR experiences and consumers' attitudes and behaviors.

5.5. Future Research

In terms of future research, there are several exciting avenues to explore in the realm of leveraging AR technology in green advertising. Firstly, building upon the findings of this thesis, it would be valuable to investigate the effectiveness of different types of green ads, including those high in emotional appeal but low in informational value. Understanding how different advertising approaches impact consumer attitudes, intentions, and behaviors can provide valuable insights for crafting persuasive AR-based campaigns. Additionally, considering the influence of ad skepticism and ad elaboration on consumer responses to AR-enhanced green ads would enhance the understanding of how to mitigate skepticism and maximize the persuasive impact of such interventions.

Furthermore, exploring the application of AR technology in diverse product categories would offer valuable insights into the versatility and effectiveness of AR in driving sustainable consumption behaviors across various contexts. Understanding how different products interact with AR experiences can help identify the most impactful strategies for encouraging pro-environmental behaviors in different consumer segments.

In addition, future research could delve into the role of social influence and social interactions in AR-based green advertising. Investigating how social factors, such as peer influence, social norms, and social presence, influence consumer responses to AR-enhanced green ads can shed light on the potential of AR technology to foster collective behavior change and create social momentum toward sustainable consumption.

Moreover, considering the long-term effects and durability of AR-enhanced green advertising interventions would be crucial. Examining the persistence of behavior change, the sustainability of consumer attitudes, and the long-term impact on purchase decisions can provide insights into the lasting effects of AR experiences on pro-environmental behavior. Lastly, exploring the integration of AR technology with other persuasive strategies, such as gamification or personalized recommendations, could open up new dimensions for enhancing the effectiveness of AR-based green advertising. Investigating the synergistic effects of combining AR with other persuasive techniques can lead to the development of comprehensive and impactful interventions that drive sustained behavioral change toward sustainability.

By addressing these areas of future research, a deeper understanding of the potential and limitations of AR technology in green advertising can be achieved, thereby advancing the ability to bridge the intention-behavior gap and foster pro-environmental behavior among consumers.

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Appendix

Appendix 1

Q1 Please consider the following statements.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I think about the impact of my daily activities on the environment (1)	o	o	o	o	o	o	o
I feel informed about environmental issues in my community (2)	o	o	o	o	o	o	o
I actively seek out information on environmental issues (3)	o	o	o	o	o	o	o
I'm concerned about the long-term effects of climate change on the environment (4)	o	o	o	o	o	o	o
I'm concerned about pollution in my local community (5)	o	o	o	o	o	o	o

I'm concerned about the loss of biodiversity (6)	o	o	o	o	o	o	o

Q2 Please consider the context of purchasing household products when answering the questions below.

To me environmentally friendly products are…

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Important	o	o	o	o	o	o	o	Unimportant
Boring	o	o	o	o	o	o	o	Interesting
Relevant	o	o	o	o	o	o	o	Irrelevant
Means nothing to me	o	o	o	o	o	o	o	Means a lot to me
Worthless	o	o	o	o	o	o	o	Valuable
Not needed	o	o	o	o	o	o	o	Needed

Q3 Over the past year, how frequently have you...

	Never (1)	2-3 times per year (2)	Every 2-3 months (3)	Once a month (4)	2-3 times per month (5)	Weekly (6)	Daily (7)
Looked for ways toreuse things? (1)	o	o	o	o	o	o	o

Switched products for environmental reasons? (2)	o	o	o	o	o	o	o
Paid more for an environmentally friendly product even though there is a cheaper alternative? (3)	o	o	o	o	o	o	o

Q4
CONDITION 1: Imagine that you are using an Augmented Reality (AR) application created by Herbal Essences, as showcased in the video below. The application enables you to view a shampoo bottle in AR, and the company will explain how they are reusing plastic to create a more sustainable product. In addition, applications allow you to virtually clean up the beach by swiping on your screen.

Please watch video below before responding to the following questions. For the most immersive and realistic experience, I highly recommend watching it in full-screen mode on your phone.

CONDITION 2: You will now be exposed to an ad for shampoo by the brand "Herbal Essences" focusing on reusing plastic.

