

Assessing Trust in AI-Driven Marketing: Factors, Implications, and Opportunities

by

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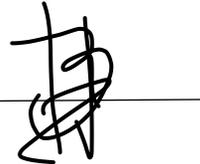
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Dedication

To my beloved parents, for their endless love, sacrifices, and unwavering support throughout every step of my journey.

And to my dear husband, for his patience, encouragement, and belief in me.

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ABSTRACT

Assessing Trust in AI-Driven Marketing: Factors, Implications, and Opportunities

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2025

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This study investigates the factors influencing trust in AI-driven marketing in the cosmetic industry, analyzing the key elements that shape consumer perceptions and their implications for marketing strategies. The research aims to assess how various trust dimensions—such as reliability, privacy management, user control, adaptability, and functionality—impact consumer engagement and purchasing decisions in the context of AI-powered marketing efforts. A questionnaire comprising 16 dimensions and 55 items was administered to a sample of 176 customers from a well-known cosmetic company. The findings reveal significant insights into the role of trust in fostering consumer relationships with AI-driven marketing, highlighting the importance of transparency, reliability, and personalized experiences. Statistical analyses, including Cronbach's Alpha, KMO and Bartlett's Test, One-Sample T-Test, and ANOVA as well as DEA were employed to validate the findings and assess the performance of trust factors. The study found that dimensions such as reliability, user control, and third-party recognition showed strong correlations with consumer trust, while privacy management and ethical considerations

presented challenges in fostering trust. This research contributes to the understanding of how AI-driven marketing can be leveraged to build stronger consumer trust in the cosmetic industry, offering practical recommendations for enhancing marketing strategies and improving consumer engagement. The study also outlines future research directions to explore the long-term effects of AI on consumer behavior and the integration of AI with other emerging technologies.

Keywords: AI-driven marketing, trust, cosmetic industry, consumer behavior, artificial intelligence, marketing strategies

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CHAPTER I: INTRODUCTION

1.1 Introduction

Artificial intelligence, or more commonly AI, is defined by Shieber (2004) as the capability of machines to display intelligence. According to Brooks (1991), the purpose of artificial intelligence is to make it possible for machines to do tasks that typically require human intelligence. Though this definition is acceptable, it only starts the conversation because it assumes there is an agreement on what is intelligence in the first place. Intelligence as a phenomenon can be found in many forms and can include comprehension, self-awareness, emotions, imagination, and even critical thinking (Legg and Hutter, 2007). Russell and Norvig (2016) on the other hand stated that the ability to learn, perform planning and solve problems is central to conceiving intelligence and these concepts are vital in artificial intelligence.

The emerging role of AI in business and the society has been interpreted in diverse ways with many being focused on marketing (Hall, 2019). In particular, AI is predicted to play a major role in the development of various aspects of customer experience (Hoyer et al., 2020) as well as customer relationship management (Libai et al., 2020). Nonetheless, the most demanding and undermost efforts due to the nature of Ai as is embraced in its prospects to bring change in operation could be on management and markets, human resources as well as sales as these are more directly hinged on client or market interactions leaving other fields like finance, operations, information systems and accounting that more less depend on sales up to lesser impacts. As it is the case with Ai, it has certain limitations as well, especially in interpersonal marketing which is accentuated by human interaction and consumer behavior which is fulcrum in many cases has strong common sense (De Bruyn et al., 2020).

In the beginning, studies of technology adoption would look at the adopters and how they responded to certain technological attributes. For example, Davis (1989) describes a model of technology acceptance in which the perceived usefulness of these technologies and their ease of use are the key elements determining the attitudes and intentions toward the technology. More contemporary research, however, extends the perspective and also incorporates the role of trust as a predictor of technology acceptance (Hoff & Bashir, 2015). Evaluating trust helps to explain not only technology rejection but also its abuse, as well as excessive dependence. The appropriateness of user trust versus technological performance is also a quantity of importance; this is termed trust calibration. There are many examples of this, for instance under-trusting a competent technology or over-trusting a poor system, both of which are not effective and can even be dangerous (Glikson & Woolley, 2020).

As a result, AI-oriented marketing is anticipated to become even more indispensable for various sectors such as cosmetic engineering, where interaction, personalization, and brand loyalty are dominant factors. Considering that AI can understand a consumer's behavior and their likes and make predictions about any future trends, an organization can deliver an experience of high level of personalization in the most efficient way possible. But still trust is the deciding factor in the successful employment of AI. With the adoption of technologies that the consumers trust, they will exercise more engagement towards the recommendations and the customized ads and thus improving the affinity towards the brand. On the other hand, if AI's decision making gets suspected most by the consumers, it will work against the aims of the marketing campaign.

In the case of the cosmetic companies however, AI orientation marketing relies on trust. The reputation of cosmetic products and a strong emotional bond with the end user has significant importance to the industry, because in a way the products are linked to

beauty, personal care, and to mental well-being. Application of AI like Virtual try-on, alternatively, skin care recommendation services, and beauty analysis are examples where consumers need to provide their personal data. If the customers see AI recommendation as unethical or too “hands-on”, trust is likely to be eroded towards the technology and the brand itself. It is no doubt that in order to earn the trust of consumers, it is important to balance the level of fidelity of AI with the openness and security of the technology as well as consumer anticipations. Furthermore, usage of AI technology within the sphere of cosmetic marketing enables a highly tailored consumer experience, however, it also raises a concern about managing the customer’s anticipation. To illustrate, if an AI predicts the wrong or ill-suited preferences for possible products, dissatisfied customers could consider changing their attitude towards the brands due to brand trust erosion. Consumers may develop concerns if they perceive that AI recommendations’ only aim is to generate profit at the expense of their true needs. As such, bringing about trust that the AI will work in the interest of the consumer is a vital aspect in regard to the deployment of the technology in the cosmetic sector.

However, factors of trust concerning AI for cosmetic companies’ consumers are not only interaction with the end client. An advanced Artificial Intelligence system, when implemented correctly, can save the company from many marketing processes, increase the effectiveness of customer segmentation and the overall efficiency of operations. But as it is, the low trust in AI will deter the realization of the advantages these advanced technologies provide. It may be necessary to adopt elaborate transparency protocols, good communications and ethical practices to ensure that AI is appreciated by consumers rather than causing alienation. Lastly, with time AI is bound to improve itself and as it does so, the cosmetic industries needs to evaluate and deal with the avenues that impact their level of trust. This also involve digital openness of algorithms, ethical context in which data is

used, the precision of the forecasts made and the level of human control in decision making. If there is an emphasis put on the aspect of trust across AI-powered marketing, cosmetic brands will benefit from the use of technology in all possible dimensions without risking their name and worth while promoting customer retention.

1.2 Problem Statement

AI and the variables affecting its adoption are becoming more and more significant every day. In an effort to reduce the spread of the deadly COVID-19 virus, several people were placed under home quarantine during the current epidemic. In several nations, algorithms were employed to monitor the pandemic's development, including its spread and its effects on the area and the world. AI-powered epidemiology has the ability to identify infectious origins more quickly than humans could. AI may have saved many lives in this situation. But the results would be catastrophic if its algorithms turned out to be defective. AI has the potential to be both beneficial and detrimental in other contexts. Many of the situations in which AI is useful are also those in which it poses a risk. According to Sethumadhavan (2019), evaluating an AI system's perceived trustworthiness requires considering both user confidence and mistrust. According to Lyons et al. (2011), there is a necessary but not always a full negative correlation between the concepts of distrust and trust. It has to do with people's misgivings about a system and their anxieties about the negative effects of that system's inability to function effectively and dependably. Strategies for mitigating the loss of trust following automation failures during human-robot contact have been proposed (Tolmeijer et al., 2020). Other research, however, has shown that even when intelligent automation makes poor recommendations, individuals tend to place too much faith in it (Dorneich et al., 2017; Kaplan et al., 2021).

A variety of issues arising from AI applications and capabilities that might erode trust are included under the dark side of AI. The capacity of AI to gather, process, and

analyze enormous volumes of data is one of the main causes of its negative aspects, raising worries about potential privacy abuses (Chen et al., 2023). Significant privacy issues are raised by people's growing apprehension about the ways in which AI-based goods and services gather, access, use, and safeguard their personal data. For example, research by Han and Yang (2018) shows that, in addition to its benefits, privacy issues are obstacles to AI-based personal help that have a detrimental effect on consumer happiness and usage. Likewise, Pitardi and Marriott (2021) discovered that user attitudes, trust, and desire to use voice-based AI, such as Alexa, are negatively impacted by privacy. Another aspect of AI's negative aspect is the perceived danger involved with its adoption and use. Consumers that depend on AI-driven technology for things like product suggestions, service delivery, or retail environments may be unsure of the repercussions (Seo & Lee, 2021). For example, Chi et al. (2021) found that consumer trust is influenced by the perceived danger of AI social robots in service delivery. Furthermore, Hasan et al. (2021) discovered that consumer loyalty for voice-controlled AI, like Siri, is directly impacted by perceived danger. Another negative effect of AI is consumer alienation, which can reduce the human element of connections in customer-business interactions. Despite their efficiency, AI-driven systems have the potential to diminish the emotional and human components of interactions, creating a feeling of alienation or separation (Puntoni et al., 2021). Accordingly, one of the main factors influencing AI-based personal assistants is social appeal; neglecting this element while creating AI-based personal assistants may result in unfavorable client reactions. Furthermore, ignoring originality in AI services and products may lead to unhappy customers. Artificial intelligence algorithms frequently generalize consumer preferences and behaviors while ignoring minute individual distinctions. The customer's demand for uniqueness may not be met by impersonal encounters that arise from this disregard for individuality. Accordingly, (Mou et al., 2023) discovered that

people' unfavorable reaction to AI was exacerbated by its uniqueness disregard. According to Longoni et al. (2019), people's unfavorable reaction to medical AI can be attributed in part to their disregard for AI's distinctiveness (Barari et al., 2024).

It can be concluded that the unprecedented amount of artificial intelligence (AI) usage and prevalence in marketing methods has changed how companies deal with customers, for example, in the cosmetic industry where trust and a customer-focused approach are indispensable qualities. AI has a great potential: enhanced customer experience due to personalized offers, higher efficiency, accurate targeting, but still the aspect of trust has to be considered. Consumers can be skeptical of the AI marketing system for a variety of reasons that include privacy concerns, data handling, and the viability of AI marketing decisions. Such reluctance could show adverse effects around customer interacts specifically with regards to emotions and trust in the beauty industry and cosmetics in general. The main issue at hand is that although AI is able to improve the marketing strategies of the cosmetic companies, the consumers do not feel comfortable with the ways in which these technologies work. Consumers might be worried about how their data is utilized and if the AI biased orders truly work according to their likes and beliefs. On the other hand, AI gives its systems wider angles to work with hence, large volumes of personal data, meaning more chances for data breaches and unethical handling of data. The unique nature of the cosmetic industry means that customers' preferences are central to the business model and AI may have to undertake some targeted abuse of efficiency in order to allow for an element of humanism with regards feedback from the clients. The other equally important point is the possibility of the use of wrong strategies when AI decision making tools are misaligned to the customers during the automated processes of marketing cosmetics. This is because when employing AI there are chances that the algorithms may be wired prioritize certain strategies such as increased sales at the

expense of consumer tastes and emotions, hence, no level of warmth is perceived at all. This emotional alienation is particularly harmful to the economy since in the cosmetic industry, a high level of satisfaction is expected and is a part of the target consumers self. The vulnerability of AI systems to emotions is one of the weaknesses which in some instances may erode trust to the systems due to the inability to appreciate individual sentiments and an over reliance on AI technology.

To summarize, the task rushes to creating marketing systems relying on AI that trust the customers and where trust is developed and maintained whilst delivering excellent performance, transparency, personalization, and ethical data use. These concerns pose challenges to cosmetic companies which would want to employ AI to the maximum but at the same time be able to use trust as a fundamental element of their marketing strategies.

1.3 Objectives

This study aims at investigating the factors that contribute to the trust of the audience in AI-driven marketing, particularly in cosmetics. Trust seems to be an important aspect for both consumers and marketers as many marketing techniques incorporate AI, such as; targeting, predicting behavior, or engaging with a customer. It is also the aim of this research to understand what can be addressed in order to gain that trust and what are the opportunities and challenges that arise to the cosmetic industries when incorporating AI for marketing purposes. In resolving some of the major issues that are related to trust, the research is seeking to achieve strategic contributions that can develop the consumer-brand relationship within the context of AI-supported advertising.

Another goal of this work is to understand the consequences associated with trust in AI marketing for consumers' behavior, particularly in the beauty and cosmetics industry, in which trust relates to a brand attachment and customized experience. Since AI can potentially alter the way consumers interact with brands, this study will assess the role

played by trust in making decisions, brand preference, and behavior over time. In this case, the research will address trust as a psychological, technological, and ethical construct determining how AI-based systems may be designed in an effort to achieve a competitive advantage through information technologies, whilst preventing any loss of consumers' trust. In the end, the aim is to give very practical advice to cosmetic companies regarding their marketing policies that integrate AI and maintain good, trustful relations with consumers.

Specific Objectives:

1. To identify the key factors that influence consumer trust in AI-driven marketing within the cosmetic industry.

This objective looks at the investigation of both technology and psychology that creates or destroys the trust in AI systems within the relationships between the consumers and the different products including personalized beauty products or services.

2. To investigate the prospects of AI technologies application for increasing effectiveness of online advertising of cosmetic brands in terms of consumer trust.

The goal of this particular objective is to investigate the role AI-based solutions like prediction, data anonymity and recommendations can play in strengthening, renewing the brand-consumer relationship.

3. To study the effects of trust (or distrust) regarding the use of AI in advertising on the behavior and choices of consumers in the sphere of cosmetic products.

This objective will tackle how the degree of trust in the AI system of advertisement alters the behavior of the consumers, including the purchase of the products, retention to the brand, and interest to the promotional activity of the AI endorsed cosmetic items.

4. To establish the potential effects of using AI in advertisement of the cosmetic products on the consumer behavior, specifically the cognitive and the emotional aspects of trust.

The objective will look at the dynamics of consumers' relationships with AI technologies as marketing grows and point out determinants of trust that leads to healthy relationships or determinants of distrust that leads to skepticism or rejection of AI marketing.

5. To suggest cosmetic companies the methods regarding how to formulate AI marketing strategies in a manner that trust is built and consumers' relationships with the firm are in the long run.

This objective will present recommendations of best practices for the use of AI that respect consumer protection, privacy, encourage enhanced understanding and acceptance by consumers for personalization.

1.4 Contribution of This Study

This study, however, seeks to address these gaps through investigating the factors that affect trust in AI marketing within the scope of cosmetics. As such, this research will enable a better understanding of the intersection of AI technology, trust and consumer behavior in order to demonstrate how cosmetic brands can utilize AI to instill great trust and stronger relationships with their consumers.

Such strategies for marketing AI systems will be put forward with emphasis placed on the ways through which trust in AI can be developed through transparency, ethical marketing, and personalized to the consumers but not intrusive marketing measures. In addition, the research will identify the trends that cosmetic companies will embrace regarding AI in order to improve trust, loyalty and satisfaction and not just use AI as a

marketing gimmick. In the long run, this research will meet academic expectations and practical approaches of AI trust in regards to consumers in a competitive market.

CHAPTER II: LITERATURE REVIEW

2.1 Introduction

Every customer has an experience when interacting with businesses. However, very few companies effectively manage the customer experience, missing valuable opportunities to cultivate long-term customer relationships (Iriqat and Daqar 2017). Customer perceptions solidify into motivating attitudes, ranging from satisfaction to loyalty. This process explains how to evaluate and test existing customer experiences, design and deploy new ones, and effectively manage them over time to ensure they consistently remain exceptional, regardless of the business context. In this regard, we demonstrate how customers transform their physical and emotional feelings into powerful perceptions of businesses. Several factors are crucial, with trust being the most important (Avnet, Pham et al. 2012).

Consumer behavior and decision-making are thought to be significantly influenced by trust. Understanding how organizations might create and implement methods to increase trust has been the subject of much research (Garbarino and Johnson 1999). We use Lee and See's (2004) definition of trust as follows: The belief that an agent will accomplish a person's objective in an uncertain and vulnerable environment. According to this definition, trust is an attitude that is strongly associated with vulnerable situations and optimistic expectations. These three components—positive expectations, vulnerability, and trust—are interrelated. Trust is also associated with perceived reliability (Hatherley 2020). Imagine a consumer who frequently shops for clothing online. They come across an advertisement for a particular brand that claims to offer personalized style recommendations based on their preferences and browsing history. The consumer may perceive this brand as trustworthy solely based on the personalized nature of the

advertising. However, it is important to note that perceived trustworthiness should not be solely relied upon as an indicator of trust. Just because the brand appears to cater to the consumer's preferences, it doesn't necessarily mean that the brand is trustworthy. Moreover, trust is distinct from having beliefs about trustworthiness and does not imply vulnerability, which is a key element of trust.

Artificial Intelligence has grown in significance as a tool to help people make decisions. In order to accomplish certain tasks and goals, artificial intelligence (AI) systems may understand external data, learn from it, and adapt (Kaplan and Haenlein 2019). This has led to the emergence of AI-assisted decision-making, where humans rely on AI algorithms to provide recommendations and insights for various domains such as healthcare and business. Trust plays a crucial role in human-machine interactions and the acceptance of AI. However, there are certain limitations in fully trusting AI systems. Despite the advancements in AI and its ability to analyze vast amounts of data, some consumers may still perceive human-delivered services as being more attentive, empathetic, and capable of considering their individual characteristics. This preference for human interaction in marketing may stem from the perception that AI lacks the ability to provide the same level of personalized care and understanding. In the cosmetics industry, for example, customers may have genuine concerns regarding the potential harms associated with AI-generated products and services. They worry that when companies rely on AI to generate specific skincare recommendations, there is a risk of harm. These concerns arise when AI-generated skincare suggestions are based on flawed studies or biased assumptions, which can lead to detrimental effects on customers' skin health. Furthermore, customers may be affected when AI-generated recommendations encourage excessive spending. Similarly, in scenarios like pricing offers by AI agents in services such

as Uber, customers may have concerns about the accuracy and fairness of AI-generated recommendations.

Transparency and explainability are key elements in establishing trust in AI algorithms. Users often require information about how the AI system arrived at its results (Dwivedi, Dave et al. 2023). However, many AI models lack transparency in their decision-making processes, making it difficult for users to interpret and understand the results or detect potential errors (Rudin 2019). This lack of transparency can hinder users' trust in the system and its recommendations (Burrell 2016).

In order to overcome these obstacles, marketers need to learn more about the psychological aspects that influence consumers' openness to AI-generated insights and devise plans to elicit favorable reactions from them. Establishing user confidence in AI-embedded systems is a crucial step in fostering a cooperative relationship between human decision-makers and these technologies.