Q5 Please watch and read the ad before responding to the following questions.
Please consider the following statements.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
This ad makes me more aware of my behavior in terms of sustainability (1)	o	o	o	o	o	o	o
This ad will cause changes in my behavior in terms of purchasing environmentally friendly products (2)	o	o	o	o	o	o	o

This ad has a positive influence on my environmental attitudes (3)	o	o	o	o	o	o	o

Q6 Please consider the following statements.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I'm likely to seek more information about this product in the future (1)	o	o	o	o	o	o	o
I intend to try this product in the future (2)	o	o	o	o	o	o	o
If I were to purchase shampoo, I would consider purchasing it from this brand (3)	o	o	o	o	o	o	o

Q7 What is your age?

- o <20 (1)
- o 20-29 (2)
- o 30-39 (3)
- o 40-49 (4)
- o 50-59 (5)
- o 60+ (6)

Q8 What is your gender?

- o Male (1)

- Female (2)
- Non-binary / third gender (3)
- Prefer not to say (4)

Q9 What is the highest level of education you have completed?

- High school diploma (1)
- Trade certificate (yrkesfaglig utdannelse/fagbrev) (2)
- Bachelor's degree (3)
- Master's degree (4)
- Doctorate (5)

Q10 What is your annual household income?

- Less than 250.000 NOK / €22.000 (1)
- 250.000-400.000 NOK / €22.000-35.500 (2)
- 400.000-600.000 NOK / €35.500-53.000 (3)
- 600.000-700.000 NOK / €53.000-62.000 (4)
- 700.000 NOK+ / €62.000+ (5)

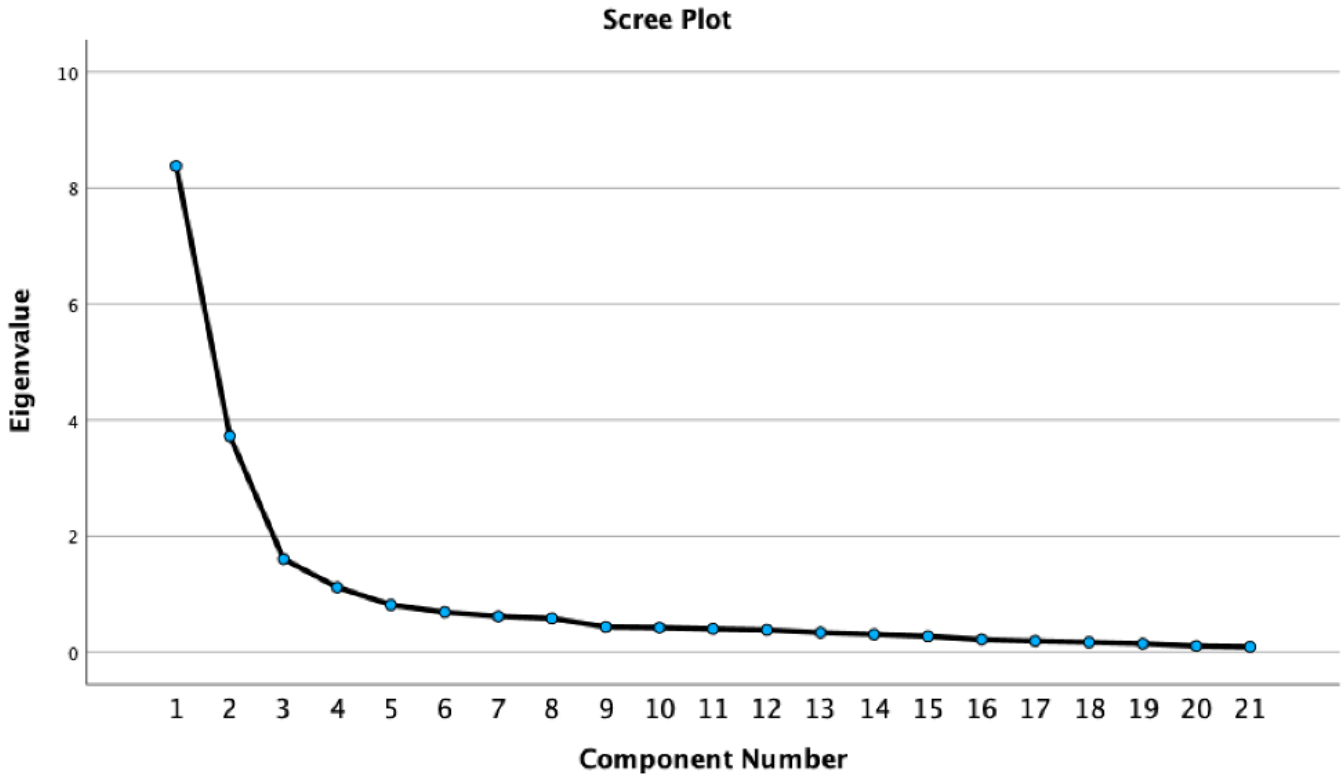
Appendix 2

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.380	39.902	39.902	8.380	39.902	39.902	5.116	24.362	24.362
2	3.724	17.734	57.637	3.724	17.734	57.637	4.469	21.282	45.644
3	1.606	7.646	65.283	1.606	7.646	65.283	3.128	14.894	60.538
4	1.117	5.321	70.603	1.117	5.321	70.603	2.114	10.066	70.603
5	.814	3.874	74.478						
6	.688	3.275	77.753						
7	.617	2.938	80.691						
8	.582	2.770	83.461						
9	.435	2.071	85.531						
10	.422	2.011	87.542						
11	.400	1.905	89.447						
12	.381	1.814	91.262						
13	.336	1.601	92.862						
14	.307	1.461	94.324						
15	.274	1.304	95.628						
16	.216	1.026	96.654						
17	.190	.905	97.559						
18	.170	.809	98.368						
19	.147	.698	99.066						
20	.106	.506	99.572						
21	.090	.428	100.000						

Extraction Method: Principal Component Analysis.

Appendix 3



Appendix 4

What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	88	43.8	43.8	43.8
	Female	113	56.2	56.2	100.0
	Total	201	100.0	100.0	

What is your age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<20	3	1.5	1.5	1.5
	20-29	48	23.9	23.9	25.4
	30-39	27	13.4	13.4	38.8
	40-49	40	19.9	19.9	58.7
	50-59	59	29.4	29.4	88.1
	60+	24	11.9	11.9	100.0
	Total	201	100.0	100.0	

What is the highest level of education you have completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school diploma	26	12.9	12.9	12.9
	Trade certificate (yrkesfaglig utdannelse/fagbrev)	28	13.9	13.9	26.9
	Bachelor's degree	87	43.3	43.3	70.1
	Master's degree	57	28.4	28.4	98.5
	Doctorate	3	1.5	1.5	100.0
	Total	201	100.0	100.0	

What is your annual household income?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 250.000 NOK / €22.000	13	6.5	6.5	6.5
	250.000-400.000 NOK / €22.000-35.500	16	8.0	8.0	14.4
	400.000-600.000 NOK / €35.500-53.000	40	19.9	19.9	34.3
	600.000-700.000 NOK / €53.000-62.000	46	22.9	22.9	57.2
	700.000 NOK+ / €62.000+	86	42.8	42.8	100.0
	Total	201	100.0	100.0	

Appendix 5

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FACTOR_3_concern	201	2.00	7.00	5.0746	1.04892
FACTOR_2_attitudes	201	1.50	7.00	5.4046	1.11873
FACTOR_4_behavior	201	1.00	7.00	3.4959	1.37239
Valid N (listwise)	201				

Appendix 6

Group Statistics

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Perceived_Persuasiveness	Condition 1 (AR)	100	4.8533	1.58509	.15851
	Condition 2	101	3.8152	1.42086	.14138
Purchase_Intention	Condition 1 (AR)	100	4.4367	1.75343	.17534
	Condition 2	101	3.5050	1.39013	.13832

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Perceived_Persuasiveness	Equal variances assumed	1.352	.246	4.890	199	<.001	<.001	1.03815	.21228	.61954	1.45677
	Equal variances not assumed			4.888	196.227	<.001	<.001	1.03815	.21240	.61927	1.45703
Purchase_Intention	Equal variances assumed	6.564	.011	4.177	199	<.001	<.001	.93172	.22308	.49181	1.37162
	Equal variances not assumed			4.172	188.347	<.001	<.001	.93172	.22334	.49116	1.37228

Group Statistics

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Please consider the following statements – This ad makes me more aware of my behavior in terms of sustainability	Condition 1 (AR)	100	4.94	1.594	.159
	Condition 2	101	4.04	1.574	.157
Please consider the following statements – This ad will cause changes in my behavior in terms of purchasing environmentally friendly products	Condition 1 (AR)	100	4.68	1.681	.168
	Condition 2	101	3.57	1.465	.146
Please consider the following statements – This ad has a positive influence on my environmental attitudes	Condition 1 (AR)	100	4.94	1.681	.168
	Condition 2	101	3.83	1.550	.154