2.2 Overview

2.2.1 AI in marketing

The marketing sector includes a wide range of organizations, activities, and approaches to develop, communicate, supply, and exchange beneficial offers for customers, clients, partners, and society at large (Mariani, Perez-Vega et al., 2022). Rapid technological advancements over the last few decades have significantly changed marketing strategies. According to the Marketing Science Institute's 2020–2022 research goals, artificial intelligence (AI) has become one of these technologies that has significantly accelerated change by improving accountability, revolutionizing marketing management capabilities, and optimizing both operations and strategies. In addition to redefining conventional marketing channels, this shift has given firms fresh chances to interact with consumers in meaningful and creative ways. The incorporation of AI, which

makes it possible to gather and analyze enormous volumes of data that were previously impossible to handle with traditional techniques, is at the heart of these developments. Consumer research, consumption trends, and consumer behavior have taken center stage in modern marketing techniques, attracting the interest of academics from a variety of fields as well as legislators and marketers (MacInnis, Morwitz et al., 2020). These days, customers engage with AI-powered systems in a variety of ways, from dynamic, real-time customer support to tailored suggestions on e-commerce platforms. By offering personalized, pertinent material that fits each user's wants and tastes, researchers have found that integrating AI may greatly improve the customer experience (Pitardi, Wirtz et al., 2021). But these advantages come with their own set of problems and conflicts, including privacy worries, the possibility of dehumanization, and possible problems with technology addiction (Lobschat, Mueller et al., 2021; Puntoni, Reczek et al., 2021).

Its increasing significance is further shown by the rising body of research on AI in marketing. For instance, Mustak, Salminen, et al. (2021) identified 10 key research areas at the intersection of marketing and artificial intelligence after a thorough analysis employing natural language processing techniques. They divided these themes into two main groups: consumer-related research and organization-and strategy-related research. Similar to this, Vlačić, Corbo et al. (2021) reviewed the literature on marketing and AI or intelligent systems using multiple correspondence analysis and content analysis. They identified four key components: marketing channels, marketing strategy, performance, and segmentation, targeting, and positioning. By offering profound insights into consumer behavior and market trends, these literature studies demonstrate how AI not only propels technology innovation but also affects strategic decision-making in marketing. The development of more individualized and aesthetically pleasing customer experiences is one of the most obvious effects of AI in marketing. On digital platforms like Facebook and

Instagram, AI-driven advertising use complex algorithms to evaluate user data and present offers that are tailored to each user's tastes. In addition to customizing ads, this customization aims to forecast market trends and improve total consumer interaction (Forrest & Hoanca, 2015; Dumitriu & Popescu, 2020). AI makes sure that marketing dollars are distributed effectively by optimizing the efficacy of advertising expenditures. Furthermore, computer vision and other AI technologies are essential to this change. AI systems can now identify objects, actions, and contextual clues in real time thanks to computer vision, which allows robots to understand photos and videos. When combined with more general AI capabilities, this capability enables robots and other automated systems to anticipate and adjust to future events. It has found applications in domains like medical image analysis, public safety, facial recognition, and surveillance monitoring (Van Esch & Stewart Black, 2021; Wisetsri, 2021). In order to provide highly personalized, data-driven advertising experiences and to empower marketers to make more strategic and economical choices, computer vision and AI-driven marketing collaborate (Yang & Siau, 2018).

AI also greatly improves the overall comprehension of the client journey and the development of thorough customer profiles. AI solutions in marketing are able to forecast the kinds of content that would most successfully draw users back to a website or digital platform by utilizing historical data and real-time analytics. Marketers may create strategies to increase customer retention by using their ability to spot trends among consumers who are likely to unsubscribe (Stalidis, Karapistolis et al., 2015; Gkikas & Theodoridis, 2019; Saura, Ribeiro-Soriano et al., 2021). Businesses can use this analytical power to improve their marketing efforts, choose the best pricing plans, decide when to post on social media, and even create email subject lines that entice readers to click through. Marketers can keep ahead of industry trends, optimize workflows, and promote

an innovative and creative culture with the help of these AI-driven insights. In the end, using AI in marketing not only benefits companies greatly but also improves the customer experience by providing highly relevant and tailored interactions (Mitić, 2019; Triberti, Durosini et al., 2020).

Furthermore, AI has an impact on operational effectiveness and strategic decision-making in every stage of the marketing funnel. AI helps marketers to more efficiently manage resources and concentrate on growth-oriented strategic initiatives by automating monotonous processes and performing highly accurate analysis of massive datasets. A fundamental change in how companies handle marketing in the current digital era may be seen in the capacity to synthesize complicated data and offer actionable insights. In addition to lowering operating expenses, the use of AI increases decision-making speed and accuracy, enabling businesses to react quickly to shifts in the market and customer needs. Keeping a competitive advantage in a market that is becoming more and more crowded requires this dynamic agility.

In summary, the application of AI in marketing is complex and revolutionary, impacting everything from operational effectiveness and strategic decision-making to client engagement and customization. The swift development of artificial intelligence (AI) technology, along with their capacity to evaluate and comprehend vast amounts of data, has transformed customer interactions and marketing strategies in a number of industries. Although there are still issues like privacy worries and the possibility of dehumanization, AI has a largely beneficial effect on marketing overall, spurring innovation and producing more meaningful customer experiences. Studies by Mariani, Perez-Vega et al. (2022), MacInnis, Morwitz et al. (2020), Pitardi, Wirtz et al. (2021), and numerous others have shown that the ongoing development and application of AI in marketing holds promise for

further boosting the efficacy of marketing tactics, which will benefit not only companies but also society at large.

AI might help marketing teams do more insightful, needs-based assessments. Because AI solutions save time, businesses can concentrate on other aspects of their marketing initiatives. Artificial Intelligence (AI) is a rapidly evolving technological breakthrough with broad implications. Businesses are consequently urged to include AI into their marketing plans in order to promote innovation and increase productivity in the years to come (Devang, Chintan et al. 2019, Capatina, Kachour et al. 2020, Frank 2021). Marketers may better understand consumer behavior and discover how to segment and help customers throughout their journeys to provide them the best experience possible by utilizing AI. Marketers may increase return on investment (ROI) without squandering money on pointless endeavors by carefully examining customer data and comprehending their actual demands. AI can also assist in avoiding obnoxious, ineffectual advertising (Peyravi, Nekrošienė et al. 2020; Theodoridis and Gkikas 2019). Automating jobs that formerly needed human intellect is one of AI's main goals. For enterprises, this decrease in personnel resources or time spent on repetitive operations can result in major efficiency gains (Murgai 2018, Khokhar 2019).

Significant research has explored how consumers make choices with the aid of AI technologies. Hauser (2014) demonstrated that consumers use heuristic decision-making rules when selecting products, and AI can assist in this process. Additionally, big data analytics has been recognized as a means to gain deeper insights into consumer behavior (Hofacker, Malthouse et al. 2016, Filieri and Mariani 2021). Further empirical studies have shown that online promotional marketing and the analysis of online reviews can effectively predict future product demand (Chong, Ch'ng et al. 2017). Another key theme from the research is the role of marketing automation in attracting new customers and

building/maintaining relationships with both current and prospective customers (Järvinen and Taiminen 2016). Marketing automation uses both active methods, such as directly soliciting customer feedback, and passive methods that involve using data on past transactions and online user behaviors.

Artificial intelligence has been integrated into several essential marketing domains. The main marketing sectors where AI efforts have been concentrated include (Ismagilova, Dwivedi et al. 2020, Han, Lam et al. 2021):

- Pricing: AI is employed to refine pricing tactics and frameworks.
- Strategy and planning: AI assists in crafting and planning marketing strategies.
- Product: AI is used to improve product design, development, and management.
- Promotion: AI enhances promotional activities and marketing campaigns.
- Place management: AI aids in overseeing distribution channels and logistics.
- In addition to these fundamental marketing areas, Lai and Yu (2021) emphasized the significance and application of AI in other crucial marketing facets:
- Targeting and positioning: AI facilitates more efficient customer targeting and product/service positioning.
- Situations: AI is utilized to examine situational factors influencing marketing decisions.
- Thinking models: AI-driven thinking models are leveraged to better comprehend customer needs and preferences.

With a more data-driven, individualized strategy, marketers are transforming conventional marketing paradigms by using artificial intelligence (AI) to promote deeper connection and increased client demand. Businesses are able to provide clients with a highly customized and satisfying user experience by using integrated AI-powered apps. These sophisticated algorithms closely monitor consumer purchasing patterns, keeping an eye on the temporal and geographical aspects of when and where purchases take place. AI can provide targeted offers and personalized marketing messages by analyzing this vast amount of behavioral data. This improves the customer's overall experience and raises their average order value (Liu & Chen, 2021; Rizvi, Haleem et al., 2021).

By increasing automation and optimizing systems, this integrated, AI-driven marketing strategy gives businesses a major competitive edge. Improved decision-making skills and more efficient customer micromanagement are two major advantages that enable companies to fine-tune their marketing plans in response to real-time data analytics (Karimova & Goby, 2021). With the help of this automated method, marketers can swiftly adjust to changes in the market, dynamically optimizing campaigns and making sure that every consumer encounter is as pertinent as possible.

Artificial intelligence becomes a powerful instrument that can carry out a wide range of marketing duties more effectively than conventional techniques when combined with high-quality market research data. The accurate segmentation of target client groups is a noteworthy use of this AI-data synergy. AI systems can do complex segmentation analyses far more quickly and accurately than human analysts because to their superior processing speed and analytical skills (Crunk & North, 2007; Geru, Micu et al., 2018; Puntoni, Reczek et al., 2021). These thorough, data-driven studies enable companies to present highly tailored solutions that effectively connect with target groups, improving overall marketing effectiveness and customer involvement. With artificial intelligence (AI)

now firmly established as one of the most significant and powerful technologies in marketing, industry executives are becoming more and more eager to adopt these cutting-edge approaches as technological developments continue to grow. Businesses can stay ahead of the curve and better meet the changing needs of their target audience by utilizing AI capabilities, which give them a clear competitive edge across a range of marketing functions and performance metrics (Hildebrand, 2019; Prentice, Dominique Lopes et al., 2020).

By precisely determining which customers to include or omit from particular campaigns, AI helps marketers to improve their targeting techniques in addition to improving customization. AI-driven precision targeting guarantees that offers and items are in line with the real purchasing habits of the clientele by removing out-of-stock or irrelevant products from the marketing mix. Additionally, marketers may greatly improve the entire consumer experience by providing highly tailored content, discounts, and first-rate customer service. Businesses may now project future success indicators based on past consumer behavior and engagement patterns thanks to AI-powered predictive marketing analytics (Vladimirovich, 2020; Shovo, 2021). Businesses may propose goods and services in a more relevant and individualized way when they have a thorough understanding of each customer's particular values. The ability of AI to forecast marketing campaign success and enhance personalization is still a significant, continuing technological trend, despite the fact that many of the current AI-driven personalization solutions take a "top-down" approach, concentrating on customizing experiences at the individual level rather than across larger customer segments. Businesses will gain a significant competitive edge if they can successfully utilize these AI skills (Karimova & Shir Khanbeik, 2019; Ullal, Hawaldar et al., 2020). Strong cooperation between businesses and their outside partners is also essential for the efficient deployment and administration of AI systems. These

collaborations are essential for thorough data collecting, exacting analysis, and continuous system upkeep. For example, marketing teams may carefully monitor and cost-effectively improve their processes thanks to process intelligence solutions, which give firms real-time, complete insights into their operational workflows (Zerfass, Hagelstein et al., 2020). This partnership guarantees that product offers and marketing messaging are consistently in line with the changing needs and preferences of customers. Furthermore, marketers may create more thorough and nuanced user profiles by using AI to determine which marketing philosophies—whether rational, humorous, or emotional—resonate better with certain client groupings (Basri, 2020; Chatterjee, Nguyen et al., 2020). The transmission of highly tailored communications is made easier by these unique insights, which may greatly increase client happiness and engagement.

However, the quality of the underlying data is critical to the effectiveness of AI-powered insights. AI algorithms may make incorrect conclusions as a result of poor data quality, endangering whole marketing initiatives. To create strong data cleansing and maintenance procedures, marketing teams must thus collaborate closely with data management and IT departments. To effectively utilize AI's potential in marketing contexts, it is necessary to ensure data integrity and consistency (Olstad & Lee, 2020; Akyüz & Mavnacıoğlu, 2021).

AI enables a thorough grasp of the consumer journey, going beyond targeting and data processing. AI's capacity to evaluate enormous volumes of online data allows it to offer accurate insights into important facets of customer behavior, like the best times to post, the best pricing schemes, and the most attention-grabbing email subject lines to increase conversions. In addition to anticipating trends and modifying their strategy accordingly, these insights help marketers optimize workflows and cultivate an innovative culture. Ultimately, by providing more individualized, pertinent, and captivating

experiences, the use of AI in marketing increases value for companies and customers (Mitić, 2019; Triberti, Durosini et al., 2020).

Additionally, businesses may get greater automation and optimization with AI-driven marketing, which facilitates better decision-making along the marketing funnel. By examining previous contacts and behavioral patterns, predictive analytics enables companies to make accurate predictions about future customer behavior. In order to create individualized client interaction plans and targeted marketing efforts that boost conversion rates and boost income, this predictive power is essential. Businesses who effectively use these AI-driven insights may make real-time, dynamic adjustments to their marketing plans, keeping them competitive in a market that is becoming more and more data-driven.

In conclusion, the use of AI in marketing is a game-changing tool that, when applied in a variety of ways, increases consumer demand and engagement. Marketers may provide highly tailored messages and offers that improve average order value and overall customer experience by using AI-powered applications to track and evaluate consumer buying habits (Liu & Chen, 2021; Rizvi, Haleem et al., 2021). By improving system automation and optimization, this integrated strategy gives businesses a competitive edge and facilitates more accurate customer micromanagement and more efficient decision-making (Karimova & Goby, 2021). AI is a potent tool for target group segmentation and creating customized offers that greatly increase marketing effectiveness and engagement when combined with high-quality market research data (Crunk & North, 2007; Geru, Micu et al., 2018; Puntoni, Reczek et al., 2021). Additionally, AI helps businesses better match their marketing plans with changing consumer wants by enabling more precise targeting and predictive analytics, which keeps them ahead of the competition (Hildebrand, 2019; Prentice, Dominique Lopes et al., 2020). Lastly, to fully realize AI's potential, strict data quality management and close cooperation with outside partners are necessary to guarantee

that the insights gained from these systems result in more successful, data-driven marketing strategies (Zerfass, Hagelstein et al., 2020; Basri, 2020; Chatterjee, Nguyen et al., 2020; Olstad & Lee, 2020; Akyüz & Mavnacıoğlu, 2021). All things considered, using AI into marketing not only changes how companies communicate with their clientele, but it also reshapes the strategic framework that guides marketing choices. AI's place as a key component of contemporary marketing strategy will be cemented as its capabilities to improve consumer interaction, boost operational effectiveness, and spur revenue development continue to develop.

Businesses' approaches to customer interaction, campaign optimization, and trend prediction have all undergone significant change as a result of the use of artificial intelligence (AI) into marketing. According to Davenport, Guha, Grewal, and Bressgott (2020), rule-based systems and data analytics tools that expedited decision-making processes were the foundation of early AI applications in marketing. By automating repetitive processes and swiftly analyzing massive amounts of data, these innovative technologies were created to optimize efficiency. However, they unintentionally hindered their capacity to build customer confidence by prioritizing efficiency above openness. Early recommendation engines, for example, used opaque algorithms that made users wonder how their personal information was being used to select products. This is also an issue in today's AI-driven marketing environment.

The introduction of sophisticated machine learning (ML) and natural language processing (NLP) techniques transformed AI applications in marketing as technology improved. According to Wedel and Kannan (2016), this progress made it possible to create increasingly complex systems that could process data in real time and conduct hyper-personalization. By switching from static, demographic-based segmentation to dynamic, behavior-driven data, businesses were able to more accurately customize their marketing

campaigns. Companies like Netflix and Amazon took advantage of these developments by improving their targeting tactics using ongoing data inputs. But because the extent and variety of data collecting needed for such individualized experiences present important ethical issues, these advancements have also heightened privacy discussions (Gomez-Uribe & Hunt, 2016). An examination of these advancements shows a two-pronged effect: whereas AI-powered systems improve accuracy and operational effectiveness, their "black-box" nature makes it more difficult to gain and keep the trust of customers.

One of AI's most important contributions to contemporary marketing is personalization. AI systems are now able to customize material to individual tastes by utilizing contextual information, real-time interactions, and past behavior data. This greatly lessens consumer decision fatigue (Huang & Rust, 2021). Starbucks' creative use of AI to recommend menu items through their mobile application serves as one example. This strategy showed how customization may result in significant revenue growth by improving customer interaction and achieving a noteworthy 20% increase in average order value (Huang & Rust, 2021). However, there is a catch to the advantages of this kind of personalization: it involves a lot of data collecting methods that may be seen as invasive. According to research by Kim and Park (2019), addressing customer concerns requires clarity about algorithmic procedures and data utilization. Customers are more likely to see AI as a useful tool rather than a kind of surveillance when they comprehend the reasoning behind recommendations, such as the fact that they are based on previous purchases rather than confidential third-party data.

The ability of AI to maximize marketing effectiveness is further demonstrated by programmatic advertising. In order to maximize return on investment, platforms like Google Ads use reinforcement learning algorithms to modify bid prices and ad placements in real time (Braun & Moe, 2013). This type of automation greatly lowers operating

expenses while minimizing human mistake. But it also presents difficult moral dilemmas. For instance, algorithmic biases in ad targeting might perpetuate gender gaps by displaying STEM career ads less frequently to women, as shown by Lambrecht and Tucker (2019). These biases highlight how important it is to continuously audit AI systems to guarantee equity. Regulatory agencies have started to examine these activities more thoroughly, especially in areas subject to strict data protection rules like the General Data Protection Regulation (GDPR) of the European Union (Wachter, Mittelstadt, & Floridi, 2017). An examination of these cases demonstrates a serious weakness in the use of AI: whereas companies frequently put efficiency and profitability first, they could unintentionally ignore the social repercussions of biased algorithms, undermining trust among historically underrepresented groups.

Predicting customer behavior is another area where AI has shown significant promise. Leading fashion stores like Zara have adopted the use of deep learning algorithms to predict trends and buying habits. By predicting style demand with remarkable accuracy, these models help retailers optimize inventory management and cut down on waste (Caro & Martínez-de-Albéniz, 2015). Similar to this, AI is used by subscription services like Spotify to examine listening patterns and suggest customized playlists, resulting in a smooth and interesting user experience (Gomez-Uribe & Hunt, 2016). However, the caliber and variety of the training data have a significant impact on these models' prediction accuracy. Biased datasets can result in faulty projections, including attrition estimates that are not correct, as demonstrated by Fader, Hardie, and Shang (2010). This can have a negative impact on client retention efforts for niche markets. This drawback emphasizes how crucial it is to implement inclusive data procedures; diverse datasets improve prediction accuracy while preventing the perpetuation of discriminatory marketing strategies.

Artificial intelligence (AI)-driven chatbots and virtual assistants have further transformed customer service models by providing round-the-clock assistance for a fraction of the price of conventional service channels (Blut, Wang, & Schoefer, 2021). Because they expedite consumer contacts and offer prompt answers to common questions, these technologies have become essential components of contemporary marketing tactics. According to research by Blut et al. (2021), customers prefer human engagement for complicated or delicate situations, although they are typically receptive to chatbots for simple tasks. This research implies that rather than completely replacing human agents, AI should enhance them. According to a research by Syam and Sharma (2018), 42% of consumers left firms after having a bad encounter with chatbots, demonstrating how over-automation may irritate customers. The significance of hybrid customer service models that integrate the advantages of both AI and human knowledge is shown by these results, which also highlight the crucial connection between AI performance and brand trust.

The problem of trust, a crucial element influencing consumer adoption of AI technology, lies at the heart of these advances. Martin and Murphy (2017) have connected escalating worries about data privacy to a decline in consumer trust, which has been made worse by scandals like Cambridge Analytica, in which personal information was exploited for political ends. According to their study, consumers' trust in AI-driven platforms is severely damaged by opaque data practices, which causes customers to stop using them. On the other hand, Kim and Park (2019) have demonstrated that AI systems that are transparent—that is, that explicitly state data usage guidelines and decision-making procedures—are more likely to be adopted, especially by people who are concerned about their privacy. Apple, for instance, improved consumer loyalty by introducing its App Tracking Transparency feature, which not only guaranteed GDPR compliance but also strengthened the company's reputation as a privacy-conscious brand. This disparity

demonstrates that transparency is a strategic competitive advantage in the field of digital marketing and goes beyond only being a legal need.

The use of AI in marketing is made more difficult by ethical issues like algorithmic prejudice. Significant racial and gender biases in face recognition technologies have been revealed by Buolamwini and Gebru (2018). These systems have a tendency to misidentify non-white people more frequently, which results in biased effects in targeted advertising. In a similar vein, Lambrecht and Tucker (2019) discovered that algorithms could unfairly target males with high-paying job postings, thereby exacerbating already-existing employment disparities. These results suggest a systemic problem in which AI systems that have been educated on historical data unintentionally reinforce and even magnify social prejudices. Researchers recommend the use of "algorithmic accountability" frameworks to solve these issues. These frameworks entail thorough auditing of AI systems in order to identify and correct biased results (Samek, Wiegand, & Müller, 2017). Although there are potential ways to evaluate models for bias using tools like IBM's open-source AI Fairness 360 toolbox, their use in marketing contexts is still somewhat restricted. This disparity emphasizes how urgently industry-wide best practices and standards are needed to guarantee the ethical deployment of AI in all areas of digital marketing.

In the future, new technologies like augmented reality (AR) and generative artificial intelligence (AI) have the potential to completely rethink marketing innovation. Hilken, de Ruyter, Chylinski, Mahr, and Keeling (2017) investigated how AR technologies, including virtual try-on experiences, might bridge the gap between digital and physical customer experiences, therefore greatly improving online buying. But these cutting-edge technologies also present fresh data governance difficulties. For example, the ability of generative AI to produce artificial media that is incredibly lifelike raises questions regarding the possible abuse of deepfakes in advertising. If not handled appropriately, such

developments might mislead customers and eventually harm brand reputation. To reduce these concerns, proactive steps like watermarking AI-generated content are advised; nevertheless, existing legal frameworks frequently fall behind the rate of technical advancement (Wieringa, 2020). This developing situation highlights the paradox of AI's promise: although technology opens up new avenues for customer interaction, it also needs close supervision to maintain confidence and uphold moral principles.

In summary, the use of AI to marketing has ushered in a period of previously unheard-of efficiency, accuracy, and customisation. But there are also serious issues with transparency, data privacy, ethical responsibility, and the requirement for flexible legal frameworks that accompany these developments. The academic literature offers a thorough grasp of both the revolutionary promise and the inherent hazards of AI-driven marketing, ranging from fundamental publications by Davenport et al. (2020) to more recent evaluations by Kim and Park (2019) and beyond. Businesses must find a balance between using AI to gain a competitive edge and addressing the moral and societal ramifications of these advancements as they continue to use these technologies. The capacity of the sector to create open, moral, and customer-focused strategies that not only increase sales but also establish and maintain long-term trust will determine how AI is used in marketing in the future.

Businesses may establish a marketing environment that speaks to the many demands of contemporary customers by consistently improving AI applications, increasing transparency, and implementing ethical standards. In the end, effective AI integration in marketing involves more than just technical development; it also entails establishing strong, trustworthy connections with customers, which is a must for long-term success in the fast-paced digital market of today.

2.2.2 AI applications for marketing

1. Digital Marketing Transformation

By giving marketers cutting-edge tools to comprehend customer behavior and preferences on a never-before-seen scale, artificial intelligence has completely transformed digital marketing. Businesses can quickly scan massive quantities of internet data, such as emails and social media interactions, and turn this unprocessed data into useful insights by utilizing AI. This enables advertisers to customize campaigns that reach the appropriate audience at the right moment with the correct message. Rule-based systems that prioritized efficiency were the foundation of early AI applications in digital marketing (Davenport, Guha, Grewal, & Bressgott, 2020). But these technologies frequently functioned as "black boxes," lacking the openness required to foster enduring customer confidence. These days, marketers may include more dynamic tactics thanks to developments in machine learning (ML) and natural language processing (NLP), which enable automated decision-making, predictive analytics, and real-time data analysis. AI is becoming an essential tool for contemporary digital strategies because to these characteristics, which have greatly improved the accuracy and customization of marketing initiatives (Syam & Sharma, 2018; Yang, Liu et al., 2022).

2. Reduction of Human Error

One significant benefit of AI in marketing operations is its capacity to reduce human mistake. Due to human error, marketing initiatives were historically prone to errors and inconsistencies, particularly when they involved intricate data processing and content optimization. AI systems, on the other hand, are made to produce and optimize material with extreme accuracy, guaranteeing that the content is pertinent and tailored for different formats, including email campaigns. This automation lowers the possibility of mistakes that might jeopardize the security of data and the efficacy of campaigns as a whole. With

persistent cybersecurity challenges, businesses increasingly rely on AI to safeguard sensitive customer data and maintain the integrity of their marketing operations. By continuously learning and adapting to organizational security needs, AI not only reduces errors but also streamlines resource-intensive tasks, thereby enhancing operational efficiency (Tan & Ko, 2016; Kitsios & Kamariotou, 2021).

3. Integration of Business Processes

In order to provide a flawless customer experience, AI is essential in bridging various corporate processes. AI helps businesses to streamline their supply chain management, marketing tactics, and customer service operations by integrating many operational tasks. By taking a comprehensive strategy, every touchpoint—online and offline—is coordinated to provide customers with a consistent and tailored experience. Advanced AI systems empower marketers to develop human-centric strategies that engage customers at multiple levels, from personalized ad campaigns to interactive customer service interfaces. Such integrated processes often result in enhanced customer satisfaction and loyalty, as users appreciate a cohesive brand experience. Studies by Grewal, Hulland et al. (2020) and Sadriwala & Sadriwala (2022) underline the importance of AI in redefining traditional marketing models, paving the way for more adaptive and resilient business processes.

4. Analysis of Massive Market Data

The ability of AI to process and analyze large volumes of market data is transformative. Modern AI algorithms can sift through billions of search terms and social media interactions to forecast consumer behavior with remarkable accuracy. By identifying patterns and predicting future trends, AI enables businesses to anticipate customer needs and optimize inventory, product offerings, and promotional strategies accordingly. For example, AI-driven analytics can pinpoint when a consumer is likely to make a purchase,

allowing marketers to time their engagements perfectly. Furthermore, AI's capacity to identify inefficiencies and suggest corrective actions helps businesses maintain a competitive edge by optimizing resource allocation. The efficiency gains from AI in data analysis have been shown to potentially triple overall business productivity (De Bruyn, Viswanathan et al., 2020; Rutskiy, Mousavi et al., 2021).

5. Delivery of Valuable Information

AI is not just about processing data; it is also about delivering insights that drive strategic decision-making. By continuously evaluating new data, AI systems can provide marketers with relevant, up-to-date information that is tailored to consumer preferences. This capability transforms the marketing landscape from one of static reporting to dynamic, data-driven insights. For instance, AI algorithms can assess user behavior in real time and adjust advertising content accordingly, ensuring that each customer receives highly personalized and timely messages. This continuous feedback loop enhances marketing outcomes by aligning promotional efforts with consumer behavior trends and preferences. Purwanto, Kuswandi et al. (2020) emphasize that such AI-powered insights allow marketers to fuse cutting-edge technology with human creativity, resulting in highly engaging and effective campaigns.

6. Enhanced Customer Support

AI-powered customer support systems, such as chatbots and virtual assistants, have become integral to providing convenient and efficient customer service. These systems offer around-the-clock support and can handle a wide range of routine inquiries, significantly reducing response times and operational costs. By automating repetitive tasks, AI frees up human agents to focus on more complex and emotionally sensitive issues, thereby ensuring a balanced approach to customer care. Research indicates that while customers appreciate the speed and efficiency of chatbots for simple tasks, they still prefer

human interaction for resolving complex problems (Fish & Ruby, 2009; Sirajuddin & Jagannadharao, 2020). This hybrid approach not only improves overall customer satisfaction but also reinforces a positive brand image by demonstrating a commitment to both efficiency and personalized service.

7. Improved Marketing Automation Tools

The integration of AI into marketing automation platforms has revolutionized the way marketers nurture leads and generate content. AI-enhanced automation allows for the identification of qualified leads with greater precision, enabling marketers to tailor nurturing strategies that are both effective and efficient. Dynamic content emails, which are customized based on real-time data such as location, behavior, and psychographic profiles, are a prime example of how AI-driven personalization can elevate marketing efforts. These tools not only help in targeting subscribers' interests but also ensure that communication remains relevant and engaging over time. Dynamic content techniques, as described by Tanase (2018) and Jarek & Mazurek (2019), facilitate a more responsive and adaptive marketing strategy that enhances overall campaign performance.

8. Alleviation of Workload

One of the most significant benefits of AI in marketing is its ability to reduce the workload on human teams. AI-driven predictive analytics, for example, can extract valuable insights from existing data, thereby alleviating the need for manual data interpretation. Predictive lead scoring is one such application where AI classifies and evaluates prospects based on historical data, enabling marketers to focus their efforts on high-potential leads. This not only saves time but also enhances the overall efficiency of marketing operations. With the increased capability to process complex datasets swiftly, AI allows marketing teams to redirect their focus from routine tasks to strategic planning and creative problem-solving (Wirth, 2018; Vlačić, Corbo et al., 2021).

9. Accelerated Data Processing

AI dramatically speeds up the processing of data compared to traditional human efforts. By automating the collection, analysis, and reporting of large-scale data sets, AI provides marketers with real-time insights that are both accurate and reliable. This rapid processing capability allows for the immediate adjustment of marketing strategies, ensuring that campaigns remain agile and responsive to emerging trends. Moreover, AI's capacity to minimize errors inherent in manual data handling further solidifies its role in modern digital marketing. As highlighted by Raiter (2021) and Kumar, Rajan et al. (2019), these efficiencies enable marketing teams to concentrate on higher-order tasks, thereby driving better outcomes and reducing operational costs.

10. Customer-Centric Decision Making

AI facilitates a shift toward more customer-centric decision-making by providing deep insights into consumer behavior. By analyzing vast amounts of data from online interactions, social media, and other sources, AI helps marketers develop comprehensive customer profiles. These profiles incorporate detailed information on buying patterns, preferences, and behavioral trends, enabling more personalized and targeted marketing efforts. Rekha, Abdulla et al. (2016) and Paschen, Kietzmann et al. (2019) illustrate how AI-generated insights empower marketers to design strategies that are finely tuned to the needs and expectations of their target audience. Such an approach not only enhances the customer experience but also increases the overall effectiveness of marketing campaigns.

11. In-Depth Customer Data Analysis

AI and machine learning technologies allow for the comprehensive analysis of millions of data points, providing granular insights into customer behavior. This detailed analysis can determine the optimal timing, frequency, content, and messaging needed to

engage individual customers. By leveraging predictive models, marketers can forecast which customers are likely to make repeat purchases, determine the price thresholds that convert prospects, and identify the most promising leads for targeted engagement. The sophistication of these predictive models enables companies to tailor their marketing strategies with a level of precision that was previously unattainable (Vishnoi, Bagga et al., 2018; Mustak, Salminen et al., 2021).

12. Enhanced Stock Control and Demand Forecasting

In the realm of inventory management, AI plays a crucial role by aligning stock control with consumer demand. AI algorithms analyze purchasing patterns and forecast trends, allowing companies to manage inventory more effectively during periods of high demand. By optimizing dynamic pricing and demand forecasting, AI helps prevent overstocking and stockouts, thereby maximizing profitability. This tailored approach to inventory management can be customized to meet the unique demands of different product categories and consumer segments, as demonstrated by Aladayleh (2020) and Rodgers & Nguyen (2022).

13. Customization of the Shopping Experience

Through the use of virtual assistants and machine learning technologies, AI enables a highly personalized shopping experience. Retailers like Amazon have set a benchmark by employing AI to offer product recommendations based on a user's past interactions, search history, and purchase behavior. These recommendations are continuously refined through real-time data analysis, ensuring that they remain relevant and compelling. The ability of AI to simulate consumer interactions and predict future behaviors means that shopping experiences can be tailored to each individual, ultimately leading to improved user satisfaction and higher conversion rates (Kumar, 2020; Pedersen & Duin, 2022).

14. Digital Advertising Optimization

AI has become a cornerstone of digital advertising, significantly enhancing the effectiveness and precision of ad delivery. Platforms such as Facebook, Google, and Instagram utilize AI to analyze diverse user data—encompassing demographic details, online behavior, and even psychographic profiles—to serve highly targeted advertisements. This data-driven approach enables marketers to identify emerging microtrends and adjust their strategies in real time. As a result, businesses are able to minimize advertising waste while maximizing the return on investment. Moreover, the integration of the Internet of Things (IoT) further augments AI's capabilities, creating opportunities for even more interconnected and responsive advertising systems (Martínez-López & Casillas, 2013; Boz & Kose, 2018).

15. Improvement of Customer Experience

AI is increasingly being used to enhance customer experience by providing a comprehensive view of consumer interactions across multiple channels. Intelligent technology solutions allow marketers to gather and synthesize data from various touchpoints, creating a more holistic understanding of customer needs. This deeper insight into customer behavior facilitates the development of strategies that boost conversion rates while reducing the overall workload for marketing teams. The result is a more streamlined and effective approach to engaging customers, as noted by Güngör (2020).

16. Assisting Marketers in Decision-Making

AI applications help marketers bridge the gap between vast amounts of consumer data and actionable insights. Advanced AI tools analyze and interpret complex datasets, enabling marketers to make informed decisions about campaign strategies. With centralized platforms that consolidate data from multiple sources, marketers are better equipped to extract value from big data, leading to more strategic and impactful marketing

initiatives. This integration of AI into the decision-making process is crucial for navigating the increasingly data-driven landscape of modern marketing (Bader & Kaiser, 2019).

17. Increased Customer Satisfaction and Revenue Growth

The deployment of AI in marketing can lead to substantial improvements in customer satisfaction and revenue. AI platforms optimize ad spend across various media channels by making real-time decisions on campaign adjustments. This agility ensures that customers receive personalized and timely communications, which enhances engagement and loyalty. Furthermore, AI-driven dashboards provide marketers with detailed insights into campaign performance, allowing them to replicate successful strategies across different channels and maximize overall profitability (Tchelidze, 2019).

18. Development of Predictive Models

One of the most transformative applications of AI in marketing is its ability to develop and refine predictive models. These models are built on extensive datasets and are continuously validated against actual customer behavior. Predictive modeling allows companies to identify segments of customers who are at risk of churn and to implement targeted interventions to retain them. By analyzing omnichannel customer interactions, AI-powered churn prediction systems enable businesses to deliver personalized offers and alerts that keep customers engaged, ultimately driving higher lifetime value and revenue (Sahai & Goel, 2021).

19. Gaining In-Depth Insights into Customer Preferences

AI empowers marketing teams to obtain granular insights into customer preferences and demographics. By analyzing behavioral patterns and social media data, AI tools can reveal subtle trends that inform more personalized marketing strategies. These insights allow marketers to tailor experiences down to the individual level, ensuring that every

interaction is relevant and engaging. Such precision in understanding consumer behavior can be a significant competitive advantage, as detailed by Siau & Wang (2018).

20. Enhancing Decision-Making Processes

Both qualitative and quantitative insights derived from AI can revolutionize the way marketing decisions are made. Deep learning and other advanced AI techniques help marketers unearth complex patterns in large datasets, facilitating more informed and nuanced decision-making. By integrating these insights into strategic planning—such as optimizing digital advertising campaigns or refining product offerings—companies can achieve higher returns on their investments while reducing costs. This evolution in decision-making processes is reshaping the digital marketing landscape, as evidenced by research from Prabowo, Murdiono et al. (2019) and Boddu, Santoki et al. (2022).

21. Precise Target Audience Segmentation

A crucial aspect of effective marketing is the accurate segmentation of target audiences. AI marketing solutions enable businesses to sift through enormous volumes of data to identify and understand their most valuable customer segments. By integrating sophisticated algorithms that analyze inbound communications alongside traditional metrics, AI helps marketers uncover the underlying preferences and behaviors that define distinct customer groups. This detailed segmentation allows for more personalized outreach and improved conversion rates, as supported by findings from Daqar & Smoudy (2019).

22. Optimizing Communication Timing and Content

The timing and relevance of communication are essential for engaging customers effectively. AI-powered tools analyze consumer behavior data in real time to determine the optimal moments for delivering marketing messages. By creating detailed consumer profiles that encompass online activity, search behavior, and social media interactions, AI

enables marketers to craft hyper-targeted campaigns that resonate with individual customers. This targeted approach not only improves engagement and conversion rates but also reinforces the overall effectiveness of digital advertising efforts (Zhao & Cai, 2021).