Group Statistics

	Condition	N	Mean	Std. Deviation	Std. Error Mean
Please consider the following statements – I'm likely to seek more information about this product in the future	Condition 1 (AR)	100	4.42	1.903	.190
	Condition 2	101	3.45	1.500	.149
Please consider the following statements – I intend to try this product in the future	Condition 1 (AR)	100	4.36	1.851	.185
	Condition 2	101	3.43	1.525	.152
Please consider the following statements – If I were to purchase shampoo, I would consider purchasing it from this brand	Condition 1 (AR)	100	4.53	1.784	.178
	Condition 2	101	3.64	1.494	.149

Appendix 7

Descriptive Statistics

Dependent Variable: FACTOR_1_WTB

Condition	Mean	Std. Deviation	N
Condition 1 (AR)	4.6450	1.62052	100
Condition 2	3.6601	1.32160	101
Total	4.1501	1.55465	201

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	df1	df2	Sig.
FACTOR_1_WTB	Based on Mean	6.230	1	199	.013
	Based on Median	5.633	1	199	.019
	Based on Median and with adjusted df	5.633	1	193.876	.019
	Based on trimmed mean	6.063	1	199	.015

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: FACTOR_1_WTB

b. Design: Intercept + CONDITION

Summary

Introduction and Research Context

In recent years, sustainability has become a crucial value in society, leading to a shift in business operations. Companies are adapting their business models to align with sustainability principles and meet stakeholder expectations. Green marketing strategies, which promote environmentally safe and sustainable products, have emerged as a way for companies to demonstrate their commitment to social responsibility and gain competitive advantages. By adopting these strategies, companies can strengthen their brand image, improve their reputation, and increase brand loyalty. Companies worldwide, such as TINE in Norway and South Tyrol in Italy, have successfully adopted green marketing strategies. TINE utilizes 100% renewable milk cartons, and climate-friendly biogas vehicles, and focuses on reducing food waste. South Tyrol prioritizes seasonal fruits, uses 100% plastic-free packaging, and powers its production plant with hydroelectric energy. These companies demonstrate a commitment to sustainable practices and serve as examples of integrating environmental responsibility into business operations.

Green marketing faces challenges due to consumer skepticism and the prevalence of greenwashing, where companies make false or exaggerated environmental claims. Many consumers are skeptical of companies' environmental claims and believe that products marketed as eco-friendly or sustainable often do not live up to those claims. This skepticism highlights the need for innovative and effective strategies to motivate consumers to engage in pro-environmental behavior.

One promising tool for influencing behavior change in green advertising is Augmented Reality (AR) technology, which overlays digital data and virtual objects onto the real world, creating an immersive and interactive experience. For example, AR-enabled product packaging can provide consumers with information on the environmental impact of the product and the company's sustainability practices, empowering consumers to make more informed purchasing decisions. Moreover, it can be used to create captivating and interactive advertisements promoting sustainable products or to develop immersive brand experiences that highlight a company's commitment to sustainability. Major companies like Coca-Cola and McDonald's have successfully incorporated AR into their marketing strategies. Empirical evidence suggests that AR technology has a greater cognitive and emotional impact than traditional advertising mediums, making it a promising tool for bridging the intention-behavior gap in green consumption.

The potential of AR technology to promote sustainable consumption practices remains largely unexplored in research. To investigate the potential of AR technology as a persuasive tool for promoting pro-environmental behavior, a comprehensive literature review will be conducted, focusing on sustainable consumption behavior, green advertising, and AR technology. Additionally, a survey-based experiment using A/B testing will be conducted to examine the impact of AR on green advertising. The study will utilize an immersive AR experience by the brand Herbal Essences in partnership with TerraCycle, which allows

consumers to explore the narrative behind shampoo and conditioner bottles made from plastic collected from polluted beaches.

The findings of this study can contribute to the existing literature on sustainable consumption and persuasive technology, providing insights into the design and implementation of AR-based interventions. Understanding consumer skepticism toward environmental claims is crucial for policymakers, researchers, and practitioners. The study aims to shed light on the strategic use of AR technology in promoting green consumerism and bridging the intention-behavior gap, benefiting marketers and contributing to the broader discourse on sustainability and AR technology.