23. Comprehensive Organizational Support

Finally, AI serves as a critical support mechanism for organizations seeking to enhance their marketing operations. By aggregating data from diverse sources such as purchase histories and social media interactions, AI provides a unified view of customer behavior that informs strategic decisions. Additionally, AI technologies play a vital role in monitoring and optimizing digital advertising performance. They can flag issues, recommend best practices, and even drive automated ad campaigns to ensure that marketing efforts remain efficient and effective. This holistic support ultimately enables businesses to align their marketing strategies with evolving customer expectations and market dynamics (Kaiyp & Alimanova, 2020; Ahmed & Ganapathy, 2021).

Synthesis and Implications

The analytical exploration of AI applications in marketing reveals that AI is not merely an operational tool but a transformative force that redefines customer engagement, decision-making, and overall marketing efficiency. By leveraging advanced data analytics, predictive modeling, and real-time processing, AI facilitates a level of personalization and operational precision that was previously unattainable. However, the integration of AI also brings challenges related to data privacy, ethical considerations, and the potential for algorithmic bias. Researchers such as Syam and Sharma (2018) and Yang, Liu et al. (2022) have emphasized the need for transparency and ethical oversight to ensure that AI-driven strategies build, rather than erode, consumer trust.

The multidimensional benefits of AI—from reducing human error and expediting data processing to enabling better customer support and delivering valuable insights—

highlight its critical role in modern marketing. Yet, as noted by Tan & Ko (2016) and Kitsios & Kamariotou (2021), the successful implementation of AI requires a balanced approach that considers both technological capabilities and human elements. As AI continues to evolve, businesses must remain agile, adapting their strategies to leverage new innovations while addressing emerging challenges.

Ultimately, the integration of AI into marketing promises not only enhanced efficiency and revenue growth but also the potential to revolutionize customer experiences across industries. By aligning AI applications with ethical practices and transparent communication, companies can create marketing ecosystems that are both innovative and trustworthy—a dual imperative for sustainable success in today’s dynamic digital marketplace.

2.3 Application of AI in B2C market

In today's age, characterized by the swift and relentless progress of artificial intelligence (AI), the marketing sector has undergone a profound transformation that is reshaping every aspect of how companies communicate with their target audiences. This transformation is especially evident in the domain of tailored advertising, where AI technologies enable marketers to design personalized campaigns that cater to the unique tastes and preferences of individual consumers (Ip, 2023). The advent of AI in marketing has not only revolutionized traditional advertising practices but has also led to the development of entirely new strategies that harness the power of vast data streams and sophisticated algorithms. By leveraging AI, marketers can now analyze intricate patterns in consumer behavior and interactions, thereby creating targeted, data-driven campaigns that significantly enhance the customer experience in the competitive business-to-consumer (B2C) marketplace.

Extensive research has been conducted on the application of AI within the B2C sector, yielding valuable insights into the evolving dynamics of customer engagement. Hoyer, Kroschke et al. (2020) provided a pioneering classification of emerging AI-driven technologies and introduced a comprehensive framework that elucidates their impact throughout the entire customer journey. Their work meticulously examines the role of AI in every phase of the shopping experience—from the initial, pre-transaction phase, through the transaction phase, and into the post-transaction phase—highlighting how these advanced technologies enhance experiential value and streamline consumer interactions. Similarly, Pillai, Sivathanu et al. (2020) expanded our understanding of consumer behavior by analyzing the factors that influence shoppers' intentions to patronize AI-powered automated retail stores. Their research extended the traditional technology readiness and acceptance model by incorporating AI-specific constructs such as perceived enjoyment, customization, and interactivity, thereby offering a futuristic vision of retail where consumer experiences are deeply personalized and seamlessly integrated with cutting-edge technology.

Moreover, recent advancements in complementary technologies, including virtual reality (VR), have further amplified the impact of AI in marketing. Suh and Lee (2005) demonstrated that VR, when combined with AI, allows consumers to experience products in immersive, realistic digital environments, thereby overcoming the limitations associated with the lack of physical product interaction. This integration not only enhances the realism of the shopping experience but also addresses consumers' concerns about the tangibility and authenticity of online purchases. In essence, the convergence of AI and VR has enabled brands to create rich, multisensory shopping experiences that capture the imagination of consumers and foster deeper engagement.

AI-driven applications have also revolutionized the processing and analysis of massive datasets, a capability that is central to modern digital marketing. By harnessing advanced machine learning algorithms, companies can sift through enormous volumes of online data—from social media interactions and search queries to transactional records—and transform this raw information into actionable insights. Gursoy, Chi et al. (2019) and Chi, Denton et al. (2020) have shown that these insights enable the delivery of personalized recommendations that not only improve the consumer-brand connection but also lead to measurable improvements in sales and customer loyalty. This capability is particularly transformative in sectors where consumer preferences are highly dynamic and diverse, allowing companies to continuously refine their marketing strategies in real time. For example, by integrating AI-powered analytics into their operations, businesses can swiftly identify emerging trends, detect shifts in consumer behavior, and adapt their marketing messages to remain relevant and engaging.

In addition to enhancing consumer insights, AI significantly reduces human error in marketing operations. The automation of data analysis and content optimization minimizes the risk of mistakes that can occur in manual processes. AI systems, designed to work with high precision, ensure that marketing communications are not only accurate but also customized to suit different email formats and online platforms. This reduction in error is particularly critical in the context of data security, where even minor mistakes can lead to significant breaches. Tan and Ko (2016) along with Kitsios and Kamariotou (2021) have emphasized that by eliminating human involvement in repetitive and data-intensive tasks, AI not only improves the quality of marketing outputs but also bolsters the overall security of consumer information. Furthermore, AI facilitates the seamless integration of various business processes, enabling a unified approach to customer engagement that spans across multiple channels. This connectivity is essential for delivering a coherent, end-to-

end customer experience that builds brand loyalty. As Grewal, Guha, et al. (2021) argue, AI-powered marketing platforms allow companies to develop and execute highly individualized strategies that resonate with consumers on a personal level. By integrating data from different touchpoints—such as online browsing behavior, purchase history, and social media interactions—marketers can craft campaigns that are not only personalized but also timely and contextually relevant. The use of AI in this manner transforms the traditional marketing paradigm, creating a digital ecosystem where every interaction contributes to a more holistic understanding of the consumer.

The power of AI is also evident in its ability to analyze vast amounts of market data, which enables businesses to forecast future consumer behaviors with high accuracy. AI-driven predictive models can process billions of data points to estimate the likelihood of a purchase, identify potential trends, and even detect early signals of market shifts. Such predictive capabilities are invaluable for inventory management and demand forecasting, as evidenced by studies from De Bruyn, Viswanathan et al. (2020) and Rutskiy, Mousavi et al. (2021). These technologies not only enhance operational efficiency but also help businesses preemptively address potential market challenges, ensuring that marketing strategies remain agile and responsive to changes.

Beyond data analysis, AI plays a crucial role in delivering valuable, tailored information to consumers. By continuously evaluating new data inputs, AI systems provide marketers with timely insights that help shape future campaigns. Purwanto, Kuswandi et al. (2020) describe how AI acts as a dynamic tool that guides marketing efforts toward more ambitious goals, allowing businesses to fuse technological innovation with creative strategy. This dynamic process ensures that marketing messages are not only relevant but also adaptive to the evolving preferences of consumers. Through real-time data collection

and analysis, AI enables companies to fine-tune their advertisements, making them more engaging and effective over time.

The advent of AI-powered customer support tools, such as chatbots and virtual assistants, has also significantly enhanced the quality of customer service. These tools provide round-the-clock support, handling routine inquiries with remarkable efficiency while freeing up human agents to tackle more complex issues. Research by Tavakoli and Mura (2020) and West, Clifford et al. (2018) illustrates how companies like Hilton Worldwide and KLM Airlines have successfully integrated AI-driven solutions into their customer service frameworks, resulting in improved customer satisfaction and reduced operational costs. The ability of AI to streamline customer interactions and provide personalized support reinforces its role as a critical enabler of enhanced consumer experiences.

Moreover, the utilization of AI in marketing automation tools has greatly improved the efficiency of lead generation, content creation, and campaign management. AI-driven platforms can automatically segment audiences, predict customer behaviors, and deliver dynamic content that resonates with individual users. Studies by Tanase (2018) and Jarek and Mazurek (2019) have demonstrated that these automated systems not only increase the relevance of marketing communications but also lead to higher engagement rates and improved conversion metrics. This level of automation allows marketers to focus on strategic decision-making rather than getting bogged down by routine tasks, ultimately driving better overall performance.

In the context of easing workload and accelerating data processing, AI provides marketers with the ability to handle complex datasets rapidly and accurately. By leveraging predictive analytics and deep learning techniques, AI systems can identify patterns and generate insights that were previously inaccessible through manual analysis. Raiter (2021)

and Kumar, Rajan et al. (2019) have highlighted the role of AI in significantly reducing the time required for data processing, enabling marketing teams to respond to market trends with unprecedented speed. This not only enhances the efficiency of marketing operations but also frees up valuable resources for more strategic initiatives.

Furthermore, AI's contribution to customer-centric decision-making cannot be overstated. By synthesizing data from various digital channels, AI helps marketers create detailed consumer profiles that inform personalized marketing strategies. Rekha, Abdulla et al. (2016) and Paschen, Kietzmann et al. (2019) underscore how these insights allow businesses to design campaigns that are finely tuned to the unique needs and preferences of individual customers. This hyper-personalization is a critical factor in building long-term customer loyalty and driving sustainable revenue growth.

Additional applications of AI include the development of predictive models that forecast customer behavior, optimize stock control, and enhance digital advertising. AI algorithms can predict which customers are likely to make repeat purchases, determine the optimal pricing strategies, and even identify the best time to engage consumers with targeted messaging. These capabilities are transforming traditional marketing practices into a data-driven, proactive discipline. Guo and Jiang (2023) provide compelling evidence that AI-generated advertising outperforms conventional methods, leading to higher engagement and increased consumer loyalty. The capacity of AI to deliver precise, real-time insights is revolutionizing how companies allocate resources and strategize for future growth.

Lastly, AI's role in supporting organizations extends beyond external customer interactions. It provides a comprehensive support system that integrates various aspects of marketing operations—from analyzing consumer behavior and streamlining digital advertising to enhancing overall customer experience. By providing actionable insights and

facilitating efficient data processing, AI empowers organizations to make informed, strategic decisions that drive performance across multiple channels. As demonstrated by studies from Kaiyp and Alimanova (2020) and Ahmed and Ganapathy (2021), the integration of AI into organizational processes is essential for optimizing marketing performance and sustaining competitive advantage in today's rapidly evolving digital landscape.

In conclusion, the transformative impact of AI on marketing is multifaceted and far-reaching. With its ability to personalize advertising, reduce human error, integrate business processes, analyze vast datasets, and deliver highly relevant consumer insights, AI is redefining the very foundations of marketing in the digital age. The extensive body of research—from foundational studies by Ip (2023) and Hoyer, Kroschke et al. (2020) to more recent analyses by Guo and Jiang (2023) and Van Esch and Stewart Black (2021)—underscores the dual potential of AI to drive both efficiency and innovation while also presenting significant challenges that must be addressed. As businesses continue to adapt to these technological advancements, it is imperative that they balance the pursuit of technological excellence with a commitment to ethical practices and transparency. This balanced approach will ensure that the benefits of AI—such as improved customer engagement, increased operational efficiency, and enhanced revenue growth—are realized in a manner that fosters long-term trust and sustainable success in both B2C and B2B markets.

2.4 Trust in AI

As interest in the moral implications of AI has grown, a critical focus has emerged on ensuring that both current and future procedures in this field are reliable, ethical, and transparent. This focus reflects an understanding that preserving confidence in AI is

essential to its acceptability and the effective implementation of AI-powered services and products (Mayer, Davis et al., 1995; Siau & Wang, 2018). As the market sees an increasing number of AI-based products, various factors come into play that determine whether trust is established, maintained, or eroded. These factors include not only an individual's or group's interactions with people, data, environments, services, and goods, but also the broader social and ethical context that shapes their overall impression of trustworthiness. In this sense, trust in AI is not merely an abstract quality—it is a dynamic construct that directly influences how individuals make decisions and behave when using a product or service. AI methods are deemed reliable when they possess characteristics that inspire confidence and justify their use, as argued by Avizienis, Laprie et al. (2004).

The complexity and inherent non-determinism of many AI activities introduce an element of risk into the relationship between users and AI systems. When engaging with AI, individuals often face uncertainty due to the intricate nature of these systems and their reliance on vast amounts of data and complex algorithms (Glikson & Woolley, 2020; Komiak & Benbasat, 2006; Shareef, Kumar et al., 2021). This uncertainty is compounded by the fact that AI agents' decisions or behaviors can have far-reaching societal implications and significantly affect the companies that deploy them (Saif & Ammanath, 2020). Trust, therefore, becomes an indispensable factor for future AI adoption, as it underpins successful interactions between human users and non-human agents (Piazza, Sousa et al., 2019; Sullivan, de Bourmont et al., 2022). Moreover, scholars have distinguished between trusting an AI model for decision-making and trusting the outcomes of an individual forecast generated by that model (Ribeiro, Singh et al., 2016). Although AI systems are attractive for their ability to process large volumes of complex data far more quickly than humans, the lack of theoretical guarantees regarding the accuracy of their outputs in specific situations often leads users to question the quality of AI-generated

decisions—even among those familiar with the training process. This skepticism is rooted in the fundamental differences between biological cognition and AI processing, a gap that is a major source of distrust in AI systems (Korteling, van de Boer-Visschedijk et al., 2021).

Within the realm of trust in automation, two primary research streams have emerged. The first focuses on trust in innovation and technology itself (Ghazizadeh, Lee et al., 2012), while the second centers on confidence in the innovative company and its communication strategies (Chiesa & Frattini, 2011). Among the various elements that influence trust in AI, trust in the technology is paramount—and it evolves as performance metrics change. According to Hengstler, Enkel et al. (2016), performance in AI is determined by several factors: operational and data security elements, the process—which includes cognitive compatibility and usability—and purpose information that is contextually defined by the application’s design. Despite extensive debate over whether new technologies should be readily accepted, much of the discussion has historically focused on technology in general rather than on AI specifically (Hooks, Davis et al., 2022). Studies examining robot acceptance, for instance, have shown that while age, gender, and geographic location can influence attitudes, contextual variables alone do not fully explain these attitudes (Vu & Lim, 2022). More recent work by Sullivan, de Bourmont et al. (2022) expands on these earlier studies by examining the social determinants of trust between humans and artificial agents from a moral judgment perspective, thus considering a broader range of AI technologies.

In the context of human-AI interactions, the potential hazards associated with AI further underscore the necessity of trust. The complexity of AI systems often means that users must take a “leap of faith” when relying on them, given that the inner workings of these systems are not always observable or easily understood. This “black box” issue—particularly prevalent in neural network-based models—raises significant transparency

concerns and ethical challenges that must be addressed (Wang & Siau, 2019). Research in interpersonal trust has shown that the dynamics governing human-to-human interactions can offer valuable insights into human-automation relationships. For instance, theories of interpersonal trust suggest that similar cognitive and affective processes are at play when individuals assess the trustworthiness of both human counterparts and AI agents (Madhavan & Wiegmann, 2007; Groom & Nass, 2007). Schoorman, Mayer et al. (2007) further argue that trust in AI comprises both cognitive and affective components. The cognitive component is built upon rational evaluations of an AI's tangibility, transparency, dependability, task characteristics, and interaction skills, as supported by Komiak and Benbasat (2006). In contrast, the affective component is more closely related to the AI's perceived utility and the human-like traits it exhibits, rather than its inherent dependability or transparency. For example, the physical appearance or interface of an AI system can initially foster cognitive trust, while its tangible benefits and practical usefulness contribute more strongly to emotional trust development (Wang, Qiu et al., 2016).

Moreover, the ethical dimensions of AI further complicate the trust equation. As AI technologies become more deeply integrated into critical decision-making processes, their potential impact on society and on corporate accountability grows exponentially. This raises important questions about how AI should be governed and regulated. The ethical concerns are not only technical but also deeply moral—requiring that AI systems are not only efficient and effective but also just and fair in their operation. The absence of robust theoretical guarantees regarding the performance of AI in novel, unforeseen circumstances can lead even experts to question the reliability of AI-generated decisions. This skepticism is exacerbated by the observable disparities between the transparent, human-driven decision-making process and the opaque algorithms that characterize many AI models. The fundamental differences between human cognition and AI processing are, therefore, at the

heart of many of the trust issues observed in AI applications (Korteling, van de Boer-Visschedijk et al., 2021).

Additionally, within the broad discussion of trust in automation, the role of individual and organizational factors must be considered. On one hand, trust in AI technology itself is influenced by factors such as its operational performance, security, usability, and contextual appropriateness (Hengstler, Enkel et al., 2016). On the other hand, trust can also be shaped by external factors such as media coverage, public opinion, and regulatory oversight. Studies by Ghazizadeh, Lee et al. (2012) have indicated that both intrinsic technological factors and extrinsic organizational communication play crucial roles in forming trust. This dual perspective is vital because while technological excellence is necessary, it is not sufficient on its own to secure lasting consumer trust. Instead, transparent communication from the companies that deploy AI technologies—detailing how data is used, how decisions are made, and what safeguards are in place—is equally important (Chiesa & Frattini, 2011).

Furthermore, the debate over trust in new technologies has often been marred by a focus on generalized technology acceptance rather than the specific nuances associated with AI. Hooks, Davis et al. (2022) note that much of the early discourse on technology acceptance did not adequately distinguish between the unique challenges posed by AI systems and those encountered with traditional technologies. For example, studies have shown that sociodemographic factors such as age, gender, and living area only partially explain the variance in attitudes toward robotics and automation (Vu & Lim, 2022). In contrast, more recent investigations have begun to incorporate a wider array of social and moral variables to explain trust in AI, moving beyond mere technological performance. Sullivan, de Bourmont et al. (2022) offer a more nuanced perspective by considering how social determinants—ranging from cultural attitudes to ethical norms—influence trust in

artificial agents. This evolving body of research underscores the complex, multidimensional nature of trust in AI and highlights the need for ongoing inquiry into both its cognitive and affective components.

Given these challenges, it is imperative that designers and developers of AI systems work to enhance transparency and foster a greater understanding among users. The “black box” nature of many AI models presents a significant barrier to trust, as users remain uncertain about how decisions are made. Addressing this issue requires not only technical improvements but also a concerted effort to communicate the underlying principles and safeguards of AI systems in clear, accessible terms (Wang & Siau, 2019). Only by bridging the gap between opaque technological processes and user comprehension can the full potential of AI be realized in a manner that is both effective and ethically sound.