Literature Review

Green Consumerism and the Intention-Behavior Gap

The rise of environmentalism in the past two decades has led to an increased interest in sustainable consumption practices among consumers. Known as "green consumers", these individuals prioritize social and environmental conservation efforts and actively seek out eco-friendly products and services. The drivers of green consumption have been extensively studied, including factors such as gender, age, education, and income. Women tend to be more environmentally conscious than men, and while the relationship between age and sustainable consumption preferences is unclear, younger generations show positive attitudes toward sustainability. Higher education levels and perceived well-being are also associated with environmentally conscious behaviors. However, despite the growing interest in sustainable products, there is a significant intention-behavior gap, where consumers express positive attitudes towards green products but fail to consistently make environmentally conscious decisions. Several explanations for this gap have been identified, including social desirability bias, self-reported behaviors, consumer constraints, and perceived trade-offs between ethical considerations. Consumers may also believe that sustainable products require sacrificing convenience, cost, or performance without significant environmental benefits. Barriers to adopting eco-friendly products, such as high prices, limited knowledge, quality uncertainty, trust in companies, and product availability, further contribute to the intention-behavior gap. The existence of this gap suggests that consumers' environmental commitment has not been fully realized, despite their positive attitudes toward sustainability. It highlights the need for effective green marketing strategies and environmental innovations that can overcome barriers and incentivize sustainable consumption. As consumers become more selective with their purchases, willing to pay a premium for sustainable alternatives, businesses and brands must prioritize environmental practices to cater to the growing demand for green products and services.

Green Marketing

The concept of green marketing has emerged as a response to the need for environmentally sustainable practices in the face of growing concerns about unsustainable consumption patterns. Green marketing

encompasses various activities aimed at meeting consumer needs while minimizing adverse environmental effects. It involves promoting products, services, and initiatives that are environmentally friendly and demonstrating a commitment to corporate social responsibility. Companies engage in green marketing for several reasons, including compliance with environmental regulations, gaining a competitive advantage, exploring new markets, enhancing product value, and improving corporate reputation. By implementing green marketing strategies effectively, companies can strengthen the emotional connection between consumers and brands, generate a favorable public image, and ultimately increase sales and stock prices. Consumers increasingly prefer to purchase from companies that demonstrate social and environmental responsibility, leading to increased brand loyalty. However, companies must be cautious not to prioritize "green" criteria over consumer needs and expectations, falling into the trap of "marketing myopia". One common challenge in green marketing is the phenomenon of "greenwashing", where companies make misleading or false claims about their environmental practices and impacts. Greenwashing can lead to skepticism and confusion among consumers, eroding their trust in green advertising claims and hindering the success of green products in the market.

Consumers often perceive green products as inferior in terms of performance or lacking sufficient scientific research for development. There is also a lack of clear and universally accepted definitions for terms like "biodegradable" or "environmentally friendly", making it difficult for consumers to evaluate the credibility of green claims. If green advertising is too technical or manipulative, consumers may struggle to comprehend the message effectively, limiting the effectiveness of the communication.

To ensure the success of green marketing efforts, companies need to address these challenges. It is crucial for companies to establish authentic and transparent green claims, avoiding any potential backlash from consumers. Credibility and authenticity play a vital role in green advertising, as companies need to demonstrate a genuine commitment to environmental sustainability. Consumer skepticism towards green advertising can be mitigated by providing clear, accurate, and easily understandable information about the environmental attributes of products and services. Green marketing has gained prominence as companies strive to align their business practices with sustainability principles. By effectively implementing green marketing strategies, companies can strengthen their relationship with consumers, enhance their corporate image, and drive sales. However, the prevalence of greenwashing and consumer skepticism poses significant challenges. To overcome these challenges, companies must ensure the authenticity and transparency of their green claims, provide clear information, and demonstrate a genuine commitment to environmental sustainability. By doing so, they can foster trust among consumers and build stronger market demand for environmentally sustainable products and services.

Immersive Technologies and AR-marketing

In recent years, the rapid advancement of digital technologies has brought about significant changes in business operations and consumer engagement. Among the various categories of digital innovations, immersive technologies have emerged as a transformative force in the marketing discipline. Immersive technologies, such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), collectively known as Extended Reality (XR), offer the potential to revolutionize consumer interactions with content and reshape the customer experience across multiple touchpoints.

The integration of XR technologies in marketing practices is increasingly recognized as a means to enhance customer experiences and provide added value propositions. By leveraging immersive technologies, businesses can optimize customer interactions, cultivate meaningful relationships, and foster greater satisfaction, repeat purchases, and brand advocacy. Immersive technologies have found primary applications in advertising, brand management, and product design, demonstrating positive effects on consumer engagement, attitudes, and behaviors.

AR blends virtual elements with real-world settings to create interactive and engaging experiences for users. By overlaying digital information onto physical spaces and objects, AR marketing aims to achieve overarching marketing goals while considering ethical implications. Through AR technology, marketers can enhance the customer experience and facilitate decision-making throughout the customer journey, aligning with the BICK FOUR framework of branding, inspiration, convincing, and keeping.

The popularity of AR marketing is on the rise due to its ability to provide interactive advertisements, product demonstrations, and virtual try-on experiences, allowing consumers to make informed purchase decisions. AR marketing encompasses various business functions and adds value to customers in terms of utilitarian, inspirational, hedonic, eudaimonic, and edutaining aspects. It transforms the online shopping experience from a traditional 2D interface to a real-time, immersive environment where users can explore virtual shops, interact with virtual products, and engage with sellers, akin to physical stores.

Consumers increasingly rely on AR applications for their purchasing decisions, and the demand for AR experiences spans industries such as gaming, live events, video entertainment, and retail. Statistics indicate that over 100 million consumers have already engaged in AR shopping experiences, and a majority of consumers express their intention to maintain or increase their usage of AR in the future. Companies that provide branded AR experiences enjoy a higher likelihood of being considered by consumers, and a significant percentage of consumers are willing to pay a premium for products that offer transparency through AR. AR also possesses a unique ability to create a sense of telepresence and generate empathy, enabling consumers to connect more deeply with global issues, including humanitarian crises. Its ability to provide authenticity to the experience sets it apart from other mediums within XR technology. As AR continues to evolve, it is expected to make noteworthy contributions across various functional domains, including marketing.

Conceptual Framework and Hypothesis Overview

The study proposes that consumers exposed to AR-enhanced green ads will perceive the ads as more persuasive and demonstrate a higher intention to purchase sustainable products compared to those exposed to regular green ads:

> **H1a:** *Consumers exposed to an AR-enhanced green ad will perceive the ad as more persuasive than those exposed to a regular green ad.*
>
> **H1b:** *Consumers exposed to an AR-enhanced green ad will demonstrate a higher intention to buy sustainable products than consumers without an AR experience.*

Additionally, it is hypothesized that there is a significant overall effect of green ads enhanced by immersive AR experiences on consumers' willingness to buy sustainable products:

> **H2:** *Green ads enhanced by immersive AR experiences have a main effect on consumers' willingness to buy sustainable products*.

The study also considers the moderating effect of environmental involvement on the relationship between AR-enhanced green ads and purchase intention. Environmental involvement refers to the perceived significance of environmental issues to individuals. The Elaboration-Likelihood Model suggests that individuals with high involvement engage in motivated processing of information, while those with low involvement rely more on heuristic cues. Therefore, the study proposes that the effect of AR-enhanced green ads will be stronger for consumers with higher levels of environmental involvement.

> **H3:** *Environmental involvement moderates the effect of green ads such that, under high involvement (vs. low), the effect of the ad is higher on willingness to buy.*

This hypothesis indicates that environmentally conscious consumers who prioritize sustainability in their purchasing decisions may respond more positively to AR-enhanced green ads.

The conceptual model of the study includes three key components: AR technology in green advertisements, consumers' willingness to buy sustainable products, and the moderating role of environmental involvement. By examining these factors, marketers can better target and tailor their AR-enhanced green ads to specific consumer segments, maximizing the persuasive impact of their advertising efforts.

Methodology

Sample and Data Collection

In order to ensure the validity and reliability of the study, careful considerations were made regarding the sample and data collection methods. A convenience sampling technique was employed due to financial and time constraints, which may introduce potential selection biases and limit the representativeness of the sample. To mitigate the risk of sampling biases and response biases, objective measures were used in the questionnaire design, and respondents were assured of anonymity and confidentiality. It is important to acknowledge the limitations of the study, such as a small sample size, lack of sample diversity, and potential uncontrolled

confounding variables, which may impact the validity and reliability of the results. These limitations should be considered when interpreting the findings.

Survey Design

The study utilized a true experimental survey design to examine the impact of green advertisements on willingness to buy. Participants were randomly exposed to one type of ad, and their willingness to buy was measured. Baseline inquiries were conducted before ad exposure to assess the level of environmental involvement. After viewing the ad, participants rated its persuasiveness and purchase intentions. Lastly, demographic information was collected to identify respondent patterns and provide additional information to support the research analysis.

Stimulus Manipulation

Two ads from the brand "Herbal Essences" were utilized. The first ad, enhanced with AR, showcased the company's efforts in reusing plastic in their product packaging to clean up the oceans, providing an immersive experience for viewers. The second ad, without AR, emphasized environmental responsibility through reuse.