In summary, the growing focus on the moral implications of AI underscores the necessity of building and maintaining trust in AI-driven systems. Research has consistently shown that trust is a critical factor for the successful deployment and acceptance of AI-powered services and products (Mayer, Davis et al., 1995; Siau & Wang, 2018). The reliability of AI methods, as discussed by Avizienis, Laprie et al. (2004), depends on their ability to exhibit qualities that inspire confidence. However, the inherent complexity and non-deterministic nature of AI activities, as well as the significant societal and ethical implications of AI decisions (Glikson & Woolley, 2020; Komiak & Benbasat, 2006; Shareef, Kumar et al., 2021), make it essential to approach AI trust with a multifaceted strategy. Distinctions between trusting the model itself and trusting individual forecasts further complicate the matter (Ribeiro, Singh et al., 2016), while the profound differences between biological cognition and AI processing remain a core reason behind the prevalent skepticism (Korteling, van de Boer-Visschedijk et al., 2021).

Moreover, as trust in automation evolves, research streams have increasingly focused on both the technological performance of AI and the broader organizational context in which it is deployed. Trust in innovation and technology (Ghazizadeh, Lee et al., 2012) and confidence in the companies that create and communicate these innovations (Chiesa & Frattini, 2011) represent two critical avenues of investigation. The performance of AI—shaped by operational security, usability, and context-specific design—directly influences trust, as evidenced by Hengstler, Enkel et al. (2016). Although early discussions on technology acceptance largely treated AI as part of a broader technological trend, recent research has begun to parse out the unique challenges posed by AI, particularly those related to transparency and ethical decision-making (Hooks, Davis et al., 2022). Studies exploring sociodemographic influences on robot acceptance (Vu & Lim, 2022) have paved the way for more comprehensive analyses that consider a wider range of social determinants, as seen in the work of Sullivan, de Bourmont et al. (2022).

Finally, the application of theories from interpersonal trust to human-AI interactions provides a useful framework for understanding these dynamics. Research by Madhavan and Wiegmann (2007) and Groom and Nass (2007) indicates that the factors driving trust between humans share similarities with those governing trust in automation. Schoorman, Mayer et al. (2007) posit that trust in AI comprises both cognitive and affective components, where the former is derived from rational assessments of an AI's capabilities and transparency (Komiak & Benbasat, 2006), and the latter arises from the perceived utility and human-like characteristics of the AI system (Wang, Qiu et al., 2016). The challenge for developers is to address both components by enhancing not only the technical performance of AI systems but also their communicative and relational aspects. In doing so, it is possible to mitigate the "black box" concerns associated with advanced AI

technologies and foster a more robust, trust-based relationship between humans and machines (Wang & Siau, 2019).

In conclusion, as the moral and ethical dimensions of AI continue to gain prominence, the imperative to build and sustain trust in AI-driven systems becomes increasingly clear. The diverse range of factors that influence trust—from the technical attributes of AI models to the broader social and ethical context—must be systematically addressed to ensure that AI technologies can be safely and effectively integrated into society. By drawing on a rich body of research, including foundational studies by Mayer, Davis et al. (1995) and contemporary analyses by Siau & Wang (2018), this discussion underscores that trust in AI is not a static attribute but a dynamic process that evolves with technological advancements and changing societal expectations. Only through ongoing transparency, ethical oversight, and a commitment to integrating user feedback can the promise of AI be fully realized while maintaining the trust of its users.

According to Zhang and Li's (2005) study approach, human-technology interaction is a complicated, multidimensional phenomena that is impacted by a number of variables, including tasks, contextual factors, system features, and user characteristics. This paradigm highlights how important the user, the technology, and the job at hand are in determining how people engage with technology. The study also emphasizes how important context is in influencing human-AI interactions in particular. Many definitions and models pertaining to this subject have been examined in the literature to far, but the problem of gauging users' perceived trust in AI systems has not been adequately addressed. But according to theory, there are four main factors that might affect people's confidence in AI systems: openness, accountability and regulation, tangibility and dependability, and fairness. Fairness, accountability/responsibility/regulation, and tangibility/reliability are the first three trust elements that the researchers have categorized under the more general "Concerns"

dimension. Concerns regarding the discriminatory effects of AI usage, the necessity for a strong legal and regulatory framework, the identification of unambiguous accountability, and the lack of transparency in AI systems are all included in this dimension, which may eventually affect trust levels (Omrani, Riviuccio et al. 2022).

Prior research on trust has been hindered by a lack of clear definition and psychometric properties of attitudinal trust measures, as well as a limited understanding of its contributing factors and outcomes (PytlikZillig and Kimbrough 2016). Mayer, Davis et al. (1995) defined trust as consisting of three distinct components:

1. Ability - a domain-specific measurement of the trustee's capabilities
2. Benevolence - the extent to which the trustee is believed to behave in good faith toward the trustor
3. Integrity - the perception that the trustee would obey a set of principles considered acceptable to the trustor

This model provides a general explanation of how trust develops over time and the relationship between the trust components. By characterizing trust between two parties using these three components - ability, benevolence, and integrity (ABI) - one can infer how trust can shift based on the trustee's actions. For example, trust based solely on Ability relies on the trustee's capabilities, so satisfactory task completion would improve the relationship, while the trustee's Benevolence and Integrity would have less impact.

To refine the dimensions of trust, the three components of trust (ABI) can be further defined. Elkins and Derrick (2013) used bipolar terms to represent the opposite extremes of a numerical scale to score the traits linked to each ABI component in order to measure trust. This explains why participants may have various definitions of identical qualities within a category of trust components and may assign varying scores to the traits. Elements that may be evaluated to gauge the level of trust are included in the trust factors. Depending

on the industry, target audience, and unique trust issues for each sector, these criteria may vary. The following are examples of potential trust factors, although they are not the only ones:

1- Reliability

Reliability pertains to the consistency and dependability of marketing efforts, strategies, and results. Within the marketing context, indicators of reliability may encompass the precision and consistency of recommendations, the fulfillment of promised benefits or outcomes, and the accomplishment of customer expectations (Saoula, Shamim et al. 2023). The establishment of consumer trust in marketing techniques and the potential reduction of market competition are heavily influenced by reliability (Rai and Kumar 2023).

2- Privacy management

Privacy management, within the marketing realm, refers to safeguarding individuals' personal information and empowering them to exercise control over how their data is collected, used, and shared by organizations for marketing purposes. It involves respecting and preserving individuals' privacy rights while ensuring the confidentiality and security of their personal data (Armesh, Salarzahi et al. 2010). As consumers gain greater familiarity with data-driven marketing, the continuous emergence of new marketing technologies and the challenges of safeguarding privacy in the digital era expose consumers to vulnerability, particularly as their awareness of privacy breaches increases (Swani, Milne et al. 2021).

3- User control

User control factor revolves around granting users' choices, options, and authority over their interactions with marketing systems. This entails enabling users to make informed decisions, set preferences, and exert influence over their engagement with

marketing endeavors (Janson, Hoffmann et al. 2013). Features promoting user control may include opt-in/opt-out mechanisms, customization options, and the capacity to adjust or personalize recommendations (Michler, Decker et al. 2020).

4- Adaptability

Adaptability encompasses the development of marketing strategies and systems that possess the capability to expand, evolve, and adjust in response to shifting market conditions, customer preferences, and business requirements (Murwatiningsih, EndahWahyuningsih et al. 2019). It involves fostering behavioral modifications in customer interactions or interactions among customers to ensure that marketing endeavors can be expanded, modified, or customized as necessary to address evolving demands.

5- Functionality

Functionality is strongly connected to comprehending customer requirements and providing effective solutions (Lankton and McKnight 2011). It entails identifying and evaluating customer pain points, desires, and preferences in order to devise marketing strategies and offerings that cater to those needs. Functionality emphasizes the extent to which marketing initiatives and offerings successfully tackle customer challenges and provide practical solutions.

6- Understandability

Understandability, in the context of marketing, pertains to the clear and easily comprehensible nature of marketing messages, content, and communication materials. It involves employing simple language, avoiding technical jargon or terminology that may be unfamiliar to the intended audience, and presenting information in a straightforward manner (Harwood and Garry 2017). By prioritizing understandability in marketing efforts, organizations can ensure that their messages are effectively conveyed and readily understood by the target audience.

7- Benevolence and helpfulness

Benevolence underscores a customer-centric approach that places the needs, interests, and well-being of customers at the forefront. In marketing terms, it entails acting with good intentions, prioritizing the customer, and attending to their needs, rather than solely focusing on sales or profit-driven motives (Viot and Benraiss-Noailles 2019). Marketing efforts should involve providing accurate and dependable information, refraining from deceptive tactics or misleading claims, and fostering open and trustworthy communication with customers.

8- Personalization

Personalization entails adapting marketing strategies, communications, and offerings to cater to the unique needs, preferences, and characteristics of individual customers. It involves leveraging customer data, insights, and technology to provide customized experiences that resonate with each customer on an individual level (Shen 2014). By gaining a deeper understanding of individual customers, marketers can create more precise and pertinent marketing experiences.

9- Third-party recognition

Third-party recognition refers to the acknowledgment, validation, or endorsement of a product, service, brand, or organization by an independent external entity or authority. This recognition functions as a type of social proof and acts as a powerful marketing tool to shape customer perception, distinguish from competitors, and foster customer acquisition and retention. The underlying principle of this factor is that trust can be transferred from a trustworthy third-party to another trusted entity (Jiang, Jones et al. 2008).

10- Integrity

Integrity refers to the ethical and truthful behavior of organizations when engaging in marketing practices and interactions with customers. It involves maintaining high moral standards, being transparent, and acting in a trustworthy manner throughout the entirety of the marketing process (Li, Zhang et al. 2018).

2.5 A review on recent studies

A thorough analysis of the variables affecting consumers' inclination to buy when artificial intelligence is included into the retail setting can be found in the research by Malhotra and Ramalingam (2023). Their research highlights how AI is revolutionizing the retail industry, where salespeople have always employed persuasion to draw in clients. This inclination to buy is much increased when artificial intelligence (AI) is included since the technology offers tailored, contextually relevant recommendations that closely match the tastes of each individual customer. Malhotra and Ramalingam (2023) use media-richness theory as a theoretical framework to investigate the relationship between customers' desire to buy AI-enabled products and perceived anthropomorphism, or the appearance of human-like characteristics in goods or services. According to their research, consumers actively look for anthropomorphized goods to enhance their shopping experiences. Consumers therefore expect features that use AI to both attract and influence their purchase decisions, as mediating elements like perceived animacy and perceived intelligence come into play. Importantly, the study also highlights that the association between perceived anthropomorphism and perceived animacy is moderated by an individual's faith in artificial intelligence, suggesting that the more confident a customer is in AI, the stronger the impact of these human-like qualities on their purchase decisions.

Building on this knowledge, Nofirda and Ikram's (2023) study explores how consumers see AI devices by assessing their usability, utility, and intention to buy. They

suggest in their study a modification of the conventional Technology Acceptance Model (TAM) that is especially suited for e-commerce applications. The study offers a more nuanced view of customer behavior in online purchasing contexts by including a mediating element—trust—into the known association between perceived utility, perceived ease of use, and buy intention. Using structural equation modeling (SEM) with a sample of 170 respondents, Nofirda and Ikram (2023) were able to demonstrate that the perceived utility and convenience of AI technologies have a direct and substantial influence on customers' purchase intentions. Moreover, trust emerged as a critical mediator, bridging the gap between the perceived benefits of AI and the overall ease of use as experienced by online shoppers. These results underscore the importance of trust in enhancing consumer acceptance of AI, especially in digital contexts where human interaction is minimal and the technology's inner workings remain largely opaque.

The use of AI in commercial operations has expanded quickly beyond retail and consumer devices, radically changing operational procedures and workplace communication. Strong evidence that AI integration improves service delivery in industries including healthcare, education, and corporate settings in addition to streamlining business procedures is presented by Mikalef et al. (2022). Furthermore, Raisch and Krakowski (2021) contend that because AI can handle and analyze massive amounts of data utilizing high-performance computers and networked technologies, its transformative capacity is essential to many businesses' digital strategy. This ability to generate new, actionable insights from complex datasets is invaluable for driving innovation and improving efficiency. Wong et al. (2024) contribute to this discussion by highlighting the increasing societal acceptance of AI solutions, even as debates over ethical considerations and trust continue to emerge. Together, these studies illustrate a broad trend: AI is not only

redefining operational efficiency but also creating new paradigms for how organizations interact with both internal and external stakeholders.

However, with the extensive acquisition of personal data by AI systems, privacy issues have become a significant difficulty. According to Cheng et al. (2021), widespread data collecting techniques like voice recognition, face recognition, and contact tracking invariably result in privacy concerns, which further impede the integration of AI in commonplace applications. This tension is particularly acute in the sharing economy, where vast amounts of user data are generated and exchanged between service providers and consumers. In this context, the potential benefits of AI must be carefully weighed against the risks associated with privacy breaches and data misuse. As tech giants like Apple, Google, and Amazon Web Services continue to dominate the data landscape, the debate over privacy versus innovation remains a significant social issue that demands robust regulatory frameworks and ethical oversight.

In a parallel stream of research, Gillath et al. (2021) explore the psychological dimensions of trust in AI, demonstrating that an individual's emotions, thoughts, and behavioral responses toward artificial intelligence can be anticipated based on their prior experiences and perceptions. Their findings suggest that a stronger sense of connection security can enhance trust in AI systems, thereby increasing the likelihood of their acceptance and use. Interestingly, Gillath et al. (2021) also note that demographic factors play a role: older individuals and those with less familiarity with AI tend to exhibit lower levels of trust. Yet, the study found no significant correlation between attachment avoidance and AI trust, indicating that the dynamics of trust in technology are complex and cannot be reduced solely to demographic variables.

The issue of mandated versus voluntary use of technology further complicates the trust equation. Huang et al. (2022) and Cserdi and Kenesei (2021) observe that when technology adoption is compulsory, it often leads to misunderstanding, misuse, and even outright rejection, particularly among users with minimal technological expertise. In contrast, when users have the freedom to choose whether to engage with AI systems, trust is more readily established. This phenomenon underscores the importance of perceived autonomy in technology adoption; individuals are more likely to trust and feel comfortable with AI when they are not forced into its use but can instead derive personal benefits from it. The psychological impact of mandated technology use can lead to increased anxiety and a consequent erosion of confidence in the systems themselves, which has profound implications for both practice and policy.

Wong et al. (2024) point out that, despite the accelerating pace of AI adoption, there remains a notable gap in the literature concerning trust in AI, particularly in relation to the vulnerabilities of various stakeholders. Their study provides a comprehensive paradigm that examines AI use from both institutional and personal perspectives, offering valuable insights into how trust is developed or undermined when technology is imposed rather than voluntarily adopted. Their findings suggest that key factors such as self-threat, inherent trust propensity, and the level of regulatory protection available significantly influence user trust in AI. In contrast, elements like corporate accountability and privacy empowerment appear to play a less significant role in shaping trust perceptions, indicating that the mechanisms of trust in AI are multifaceted and context-dependent.

Huang et al. (2024) contribute further to our understanding of AI in customer service by comparing chatbot-based support systems with traditional human-based services. Their research highlights several advantages of chatbots, including scalability, 24/7 availability, and cost efficiency, which make them an attractive option for businesses

looking to standardize customer service operations. However, the study also reveals that many consumers still find human agents to be more empathetic, understanding, and adaptable than their AI counterparts. This discrepancy has led to the development of a three-tiered trust model, which posits that dispositional trust, learned trust, and situational trust collectively influence consumer outcomes after interacting with chatbot services. The empirical evidence from Huang et al. (2024), gathered from over 643 participants across multiple studies, indicates that while learned trust is partially mediated by dispositional trust, a hybrid service model that blends AI assistance with minimal human intervention can yield customer outcomes comparable to full human service.

The study by Nguyen et al. (2023) shifts the focus to the hospitality industry, investigating how customer trust in AI chatbots for hotel services is influenced by various factors. Using a probability sampling technique, Nguyen et al. (2023) collected data from 413 valid observations through structured questionnaires in Vietnam. Their analysis, which employed both correlation analysis and structural equation modeling, revealed that engagement in the hospitality context is significantly impacted by customization, anonymity, and empathetic responses, with empathy emerging as the most influential factor. The study also found that while anonymity and empathy have an indirect effect on consumer trust, they are crucial for fostering an overall positive engagement experience. These findings have far-reaching implications for lodging providers, particularly in emerging markets, as they seek to leverage AI to enhance service delivery and customer satisfaction.

In another relevant study, Chi and Hoang (2023) explore the broad application of AI in the services sector, focusing on how AI technologies influence consumer trust and communication quality. This study examines key constructs such as anthropomorphism, empathetic response, and interactivity, and employs confirmatory factor analysis along

with covariance-based structural equation modeling to validate its model. Data collected from 507 clients of two banks and two major Vietnamese communications companies reveals that while anthropomorphism and interactivity improve customer communication, they do not significantly bolster consumer trust. In contrast, the ability of AI to demonstrate empathy across different service scenarios significantly enhances trust. This research underscores the potential of AI applications as valuable tools for service providers, especially during periods of crisis—such as during the COVID-19 pandemic—when traditional service delivery models are disrupted.

Collectively, these studies provide a rich, multidimensional view of how AI influences customer behavior and trust across different industries. Malhotra and Ramalingam (2023) and Nofirda and Ikram (2023) offer insights into the retail and e-commerce sectors, emphasizing the role of perceived anthropomorphism and the mediating effects of trust within the Technology Acceptance Model. Mikalef et al. (2022), Raisch and Krakowski (2021), and Wong et al. (2024) highlight the broader implications of AI integration in business operations, while Cheng et al. (2021) raise important concerns regarding privacy and the ethical use of personal data. Gillath et al. (2021) and subsequent research by Huang et al. (2022) and Cserdi and Kenesei (2021) shed light on the psychological underpinnings of trust and the negative effects of mandated technology use. Furthermore, studies by Huang et al. (2024), Nguyen et al. (2023), and Chi and Hoang (2023) provide empirical evidence on the role of empathetic response, customization, and interactivity in shaping trust in AI applications.

In synthesizing these diverse perspectives, it becomes evident that trust in AI is a multifaceted construct influenced by a confluence of technical, psychological, and contextual factors. The ability of AI systems to process large amounts of complex data quickly and to deliver personalized, contextually relevant information is undeniably

transformative. However, the same capabilities that make AI so powerful also raise critical questions about transparency, privacy, and ethical responsibility. As AI technologies become increasingly integrated into everyday life, it is imperative that both researchers and practitioners focus on developing robust frameworks for building and maintaining trust. This includes not only enhancing the technical performance and reliability of AI systems but also ensuring that these systems are deployed in ways that are transparent, user-centric, and ethically sound.