Justification for Variables

The chosen variables in the study were carefully justified based on their theoretical and empirical relevance to sustainable consumption. *Environmental involvement* was included to assess respondents' level of involvement when buying household products and understand their motivational state, consisting of environmental concern, attitudes toward green products, and green purchase behavior. *Perceived persuasiveness* was measured as a proxy for actual persuasiveness, providing insight into the effectiveness of AR in advertising, with items related to awareness, behavioral change, and attitudes. *Purchase intention* was measured to evaluate the impact of the ads on consumers' willingness to buy sustainable products, bridging the intention-behavior gap in sustainable consumption. Perceived persuasiveness and purchase intention combined measures the willingness to buy.

Reliability and Validity

A reliability test was conducted to ensure the accuracy of survey items aligned with the variable of interest, assessing the consistency of repeated measurements. Reverse coding and Cronbach's alpha coefficient were used to verify respondent consistency, and all survey items exceeded the recommended threshold of 0.6, indicating strong internal consistency and reliability. Further, tests for sampling adequacy and correlation among variables were performed. The results indicated satisfactory suitability and a significant correlation among the variables. A principal components analysis (PCA) was conducted, retaining four factors with eigenvalues greater than 1, explaining 70.60% of the total variance. These findings confirmed the validity of

the selected measures and justified their use in subsequent analysis, highlighting the importance of establishing convergent validity in the research instrument.

Pre-test

A diverse group of individuals was selected to participate in a pre-test of the survey questions, representing the target population based on demographic criteria. The questionnaire was distributed to the participants, and their responses were carefully examined to identify any issues with clarity or comprehension. Based on the findings, modifications were made to improve the questionnaire's clarity, relevance, and comprehensibility. The pre-test proved valuable in refining the questionnaire and ensuring it aligned with the research objectives, thereby enhancing the quality of the collected data.

Results

Descriptive Statistics

The study included 263 participants, with 61 excluded due to incomplete surveys. Out of the remaining 201 participants, 101 were exposed to the ad without AR, while 100 were exposed to the AR-enhanced ad. The sample had a slightly higher representation of females (56.2%) than males (43.8%), with the majority falling into the age groups 50-59 (29.4%) and 20-29 (23.9%). Most participants reported having a high level of education, with 43.3% holding a bachelor's degree and 28.4% having completed a master's degree. The average reported income ranged between 400,000 to 700,000 NOK.

Categorical groups were created based on participants' levels of environmental involvement, with low and high categories determined by scores below or above the respective mean values for environmental concern, attitudes toward green products, and green purchase behavior. The study revealed that a majority of respondents demonstrated a high level of environmental concern and positive attitudes toward green products. However, when it came to green purchase behavior, the majority of respondents fell into the low category. This finding indicates an intention-behavior gap, suggesting that despite their concerns and positive attitudes, respondents are not translating them into actual environmentally friendly purchasing behavior.

Independent Samples T-test

The study conducted independent samples t-tests to compare the perceived persuasiveness and purchase intention between respondents exposed to the AR-enhanced green ad and those exposed to the regular green ad. The results indicated that participants exposed to the AR-enhanced ad perceived it as more persuasive and expressed higher purchase intentions compared to those exposed to the regular ad. This suggests that AR technology is an effective tool for shaping consumer attitudes and driving purchase intention in the context of green advertising, supporting the first hypothesis. However, the impact on purchase intention was less pronounced compared to perceived persuasiveness.

Univariate ANOVA

A univariate ANOVA was conducted to analyze the effect of green advertising on consumers' willingness to buy sustainable products. The analysis showed a significant difference in mean scores between the two groups, indicating that respondents exposed to the AR-enhanced ad expressed a higher willingness to buy compared to those exposed to the ad without AR. These findings support the second hypothesis that the implementation of AR in green advertising increases consumers' willingness to buy sustainable products.

PROCESS analysis

The PROCESS analysis method (Model 1) enabled the investigation of the direct effect of an independent variable on a dependent variable while controlling for the moderating effect of another variable. The results indicated that environmental involvement had a significant positive effect on willingness to buy, while the type of green advertising did not have a direct effect on willingness to buy. However, the effect of green advertising on willingness to buy was stronger among consumers with high environmental involvement. Therefore, green ads are more effective in promoting a willingness to buy among environmentally involved consumers, supporting the third hypothesis.

Discussion

This study aimed to explore the effectiveness of AR technology in green advertising to bridge the intention-behavior gap and encourage pro-environmental behavior among consumers. The findings of the research provide valuable insights into the potential of AR technology in promoting sustainable behavior and products. The study supported the hypotheses that AR-enhanced green ads would be perceived as more persuasive and elicit a higher intention to buy sustainable products compared to regular green ads. The results revealed a significant main effect of AR ads on consumers' willingness to buy sustainable products. AR technology demonstrated its potential to enhance the persuasiveness and impact of ads, shaping consumers' attitudes and behaviors in a positive way. By visually and comprehensively conveying the environmental benefits of sustainable products, AR technology strengthens the connection consumers feel towards these products, ultimately increasing their intention to purchase them. The immersive and interactive nature of AR experiences fosters a sense of involvement and emotional connection, leading to a stronger desire to support sustainability and make pro-environmental purchase decisions.

Furthermore, the study investigated the moderating role of green involvement in the effectiveness of AR-enhanced green ads. The findings robustly supported the hypothesis that highly environmentally involved consumers exhibit a more favorable response to AR-enhanced green ads. These individuals, who are already motivated by sustainability concerns, show a greater receptiveness to the immersive and interactive experiences provided by AR technology. The combination of their pre-existing commitment to the environment and the captivating nature of AR ads synergistically amplifies their willingness to embrace

sustainable consumption behaviors. Targeting highly green-involved consumers with AR-enhanced green ads can effectively capture their attention and engagement while reducing skepticism toward green advertising by communicating authentic and transparent claims.

Overall, this study highlights the potential of AR technology in the advertising industry, particularly in promoting sustainable behavior and products. Leveraging the interactive and immersive capabilities of AR, marketers, and advertisers can captivate and engage consumers, resulting in more favorable perceptions of sustainable products and initiatives. The findings align with previous research on the positive effects of AR experiences on consumer engagement, attitudes, and behaviors. Integrating AR technology into advertising campaigns enables better product assessments and brand connections while seamlessly integrating technology into everyday life. This study reinforces the notion that AR technology holds significant potential in bridging the intention-behavior gap in sustainable consumption, enhancing consumers' understanding and motivation to make pro-environmental choices.

As the advertising industry continues to evolve, the strategic adoption of AR technology can play a pivotal role in promoting sustainable behavior and fostering a more environmentally conscious society. By leveraging the persuasive power of AR-enhanced green ads, businesses can inspire and empower consumers to actively participate in pro-environmental behaviors, contributing to the global pursuit of a more sustainable world.

Theoretical and Managerial Implications

This study demonstrates that AR technology has a positive impact on consumers' willingness to engage in sustainable consumption. By considering the moderating role of environmental involvement, the study provides insights into the complex dynamics between AR technology, consumer attitudes, and sustainable behavior. Marketers can leverage AR as a powerful tool in green advertising campaigns to communicate environmental benefits, enhance consumer understanding, and motivate sustainable behaviors. It is important to align AR experiences with consumers' environmental involvement and prioritize authenticity and transparency in AR-enhanced green ads. Continuous innovation in advertising strategies is crucial to adapt to changing consumer preferences and technological advancements. Incorporating AR strategically enables marketers to capture attention, enhance brand perceptions, and promote sustainable consumption choices effectively.

Limitations

This study has several limitations. Firstly, it focused on one specific application of AR in green advertising, and future research should explore different types of AR experiences and their impacts on consumer attitudes and behaviors. Secondly, the study used a video of an AR advertisement rather than a fully immersive AR experience, which may not fully reflect the persuasive effects and purchase intentions of actual AR

experiences. Additionally, the reliance on survey-based experiments and convenience sampling limits the generalizability of the findings to real-world consumer behavior. Future research should consider longitudinal studies or field experiments with more diverse samples to enhance external validity. Lastly, the high correlation between participants' attitudes and behaviors in the survey-based approach may be influenced by social desirability or demand characteristics. Alternative research designs and methodologies are needed to establish a more robust understanding of the causal relationship between AR experiences and consumer attitudes and behaviors.

Future Research

Building upon the findings of this thesis, future research on leveraging AR technology in green advertising can explore various aspects. This includes investigating different types of green ads, understanding the influence of ad skepticism and elaboration, exploring diverse product categories, examining social influence, studying the long-term effects of AR-enhanced green advertising, and integrating AR with other persuasive strategies. By addressing these areas, we can gain deeper insights into the potential and limitations of AR technology in promoting sustainable behavior change, bridging the intention-behavior gap, and fostering pro-environmental attitudes among consumers.