In conclusion, the growing body of research underscores that while AI offers significant opportunities to enhance customer engagement and streamline business processes, its long-term success hinges on the establishment of robust trust mechanisms. The interplay between perceived anthropomorphism, customization, empathy, and the mediating role of trust remains central to understanding consumer behavior in the AI era. As demonstrated by the studies referenced above—from Malhotra and Ramalingam (2023) to Chi and Hoang (2023)—a nuanced, analytical approach that integrates insights from various fields is essential for navigating the complex landscape of AI adoption. Ultimately, balancing technological innovation with ethical transparency and consumer empowerment will be key to ensuring that AI-driven marketing continues to evolve in a way that is both effective and trustworthy.

Kaplan et al. (2021) conducted a comprehensive meta-analysis to uncover the key variables that influence people's faith in artificial intelligence (AI). Their work meticulously examined data from 65 publications and categorized the antecedents of trust into three broad dimensions: (a) the AI trustee, (b) the human trustor, and (c) the shared environment where interactions occur. Within these overarching categories, they further dissected the factors into subcategories such as contextual tasking, AI performance and traits, and human characteristics and skills. Moreover, the study explored additional

moderating influences by considering four typical uses of AI—namely, chatbots, robotics, automated vehicles, and nonembodied, simple algorithms. The findings from Kaplan et al. (2021) indicate that numerous antecedents, including factors like anthropomorphism and AI dependability, serve as strong predictors of trust in AI. Importantly, the analysis revealed that each of the three primary categories plays a crucial role in shaping overall trust, suggesting that both the technological attributes of AI systems and the characteristics of the human users, as well as the context in which they interact, are integral to fostering confidence in AI-driven solutions.

In a related study, Terenggana (2024) focused on assessing the impact of AI on customer experience (CX) among Surabaya consumers using the Maxim transportation app. This research employed a deductive methodology to gather data through questionnaires, interviews, and subsequent data analysis. The study aimed to investigate how AI transforms service delivery by enabling greater customization and flexibility in user interfaces, which, in turn, improves operational performance and enhances customer satisfaction. Terenggana (2024) demonstrated that the integration of AI into transportation operations not only augments the personalization of services but also creates new business opportunities by streamlining processes and responding swiftly to customer needs. However, the study also highlighted the challenges associated with maintaining data integrity and upholding ethical standards. These challenges underscore the importance of carefully balancing technological innovation with robust data protection measures and ethical considerations, particularly in the dynamic and data-intensive environment of transportation services.

Calvo et al. (2023) conducted research aimed at exploring the potential contributions of AI systems to the design and enhancement of the omnichannel customer experience (OCE). Their investigation sought to clarify the intersection between AI

applications and OCE by incorporating insights from managers, consultants, and customers. The study's findings revealed that the inclusion of AI systems can shift the relevance of certain OCE dimensions. For instance, dimensions such as customization, consistency, and flexibility were found to be more closely linked to the experiential aspects of the omnichannel journey, directly affecting how customers interact with brands across various platforms. Conversely, aspects like networking and integration were viewed as core competencies that internal retailers must develop to support a robust omnichannel strategy. Furthermore, Calvo et al. (2023) observed variations in the omnichannel customer journey across different product categories—including furniture, electronics, and clothing—indicating that the impact of AI on OCE is not uniform but rather contingent on the specific market context and consumer expectations.

Collectively, these studies illustrate the multifaceted nature of trust and customer experience in the era of AI. Kaplan et al. (2021) provide a rigorous framework for understanding the antecedents of trust, emphasizing that both the intrinsic characteristics of AI systems and the attributes of the users, as well as the contextual environment, are essential to fostering a trustworthy relationship. Terenggana (2024) extends this discussion into a practical domain, demonstrating how AI integration in transportation services can enhance customer experience through personalized, agile service delivery—while also highlighting critical ethical and data-related challenges. Calvo et al. (2023) further complement these insights by elucidating how AI contributes to the omnichannel experience, identifying which dimensions of customer interaction are most enhanced by AI and which remain largely dependent on retailer expertise.

The convergence of these studies offers a holistic view of how AI reshapes both trust and customer experience across various sectors. On one hand, the meta-analytical approach of Kaplan et al. (2021) underscores the importance of viewing trust as a multi-

dimensional construct influenced by technological, human, and environmental factors. On the other hand, Terenggana's (2024) empirical investigation in the context of a transportation app demonstrates the tangible benefits—and accompanying challenges—of implementing AI-driven personalization in service delivery. Meanwhile, Calvo et al. (2023) bridge these insights by examining the omnichannel customer journey, highlighting that AI's role is not merely to automate processes but to fundamentally reconfigure how customers experience and interact with brands.

These findings have significant implications for both academia and practice. For researchers, the integrated models proposed by Kaplan et al. (2021) and further explored by Calvo et al. (2023) open new avenues for investigating the interplay between technology and trust. For practitioners, particularly those in fast-evolving sectors such as transportation and retail, the evidence provided by Terenggana (2024) and the broader literature emphasizes the need to implement AI in ways that enhance transparency, maintain data integrity, and address ethical concerns. The ability to customize user experiences while managing the risks associated with AI requires a delicate balance—one that is increasingly vital as businesses strive to create more engaging and trustworthy interactions with their customers.

In conclusion, the growing body of research—from the meta-analysis of Kaplan et al. (2021) to the targeted studies by Terenggana (2024) and Calvo et al. (2023)—demonstrates that the impact of AI on trust and customer experience is both profound and multifaceted. These studies collectively highlight that while AI offers tremendous potential to revolutionize customer interactions through enhanced personalization and operational efficiency, it also presents challenges that must be rigorously managed. As organizations continue to adopt AI-driven strategies, ensuring that these technologies are implemented in a trustworthy and ethically sound manner will be critical to their long-term success. By

drawing on insights from multiple disciplines, the research provides a comprehensive framework that not only advances our theoretical understanding of AI trust and omnichannel experiences but also offers practical guidelines for leveraging AI to achieve sustainable competitive advantage in today's complex digital landscape.

2.6 Research gaps

The potential of AI in B2C marketing is widely recognized, but the academic research in this domain remains limited. Existing literature has primarily focused on the theoretical applications of AI in marketing, with a relative lack of empirical studies that investigate the real-world implementation and effectiveness of AI-based marketing strategies in situations where customers are cognizant of their interaction with AI. By examining the relationship between trust and the adoption of AI, this study aims to make contributions by addressing the following research gaps:

- Understanding the key factors influencing trust in AI in the marketing context;
- Exploring the opportunities for leveraging AI to enhance trust in marketing interactions;
- Investigating the implications of trust in AI-driven marketing for consumers;
- Investigating the long-term effects of AI-driven marketing on consumer behavior; and
- Examining industry-specific variations in trust in AI.

This study focuses on the use of AI, rather than general machine learning, in B2C marketing contexts where customers are explicitly aware that they are directly engaging with AI-powered interfaces or systems. This could include situations such as chatbots, virtual assistants, recommendation engines, conversational commerce interfaces, and

intelligent self-service kiosks, where the customer knowingly interacts with an AI-based system.

In setting boundaries for this study, several delimitations are established to ensure clarity and focus:

- Focusing on advertising as a branch of marketing: This focused approach allows the study to provide in-depth analysis and insights specifically within the advertising domain, rather than covering the broader field of marketing. By concentrating on advertising, the researchers can dive deeper into the nuances and dynamics of how AI is being utilized and impacting this particular aspect of the marketing landscape.
- Centering on the B2C market: Limiting the scope to the B2C market enables the study to gather more meaningful and actionable insights. The B2C market is where the impact of AI-driven advertising on consumer behavior is often most pronounced, and this focus allows the researchers to better understand these dynamics. Extracting insights from the B2C context can provide valuable guidance for businesses and marketers seeking to optimize their AI-powered advertising strategies for reaching and engaging individual consumers.
- Examining direct interactions with AI: By focusing on consumer interactions with AI-driven advertising, the study can produce findings that are more directly applicable and relevant to the end-user experience. This approach allows the researchers to gain a deeper understanding of how consumers perceive, engage with, and respond to AI-powered advertising elements, which is crucial for informing effective strategies.

- Emphasizing AI-driven strategies: Concentrating on the AI-driven aspects of advertising, rather than broader machine learning techniques, enables the study to offer more specialized insights. This focus on AI-specific strategies and their measurable effects on customer engagement provides valuable guidance for marketers and advertisers seeking to leverage the latest advancements in artificial intelligence.

By delineating these four key boundaries, the study aims to deliver targeted and impactful insights that can meaningfully inform the rapidly evolving landscape of AI-driven advertising, particularly within the B2C market and the direct interactions between consumers and AI-powered advertising solutions.

2.6.1 Research gaps in cosmetics industry

There is still a big empirical study gap in the cosmetics business, despite the fact that the majority of the present body of work on trust in AI-driven marketing has concentrated on conventional industries like retail, healthcare, and finance. Although a lot of research has looked at how people use AI in different settings, little is known about how trust is established and preserved in the cosmetics industry, which is heavily dependent on aesthetic appeal, personal hygiene, and brand image. In talks on AI trust, the cosmetics business has been noticeably neglected, despite the quick use of AI in marketing efforts. Given the particular difficulties encountered by cosmetics companies, such as the need to strike a balance between aesthetic innovation and ethical and consumer privacy concerns, this disparity is especially noticeable. Our knowledge of the ways AI might improve customer trust and eventually foster brand loyalty is constrained by the paucity of research in this sector.

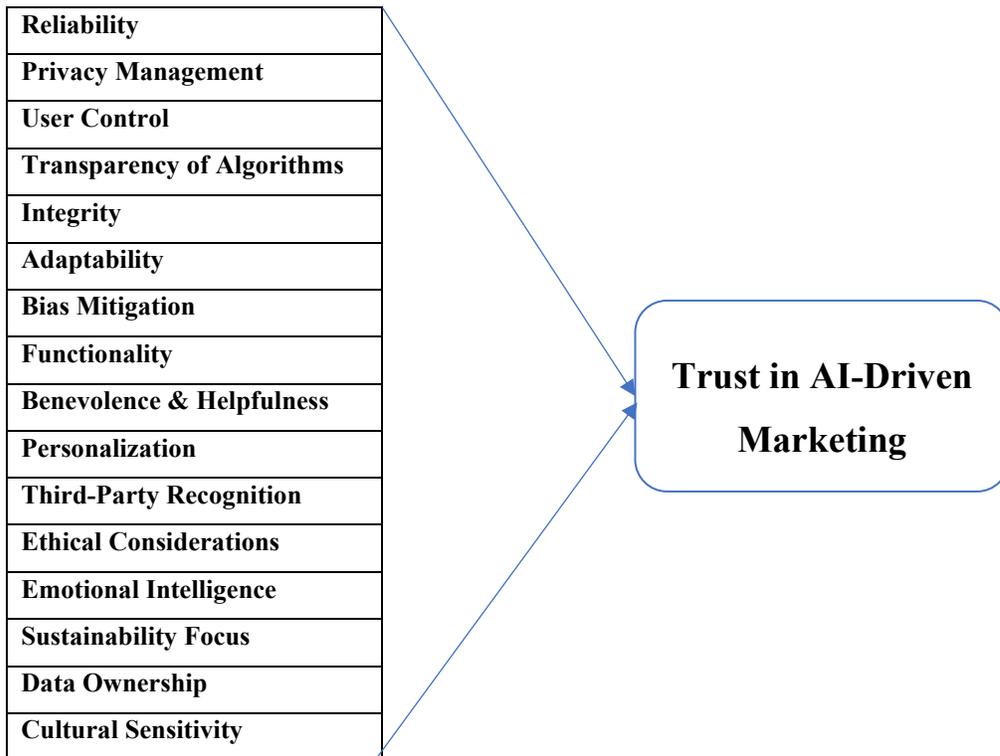


Figure 2.1
Research model

16 factors that seem to affect confidence in AI-driven marketing, particularly in the cosmetics industry, were found in our study. Reliability, Privacy Management, User Control, Algorithm Transparency, Integrity, Adaptability, Bias Mitigation, Functionality, Benevolence & Helpfulness, Personalization, Third-Party Recognition, Ethical Elemental Intelligence, Sustainability Focus, Data Ownership, and Cultural Sensitivity are some of these dimensions. In a field where cultural and personal values are crucial, this extensive collection of criteria highlights the complex nature of trust when customers interact with AI.

A glaring research gap is highlighted by the lack of prior empirical data on these variables in the cosmetics business. Our study intends to add a fresh viewpoint to the body of literature on AI-driven marketing by examining these issues. Our suggested conceptual

framework, which is shown in Figure 2-1, provides a basis for more research on trust in this specialized market by graphically summarizing these 16 aspects and demonstrating their possible interactions.

Since knowledge of the factors influencing AI trust may guide better marketing campaigns and technological deployments, closing this gap is essential for both scholars and industry professionals. Our findings should be expanded upon in future studies by evaluating the suggested characteristics in other cosmetics marketplaces and taking into account potential moderating factors like cultural quirks and demographic variations. In addition to expanding theoretical understanding, this strategy will provide marketers looking to maximize AI applications in the cosmetics sector with useful advice.

CHAPTER III: METHODOLOGY AND APPROACH

3.1 Introduction

With an emphasis on the cosmetics industry, this chapter describes the thorough technique used to gauge consumer trust in AI-driven marketing. Understanding how important trust is in influencing the attitudes and actions of consumers, the study takes a two-pronged approach. A questionnaire measuring several aspects of trust in AI-controlled marketing is designed, tested, and improved in the first phase. This tool is especially designed to collect the complex opinions of Iranian consumers and business executives. In the second stage, we use the Data Envelopment Analysis (DEA) method to assess the effectiveness of several trust-related elements statistically. The study intends to demonstrate the efficacy of AI applications in boosting trust by analyzing the link between input resources (such as technology investment and data management) and output results (such as levels of customer trust, contentment, and loyalty). By doing this, this technique gives practical insights for enhancing marketing tactics in an AI-driven world, in addition to an empirical foundation for comprehending trust dynamics.

Trust in technology-based marketing is becoming more and more important in today's ever changing digital economy. Transparency, data security, and the perceived dependability of AI systems are key factors in determining consumers' adoption of AI in marketing. In order to ensure that the study findings are both practically applicable and

academically sound, the technique described in this chapter aims to close the gap between theoretical conceptions and real-world application.

3.2 Stage 1: Questionnaire Design, Reliability, and Validity Testing

1. Questionnaire Development

The first phase of this study focuses on creating a thorough questionnaire that is influenced by a thorough analysis of the literature on consumer behavior, marketing trust, and artificial intelligence. The questionnaire is designed to assess several aspects of trust, drawing on well-established theoretical frameworks. These aspects include but are not restricted to:

- **Transparency:** How openly AI systems communicate their data usage and decision-making processes.
- **Data Exploitation:** Consumers' perceptions of data security and ethical data handling practices.
- **Risk Perceptions:** The degree of perceived risk associated with the use of AI in marketing, particularly concerning privacy and data breaches.
- **Customization Capabilities:** The extent to which AI can be tailored to deliver personalized marketing messages that resonate with individual consumer identities, emotions, and aesthetic preferences.

The questionnaire is divided into two sections in order to reflect the complex nature of confidence in AI. The first is a brief 16-item portion that focuses on fundamental trust qualities including user experience, privacy, and dependability. With an extra 55 questions intended to probe deeper into more nuanced viewpoints and attitudes about how AI influences marketing results, the second section builds on these characteristics. A comprehensive study is made easier by this two-pronged method, which guarantees the acquisition of both broad perceptions and complex, context-specific insights.

Additionally, the tool is made to offer useful insights to industry stakeholders in addition to being a means of gathering data for scholarly research. Every item on the questionnaire is guaranteed to be pertinent, quantifiable, and representative of the current market dynamics in the Iranian cosmetics sector by the study's alignment with current theoretical conceptions and prior empirical findings.

*Table 2.1
Dimensions and Items of Research Questionnaire*

<p>Reliability</p>	<p>How reliable do you find digital services in anticipating and fulfilling your needs on a regular basis?</p> <p>How often do you experience that the platform's suggestions align with your preferences and expectations?</p> <p>Have you ever felt that the information or recommendations provided were incomplete or inaccurate?</p> <p>How confident are you in the accuracy and usefulness of the recommendations you receive from digital marketing platforms?</p> <p>To what extent do you believe these systems consistently perform well in delivering timely and relevant information?</p>
<p>Privacy Management</p>	<p>How well do you think digital marketing platforms respect your personal information?</p> <p>Do you believe companies take appropriate steps to protect your privacy when using their services?</p> <p>How often are you concerned about the use of your personal data by the platforms you interact with?</p> <p>Do you feel confident in the control you have over the data shared with online marketing systems?</p>
<p>User Control</p>	<p>How much control do you feel you have over the content or offers you see from digital services?</p> <p>Do you feel you can easily adjust the preferences to align the marketing suggestions you receive with your needs?</p>

	<p>How often are you able to opt out of automated decisions made by marketing systems?</p> <p>To what extent do you feel empowered to customize your online marketing experience?</p>
<p>Transparency of Algorithms</p>	<p>How clear are companies in explaining how they use technology to suggest products or services to you?</p> <p>Do you feel adequately informed about the criteria behind the ads or offers presented to you?</p> <p>Are you satisfied with the level of detail provided by services about how they use your data?</p> <p>How often do you feel that companies openly share how their marketing recommendations are generated?</p>
<p>Integrity</p>	<p>Do you trust that companies uphold strong ethical values in their marketing practices?</p> <p>How often do you believe that digital marketing platforms act with honesty and fairness in their business practices?</p> <p>To what extent do you feel companies avoid using manipulative tactics in their marketing efforts?</p> <p>How comfortable are you with the ethical standards of the platforms you use?</p>
<p>Adaptability</p>	<p>How well do you think the services you use adapt to changes in your preferences over time?</p> <p>Do you feel the content or offers you receive are continuously adjusted to better reflect your current needs?</p> <p>How often do you notice platforms changing their approach based on your interactions and behaviors?</p>
<p>Bias Mitigation</p>	<p>Do you believe the marketing content presented to you is free from bias or favoritism?</p> <p>How often do you feel marketing platforms treat all users fairly, regardless of their background or characteristics?</p>

	To what extent do you think the services you use work to eliminate bias from their recommendations?
Functionality	<p>How often do you find digital services performing as smoothly as expected without technical issues?</p> <p>Do you feel satisfied with the speed and efficiency of online marketing platforms in delivering personalized content?</p> <p>To what extent do you find the systems capable of meeting your needs with minimal errors?</p>
Benevolence & Helpfulness	<p>How confident are you that marketing services genuinely aim to assist you rather than exploit your data?</p> <p>Do you believe the platforms you use are focused on delivering helpful content that benefits you?</p> <p>How often do you feel the services make efforts to provide value beyond just pushing sales or promotions?</p>
Personalization	<p>How well do you think the recommendations or offers you receive match your individual preferences and interests?</p> <p>Do you feel that marketing content is personalized in a way that makes your experience more relevant?</p> <p>To what extent do you feel comfortable with the level of personalization provided by digital marketing platforms?</p> <p>How often do you notice platforms refining their suggestions based on your past behaviors?</p>
Third-Party Recognition	<p>Do you trust the platforms more when they have certifications or recognition from reputable third parties?</p> <p>How important is it for you that marketing systems are verified by independent organizations?</p> <p>To what extent do you feel more confident in platforms that have external endorsements or reviews?</p>

<p style="text-align: center;">Ethical Considerations</p>	<p>Do you believe the services you use prioritize ethical guidelines in their data usage?</p> <p>How often do you feel comfortable with the ethical implications of the marketing practices you encounter?</p> <p>To what extent do you trust the companies to adhere to moral and ethical standards when delivering content?</p>
<p style="text-align: center;">Emotional Intelligence</p>	<p>How well do you feel digital platforms understand your emotional reactions to the content you receive?</p> <p>Do you notice marketing efforts adjusting based on how you might be feeling at any given moment?</p> <p>How often do you find the platforms showing sensitivity to your emotional state in their communication?</p>
<p style="text-align: center;">Sustainability Focus</p>	<p>Do you trust that the platforms consider environmental impacts in their marketing practices?</p> <p>How important is it for you that digital services align their offerings with sustainable and eco-friendly practices?</p> <p>To what extent do you notice efforts to promote sustainable solutions in the marketing content you receive?</p>
<p style="text-align: center;">Data Ownership</p>	<p>How much control do you feel you have over your own data when interacting with marketing platforms?</p> <p>Do you believe the platforms respect your right to own and manage your personal data?</p> <p>How often do you feel you can easily retrieve or delete the data these platforms have about you?</p>
<p style="text-align: center;">Cultural Sensitivity</p>	<p>How well do you think the content you receive is sensitive to your cultural values and background?</p> <p>To what extent do you feel companies respect cultural diversity in their marketing strategies?</p> <p>How comfortable are you with the way companies approach cultural differences in their messaging?</p>

2. Pilot Testing and Expert Review

We ran a pilot test with 30 volunteers chosen from the customer base of a respectable cosmetics company well-known for its AI-powered marketing campaigns prior to starting the full-scale study. Two main goals guided the design of this pilot phase: first, to confirm the questionnaire's reliability; and second, to pinpoint any possible causes of instrument error. We used the following formula to determine the necessary sample size based on the pilot's insights:

$$n = \frac{Z^2 \times p \times (1 - p)}{d^2}$$

This method produced a sample size of 162 respondents based on our presumptions and preferred degree of confidence. We sent out extra questionnaires in order to protect against nonresponses and guarantee thorough data collection, and 176 completed replies were obtained.

Testing the Instrument in the Field: The research intends to identify any ambiguities, inconsistencies, or unclear issues that can impair respondents' comprehension by distributing the questionnaire to a small but representative sample. The input obtained from this preliminary test is essential for improving the tool.

Evaluation by Experts: Simultaneously, a group of experts is asked to examine the questionnaire. These experts include academics with backgrounds in AI and marketing as well as business professionals with practical knowledge of digital marketing and consumer behavior. Their opinions are very helpful in making sure that the information is both realistically applicable and theoretically solid. These professionals concentrate on evaluating the survey instrument's general organization, linguistic clarity, and each question's relevancy. Iterative changes are made in response to the combined input from the expert review and the pilot test. The procedure entails rewording unclear queries, getting rid of repetitions, and making sure the wording is understandable to a wide range

of customers. Before the instrument is given to a larger sample, this thorough pre-testing stage is crucial for improving its validity and reliability.

The questionnaire for our study was mainly disseminated online using a variety of venues, including as social media, email invites, and partnerships with pertinent trade associations. In order to ensure that the replies represented a wide range of customer experiences, this multi-channel distribution strategy was created to reach a large and varied sample of our target demographic.

A number of steps were taken to reduce prejudice. First, the questionnaire was created with complete anonymity in mind, which promoted truthful and objective answers. Second, in order to improve the questionnaire by identifying and removing any leading or unclear questions, a pilot test was carried out with 30 participants. In order to minimize order effects—which might affect how respondents reply to following items—we also randomized the order of several questions. In order to further minimize sample bias and improve the overall trustworthiness of our findings, the data collecting time was finally prolonged to guarantee that answers from various demographic groups were suitably represented.

3. Reliability and Validity Assessment

After refining the questionnaire, a detailed reliability and validity assessment is conducted to ensure the measurement tool accurately captures the constructs of interest.

Reliability Assessment:

The internal consistency of the questionnaire is evaluated using Cronbach's alpha, with a target threshold of 0.7 or higher indicating acceptable reliability. In addition to Cronbach's alpha, test-retest reliability and split-half reliability methods are considered where feasible to further confirm the stability and consistency of the instrument over time.

Validity Assessment:

Two principal types of validity are examined:

Content Validity:

Content validity is primarily established through the expert review process during the pilot testing phase. Feedback from domain experts ensures that the questionnaire comprehensively covers all dimensions of trust relevant to AI-driven marketing in the cosmetics sector.

Construct Validity:

Confirmatory Factor Analysis (CFA) is used to evaluate construct validity. This statistical technique confirms if the questionnaire's underlying factor structure is consistent with the theoretical frameworks put out in the literature. CFA aids in assessing if the variables being assessed appropriately capture aspects of trust, including risk perception, data security, and transparency. At this point, a bigger sample of customers from the same cosmetics brand are asked to fill out the updated survey. In addition to confirming the validity and reliability of the tool, this prolonged testing period aids in improving the measurement scales, guaranteeing that the variables impacting confidence in AI-based marketing are accurately recorded. The improved tool is thus deemed suitable for use in the DEA analysis that follows, giving the research a strong empirical basis.

3.3 Stage 2: Data Envelopment Analysis (DEA)

1. Applying the DEA Model

The second phase of the study uses the Data Envelopment Analysis (DEA) methodology to quantitatively evaluate the trust efficiency of AI-driven marketing. By comparing the ratio of outputs to inputs, DEA, a non-parametric linear programming approach, assesses the effectiveness of decision-making units (DMUs). The DMUs in this study are a variety of trust-related criteria, including perceived risk, data privacy,

customization, and transparency. Through the use of DEA, the study seeks to ascertain the extent to which these elements support consumer trust in AI-driven advertising campaigns.

DEA is a non-parametric technique that compares input-to-output ratios without making rigid statistical assumptions in order to evaluate the effectiveness of decision-making units. In order to assess the multifaceted effects of several empowering elements on confidence in AI-driven marketing, especially in situations where data may not follow a normal distribution and non-linear correlations may exist, we used DEA in our study.

Structural Equation Modeling (SEM), on the other hand, is a parametric method used to investigate the structural and causal links between latent and observable variables. SEM's application may be limited when the data structure is complicated or non-standard because it usually relies on assumptions such data normality and linearity of correlations.

Without being constrained by parametric assumptions, DEA enables an accurate assessment of every dimension (e.g., User Control, Privacy Management, Integrity, Adaptability, Bias Mitigation, Functionality, Benevolence & Helpfulness, Personalization, Third-Party Recognition, Ethical Considerations, Emotional Intelligence, Sustainability Focus, Data Ownership, and Cultural Sensitivity). This makes it especially appropriate for our research, which aims to evaluate each factor's effectiveness and role in building customer confidence in the cosmetics sector.

DEA offers an alternative viewpoint by quantifying performance efficiency, whereas SEM concentrates on evaluating theoretical models and latent constructs. We may overcome some of the drawbacks of strictly parametric techniques like SEM by integrating insights from DEA to gain a comprehensive knowledge of how effectively each dimension contributes to trust.

In conclusion, our research's use of DEA provides a strong instrument for assessing the intricate, multifaceted character of trust in AI-driven marketing. By reducing the

drawbacks of SEM, it enhances conventional techniques and offers a more comprehensive examination of the variables affecting trust in an ever-changing sector.

The selection of DEA is especially beneficial as it does not need a pre-specified functional form and permits a multi-dimensional study of efficiency. When handling intricate, qualitative aspects like customer trust—which might be impacted by several interconnected factors—this adaptability is essential.

2. Defining the relevant variables: inputs and outputs

Applying DEA mathematically begins with the definition of the variables that will be included in the analysis.

- Inputs: These inputs can refer to resources expended in the AI infused Marketing System such as the outlays for collecting customer information, the amounts invested in AI technologies, and the AI campaigns run by the marketing team.
- Outputs: The outputs will also include the various levels of trust, customer satisfaction, and loyalty that are achieved as outcomes of such AI-driven marketing campaigns. Other outputs will include specific measures such the efficiency of offering personalized product suggestions in relation to privacy and data vulnerability concerns.

3. The processes of data collection and its standardization

Information about the cosmetic company and its customers will be gathered with a focus on the specified inputs and outputs in order to complete the ANC. In order to determine the equivalencies of inputs and outputs that are diverse in nature, data normalization will be required. For comparison across the DMUs, for example, financial resource expenditures, customer satisfaction with services, and customer confidence ratings have been combined into a single metric. Rescaling the data to ensure that all

variable values fall between 0 and 1 is known as normalization. This approach has the benefit of eliminating the influence of disparate measurement units and enabling equitable comparison of the variables in the trust domain.

4. Daring to Formulate the DEA Model

This time, the CCR (Charnes, Cooper, and Rhodes) technique will allow the DEA model to be developed inside the output-oriented perspective. This method holds some inputs (data, investment) constant while evaluating each DMU's performance in generating outputs (trust, customer happiness, etc.). In the context of AI marketing, this is suitable for quantitative insights and assessment of the effectiveness and productivity of the trust-oriented components. It aims to assess how well the variables function in the scenario where AI is used most effectively and the intended customer results are achieved.

Some mathematical notations for the DEA model encompass:

- Set of DMUs: The trust-related factors influencing AI marketing.
- Inputs and Outputs: The resource investment and the generated output of trust, respectively.

The DEA model will compute efficiency scores for each factor related to trust in turn establishing which factors significantly enhance trust of the customers at all times.

5. Efficiency Score Calculation and Improvement

The efficiency scores will also be calculated for each DMU. The high scoring ones will be termed as efficient meaning that they are able to command a reasonable amount of confidence and satisfaction from customers in relation to the resources employed. On the other hand, DMUs with inefficient score will be termed inefficient and such DMUs will provide opportunities for enhancement through AI centered marketing techniques.

6. Sensitivity Analysis

A sensitivity analysis will be performed in order to establish the comparative importance of various trust attributes in the use of the efficiency metric. The DEA model will be executed several times, in each of which one of the output variables (for example, satisfaction or perceived risk) is omitted. The change in efficiency will let us ascertain the most important areas as far as trust in AI and marketing particularly in the cosmetic industry is concerned.

Contribution of DEA Results

The conclusions drawn from the DEA analysis are fundamental to both theoretical knowledge and real-world implementation. Clear suggestions on how the cosmetics firm may improve its AI-driven marketing plan are given by the efficiency ratings and the sensitivity analysis that follows. In particular, the outcomes:

Identify Best Practices: Highlight which trust-related factors—such as transparency, data security, and personalization—are most effective in building consumer trust.

Guide Resource Allocation: Offer a framework for reallocating resources toward more efficient practices, ensuring that investments in AI yield optimal outcomes in terms of customer trust and satisfaction.

Improve Strategic Decision-Making: Give marketing managers the tools they need to use data to enhance marketing initiatives and increase customer loyalty and engagement.

Educate the Development of Policy: Showcase the quantifiable effects of trust-oriented marketing techniques to add to the larger conversation on AI ethics and consumer safety.

These discoveries have important practical ramifications. By methodically assessing the effectiveness of trust-building strategies, the study offers a reproducible

methodology for other businesses looking to maximize their AI marketing efforts in addition to practical insights for the cosmetics industry.

CHAPTER IV:

RESULTS

4.1 Introduction

This chapter presents the results of our study, which sought to determine if consumers of a well-known cosmetics firm had faith in AI-driven marketing. The analysis's main objectives are to determine the elements that affect trust, investigate how these elements affect marketing tactics, and find ways to increase consumer confidence in AI applications. An outline of the respondents' demographic traits opens this chapter, which is followed by a thorough analysis of the information gathered via the questionnaire. To offer thorough insights into the several facets of trust in AI-driven marketing, our study makes use of both descriptive and inferential statistics.

4.2 Demographic Characteristics

The respondents' demographic details are essential for comprehending the data's context and serving as a basis for evaluating the findings. The age distribution and educational attainment of the 176 participants who finished the final questionnaire are examined in this section.

Age Distribution

Three age groups were created from the responses: those under 30, those between 30 and 40, and those above 40. This classification makes it possible to examine how various age groups' levels of confidence in AI-driven marketing may differ.

Age Under 30: Of the 176 participants, 32 people (18.2%) were younger than 30. Compared to previous age groups, this group reflects younger consumers who are frequently more tech-savvy and may have different expectations and degrees of trust surrounding AI-driven marketing. Their opinions on AI applications in marketing may be influenced by their expertise with digital technology and social media platforms.

30–40 Years: 103 people, or 58.5% of the total respondents, were in the 30- to 40-year-old age range. Mid-career workers who may strike a balance between technological knowledge and a critical viewpoint on its repercussions are included in this category. Their experiences as professionals and consumers who use technology in both their personal and professional life may have an impact on their confidence in AI-driven marketing.

Over 40: Of the responders, 41 (23.3%) were older than 40. This age group may be more skeptical about AI since they are less accustomed to or exposed to quickly changing technologies. Their belief in AI-driven marketing is essential for long-term corporate success, though, since they also constitute a sector with substantial purchasing power and brand loyalty.

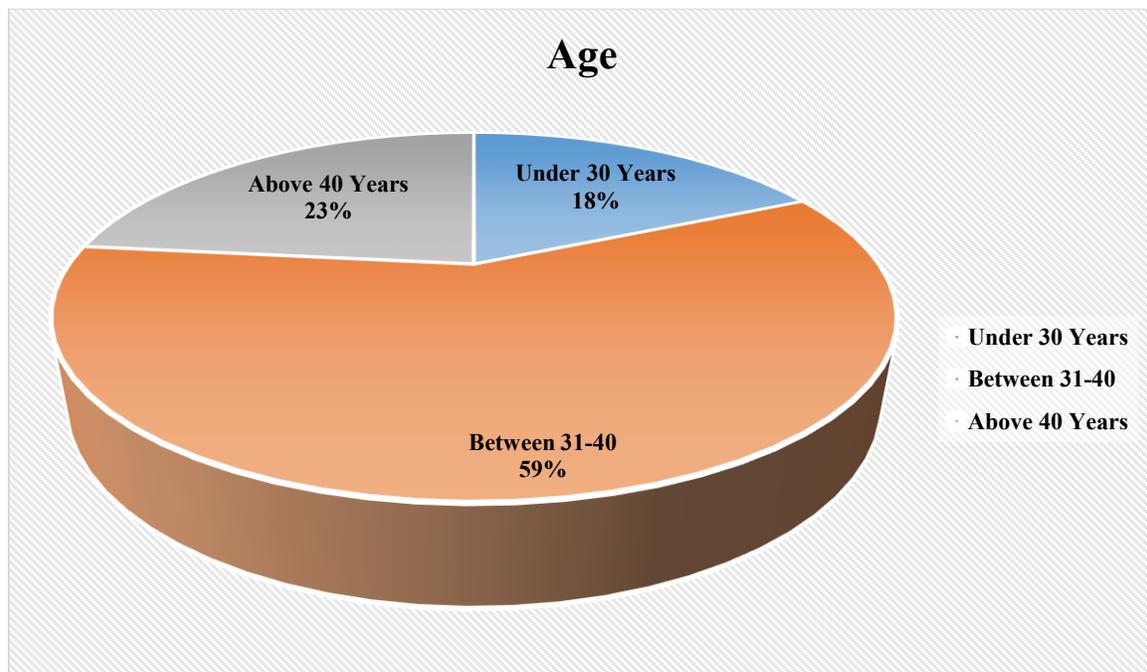


Figure 4.1
Age Distribution

Educational Level

Three levels of education were used to classify the respondents' backgrounds: bachelor's, master's, and doctoral (PhD) degrees. This classification sheds light on the potential relationship between confidence in AI-driven marketing and educational attainment.

Bachelor's Degree: 136 respondents, or 77.3% of the sample, have a bachelor's degree. This group's faith in AI-powered marketing may be a reflection of a balance between their theoretical and practical knowledge of technology and its uses. They probably have a basic grasp of AI thanks to their schooling, which shapes their expectations and confidence in its application in marketing.

36 respondents, or 20.5% of the sample, have a master's degree. These people could be more knowledgeable about the operational and strategic facets of AI-driven marketing, which might result in more complex perspectives on trust. They may be more perceptive about how AI is used and how it affects their customer experience because of their higher education.

Doctorate: Four respondents, or 2.3% of the sample, have earned a doctorate. With regard to AI technology, this highly educated group may possess specific knowledge or a research-focused viewpoint. Their critical assessment of the ethical, social, and practical ramifications of the technology may have an impact on their level of confidence in AI-driven marketing.

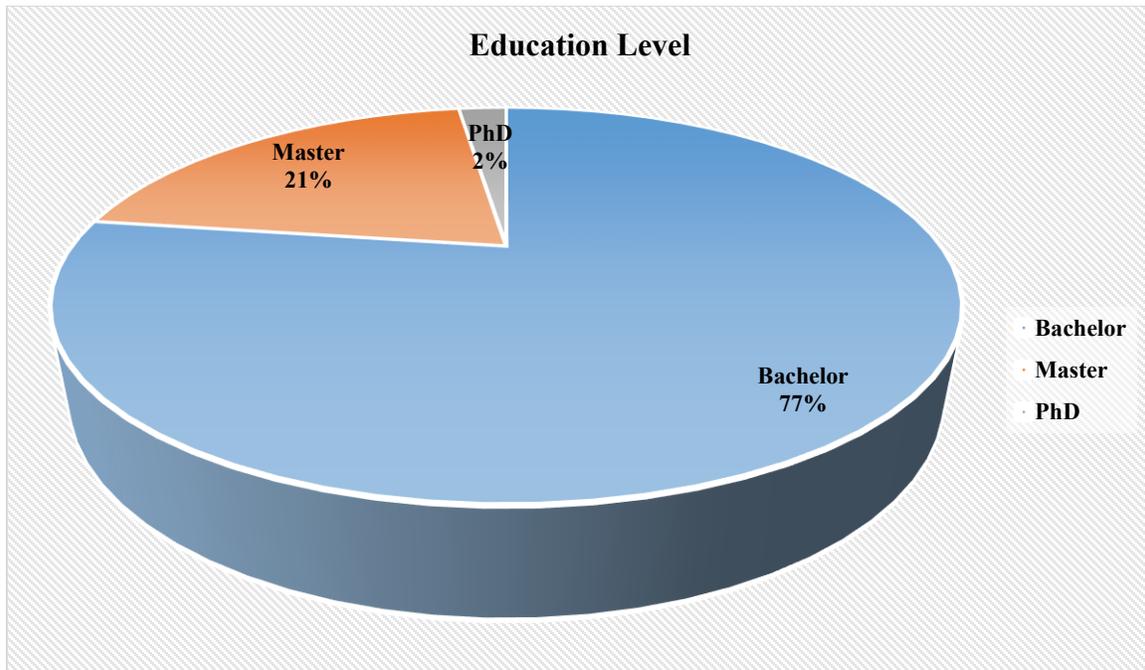


Figure 4.2
Educational Level

By looking at these demographic characteristics, we intend to provide a comprehensive understanding of the different perspectives on trust in AI-driven marketing. Given the causes, opportunities, and outcomes that have been identified for increasing trust in AI applications in marketing, the outcomes of these demographic insights will be further investigated.

4.3 Validity and reliability

We performed a number of statistical tests, such as Cronbach's Alpha and the Kaiser-Meyer-Olkin (KMO) measure in addition to Bartlett's Test of Sphericity, to guarantee the validity and reliability of our study instrument. These tests are essential for determining the questionnaire's internal consistency and sample suitability for gauging public confidence in AI-driven marketing.

Cronbach's Alpha for Reliability

A popular metric for assessing internal consistency is Cronbach's Alpha, which shows how effectively a questionnaire's items capture a single, unidimensional latent concept. The Cronbach's Alpha for our questionnaire, which had 55 items and 16 dimensions, was determined to be 0.931. Excellent internal consistency among the items is indicated by this result, which is much above the generally recognized cutoff of 0.70.

Our questionnaire's questions appear to be strongly connected, as indicated by the high Cronbach's Alpha, which also implies that respondents' responses were consistent across items. In order to ensure that the aspects of trust in AI-driven marketing are accurately quantified, this consistency is essential. The findings imply that our survey is a reliable instrument for identifying the complex elements influencing confidence in AI-powered advertising campaigns. This kind of dependability is essential for drawing sound conclusions regarding the connections between various aspects of trust and how they affect AI-powered marketing strategies.

Table 4.1
Cronbach's Alpha

Case Processing Summary

		N	%
Cases	Valid	176	100.0
	Excluded ^a	0	0
	Total	176	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.931	55

KMO and Bartlett's Test for Sampling Adequacy

In addition to testing the reliability of our questionnaire, we also tested its validity using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity. The KMO measure is used to assess if the sample size is appropriate for factor analysis. Its values vary from 0 to 1, with values closer to 1 indicating the need for a factor analysis. Our data has a KMO value of 0.847, which is considered good. The dataset's strong KMO value suggests that additional variables may be able to explain the correlations between variable pairs, making it suitable for factor analysis. Bartlett's Test of Sphericity improves the KMO measure by identifying if the correlation matrix is an identity matrix, which would imply that the variables are unrelated and unsuitable for structure discovery. We may infer that the item correlations are statistically significant and suitable for further component analysis based on our Bartlett's Test significance score of Sig = 0.000. This result validates the data's applicability for exposing the underlying factor structure of trust in AI-driven marketing.

Table 4.2
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.847
Bartlett's Test of Sphericity	Approx. Chi-Square
	df
	Sig.
	4.829E3
	1485
	.000

Together, the high KMO value and the significant Bartlett's Test suggest that the dataset is adequate for identifying consistent and understandable features of trust. These findings provide a strong foundation for the component analysis, which is necessary to validate the elements of trust included in our model. The validity ensured by these tests supports the dependability of the study findings and increases the validity of the conclusions drawn about the factors influencing trust in AI-driven marketing.

Table 4.3
Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.718	24.941	24.941	13.718	24.941	24.941
2	3.504	6.371	31.312	3.504	6.371	31.312
3	2.487	4.523	35.835	2.487	4.523	35.835
4	2.278	4.142	39.976	2.278	4.142	39.976
5	2.012	3.658	43.634	2.012	3.658	43.634
6	1.912	3.477	47.111	1.912	3.477	47.111
7	1.657	3.012	50.123	1.657	3.012	50.123
8	1.532	2.785	52.908	1.532	2.785	52.908
9	1.504	2.734	55.642	1.504	2.734	55.642
10	1.419	2.580	58.222	1.419	2.580	58.222
11	1.301	2.365	60.587	1.301	2.365	60.587
12	1.234	2.244	62.831	1.234	2.244	62.831
13	1.086	1.975	64.807	1.086	1.975	64.807
14	1.028	1.869	66.676	1.028	1.869	66.676
15	1.003	1.824	68.499	1.003	1.824	68.499
16	.926	1.684	70.184			
17	.898	1.634	71.817			
18	.848	1.541	73.359			
19	.801	1.457	74.815			
20	.754	1.370	76.185			
21	.751	1.365	77.551			
22	.724	1.316	78.867			
23	.703	1.278	80.145			
24	.658	1.197	81.342			
25	.630	1.145	82.488			
26	.568	1.033	83.521			
27	.565	1.027	84.548			
28	.546	.992	85.540			
29	.533	.968	86.508			
30	.508	.924	87.432			
31	.495	.900	88.332			
32	.458	.833	89.165			
33	.445	.809	89.974			
34	.423	.769	90.743			

35	.399	.726	91.469		
36	.387	.704	92.173		
37	.369	.670	92.843		
38	.356	.646	93.490		
39	.329	.599	94.088		
40	.324	.589	94.678		
41	.313	.569	95.247		
42	.287	.522	95.770		
43	.252	.459	96.228		
44	.237	.431	96.660		
45	.228	.414	97.074		
46	.208	.378	97.453		
47	.201	.366	97.818		
48	.188	.342	98.161		
49	.181	.328	98.489		
50	.175	.318	98.807		
51	.154	.281	99.087		
52	.141	.256	99.343		
53	.127	.231	99.574		
54	.123	.224	99.798		
55	.111	.202	100.000		

Extraction Method: Principal Component Analysis.

We conducted an exploratory factor analysis (EFA) to determine the underlying component structure of the questionnaire, which has 16 dimensions and 55 items designed to measure confidence in AI-driven marketing. A key output of this study is the "Total Variance Explained" table, which displays the proportion of the dataset's variance that can be accounted for by the identified components. The "Total Variance Explained" table compiles the eigenvalues for each component, which show the variance that each factor explains. In our study, several factors with eigenvalues greater than one emerged, indicating that they contribute significantly to the volatility of the data. A significant amount of the variance in confidence in AI-driven marketing may be explained by a small

number of factors, as indicated by the substantial cumulative variance explained by these components.

For instance, the first five components accounted for a considerable amount of the variance, indicating that these dimensions are crucial for understanding trust. This is significant because, in the context of AI-driven marketing, it draws attention to the critical elements that are most crucial in influencing how consumers see trust. The other elements are significant in conveying the many aspects of trust, albeit accounting for a lesser percentage of the overall variance.

The results from the "Total Variance Explained" table provide quantitative evidence for the dimensionality of trust in AI-driven marketing. By identifying the most crucial elements, we may choose subjects for further research and action. These components enable more targeted strategies to increase customer satisfaction and trustworthiness by assisting marketers and businesses in determining which aspects of AI-driven marketing have the most influence on building or shattering trust.

4.4 Statistical Analysis

Before conducting any more statistical analyses, we used the Kolmogorov-Smirnov (K-S) test to assess the normality of our data distribution. Making sure the data has a normal distribution is crucial for many statistical tests since it impacts the validity of the test results.

The greatest difference between the sample distribution and a reference normal distribution is found using the Kolmogorov-Smirnov test. Our analysis's K-S test result was 0.653 with a significance level (Sig) of 0.787. If the significance value is greater than 0.05, the null hypothesis—which maintains that the sample distribution is normal—cannot be disproved. Consequently, our data and a normal distribution do not differ much.

This outcome is significant because it establishes the validity of subsequent parametric tests. A normal distribution suggests that our data is appropriate for further analysis, including tests like factor analysis and regression models that depend on normality. We are certain that the statistical methods we wish to employ will produce precise and understandable findings because of the K-S test's non-significant result. The normal distribution of our data practically guarantees that the conclusions drawn from our research will be representative and widely applicable, enhancing the validity of our findings. Furthermore, we are confident enough to proceed with more intricate analysis since we know that our dataset fits the fundamental assumption of normality. This step highlights the importance of preliminary data diagnostics in research to preserve the reliability and integrity of the whole analytical process.

Table 4.4
One-Sample Kolmogorov-Smirnov Test

		VAR00001
N		176
Normal Parameters ^a	Mean	3.1312
	Std. Deviation	.40297
Most Extreme Differences	Absolute	.049
	Positive	.049
	Negative	-.042
Kolmogorov-Smirnov Z		.653
Asymp. Sig. (2-tailed)		.787

a. Test distribution is Normal.

We used the One-Sample T-Test for each of the 16 dimensions in our study after the Kolmogorov-Smirnov (K-S) test findings showed that our data had a normal distribution. We set the test result at 3, which is a neutral midpoint, because our questionnaire used a Likert scale with a range of 1 to 5. The purpose of this test was to ascertain whether the mean scores of each dimension deviated considerably from this

neutral number, which would suggest that the respondents had a favorable or unfavorable opinion of each dimension.

*Table 4.5
Statistics of One-Sample*

	N	Mean	Std. Deviation	Std. Error Mean
Reliability	176	3.3830	.45197	.03407
Privacy Management	176	2.9957	.56472	.04257
User Control	176	3.1903	.52303	.03943
Transparency of Algorithms	176	2.8537	.66406	.05006
Integrity	176	2.9062	.60452	.04557
Adaptability	176	3.2595	.56364	.04249
Bias Mitigation	176	3.0473	.67492	.05087
Functionality	176	3.1610	.60994	.04598
Benevolence & Helpfulness	176	3.0417	.70068	.05282
Personalization	176	3.1818	.58337	.04397
Third-Party Recognition	176	3.6061	.75348	.05680
Ethical Considerations	176	3.0341	.71809	.05413
Emotional Intelligence	176	3.1231	.72724	.05482
Sustainability Focus	176	3.3390	.60942	.04594
Data Ownership	176	2.9678	.75566	.05696
Cultural Sensitivity	176	3.0095	.71040	.05355

Table 4.6
One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Reliability	11.241	175	.000	.38295	.3157	.4502
Privacy Management	-.100	175	.920	-.00426	-.0883	.0798
User Control	4.828	175	.000	.19034	.1125	.2682
Transparency of Algorithms	-2.923	175	.004	-.14631	-.2451	-.0475
Integrity	-2.057	175	.041	-.09375	-.1837	-.0038
Adaptability	6.107	175	.000	.25947	.1756	.3433
Bias Mitigation	.931	175	.353	.04735	-.0531	.1478
Functionality	3.501	175	.001	.16098	.0702	.2517
Benevolence & Helpfulness	.789	175	.431	.04167	-.0626	.1459
Personalization	4.135	175	.000	.18182	.0950	.2686
Third-Party Recognition	10.671	175	.000	.60606	.4940	.7182
Ethical Considerations	.630	175	.530	.03409	-.0727	.1409
Emotional Intelligence	2.246	175	.026	.12311	.0149	.2313
Sustainability Focus	7.380	175	.000	.33902	.2484	.4297
Data Ownership	-.565	175	.573	-.03220	-.1446	.0802
Cultural Sensitivity	.177	175	.860	.00947	-.0962	.1152

Dimensions with Significant Results (Sig < 0.05)

Reliability

Result: $t(175) = 11.241, p < 0.001$, Mean Difference = 0.383 (95% CI: 0.316, 0.450)

Analysis: The significantly positive mean difference indicates that respondents perceive AI-driven marketing solutions as reliably producing desired outcomes.

Consumers' high rating in reliability suggests strong confidence in the consistency and dependability of these systems—a key asset for fostering trust.

User Control

Result: $t(175) = 4.828$, $p < 0.001$, Mean Difference = 0.190 (95% CI: 0.113, 0.268)

Analysis: The significant positive deviation in the user control dimension reflects that consumers feel empowered when they can control how they interact with AI systems. This perception of empowerment likely contributes to higher overall trust, as it reassures users that they are not passive recipients but active participants in the marketing process.

Transparency of Algorithms

Result: $t(175) = -2.923$, $p = 0.004$, Mean Difference = -0.146 (95% CI: -0.245, -0.048)

Analysis: The negative mean difference in transparency indicates that consumers rate the openness of AI algorithms below neutral. This result suggests a significant concern regarding the opacity of algorithmic decision-making, implying that increased efforts toward transparency could potentially enhance trust.

Integrity

Result: $t(175) = -2.057$, $p = 0.041$, Mean Difference = -0.094 (95% CI: -0.184, -0.004)

Analysis: Although the deviation is modest, the negative score in the integrity dimension signifies a slight but significant concern about the ethical standards and honesty of AI systems. This finding points to a need for reinforcing ethical practices to bolster consumer confidence.

Adaptability

Result: $t(175) = 6.107$, $p < 0.001$, Mean Difference = 0.259 (95% CI: 0.176, 0.343)

Analysis: The high positive score for adaptability reflects consumers' belief in AI's capability to adjust to changing market conditions and consumer needs. Such responsiveness is crucial in the dynamic cosmetics industry and is perceived as a strong advantage in AI marketing strategies.

Functionality

Result: $t(175) = 3.501$, $p = 0.001$, Mean Difference = 0.161 (95% CI: 0.070, 0.252)

Analysis: Functionality, representing the practical efficiency and usefulness of AI applications, is rated significantly above neutral. This indicates that consumers find AI tools not only operationally efficient but also valuable in delivering effective marketing outcomes.

Personalization

Result: $t(175) = 4.135$, $p < 0.001$, Mean Difference = 0.182 (95% CI: 0.095, 0.269)

Analysis: The significant positive deviation for personalization suggests that consumers appreciate tailored experiences provided by AI. The ability to customize marketing messages to individual preferences is a critical driver of trust, particularly in an industry that values personal identity and aesthetics.

Third-Party Recognition

Result: $t(175) = 10.671$, $p < 0.001$, Mean Difference = 0.606 (95% CI: 0.494, 0.718)

Analysis: With a very high mean difference, this dimension indicates that external endorsements and validations play a pivotal role in shaping consumer trust. The strong positive perception suggests that third-party recognition can significantly enhance the credibility of AI-driven marketing efforts.

Emotional Intelligence

Result: $t(175) = 2.246$, $p = 0.026$, Mean Difference = 0.123 (95% CI: 0.015, 0.231)

Analysis: This finding demonstrates that consumers acknowledge AI's ability to understand and respond to human emotions. Although the effect is smaller compared to other dimensions, it nonetheless contributes positively to the overall perception of trust by enhancing customer engagement.

Sustainability Focus

Result: $t(175) = 7.380$, $p < 0.001$, Mean Difference = 0.339 (95% CI: 0.248, 0.430)

Analysis: The significant positive score for sustainability focus indicates that consumers value environmentally friendly practices in AI-driven marketing. This not only contributes to trust but also aligns the marketing strategies with broader societal values, thereby strengthening brand loyalty.

Dimensions with Non-Significant Results (Sig > 0.05)

Privacy Management

Result: $t(175) = -0.100$, $p = 0.920$, Mean Difference = -0.004 (95% CI: -0.088, 0.080)

Analysis: The neutral result in privacy management suggests that consumers neither strongly trust nor distrust how their privacy is handled by AI systems. This ambivalence could indicate that current privacy measures meet basic expectations but do not exceed them, highlighting a potential area for enhancement.

Bias Mitigation

Result: $t(175) = 0.931$, $p = 0.353$, Mean Difference = 0.047 (95% CI: -0.053, 0.148)

Analysis: With no significant deviation from neutrality, bias mitigation is not perceived as a strong factor in influencing trust. This may suggest that consumers are unsure about the effectiveness of AI systems in minimizing bias, or that existing measures are insufficiently communicated.

Benevolence & Helpfulness

Result: $t(175) = 0.789$, $p = 0.431$, Mean Difference = 0.042 (95% CI: -0.063, 0.146)

Analysis: The neutral evaluation of benevolence and helpfulness implies that while AI-driven marketing is recognized for its functionality, its capacity to be genuinely supportive and customer-friendly does not stand out. Enhancing these attributes could further improve overall trust.

Ethical Considerations

Result: $t(175) = 0.630$, $p = 0.530$, Mean Difference = 0.034 (95% CI: -0.073, 0.141)

Analysis: Although integrity showed a slight negative deviation, the broader ethical considerations remain neutral. This suggests that while consumers have some trust in the ethical framework of AI, there is not enough of a strong sentiment to either affirm or reject the ethical practices of these systems.

Data Ownership

Result: $t(175) = -0.565$, $p = 0.573$, Mean Difference = -0.032 (95% CI: -0.145, 0.080)

Analysis: The neutral result in data ownership indicates uncertainty among consumers regarding their control over personal data within AI-driven marketing. This ambivalence highlights an opportunity for marketers to enhance transparency and provide greater control to build trust.

Cultural Sensitivity

Result: $t(175) = 0.177$, $p = 0.860$, Mean Difference = 0.009 (95% CI: -0.096, 0.115)

Analysis: With no significant difference from the neutral midpoint, cultural sensitivity appears to be a dimension where consumers do not hold strong opinions. This neutrality could signal that AI systems in the cosmetics industry have not yet effectively addressed diverse cultural preferences, presenting another opportunity for improvement.

Comprehensive Discussion

A complex picture of trust in AI-driven marketing is shown by the T-test analysis. Reliability, user control, flexibility, functionality, personalization, third-party recognition, emotional intelligence, and sustainability emphasis are just a few of the aspects with notable positive outcomes that show where customers are very satisfied and trusting. These findings imply that customers in the cosmetics industry value AI systems' adaptability and personalization in addition to their technical stability. On the other hand, the notable negative variations in algorithm transparency and integrity point to deeper issues with the ethics and transparency of AI systems. Customers seem to be leery of the opaqueness of AI decision-making, suggesting that in order to increase trust, marketers should give increasing transparency a priority. Potential areas for additional improvement are highlighted by the dimensions—privacy management, prejudice reduction, kindness & helpfulness, ethical concerns, data ownership, and cultural sensitivity—that did not considerably depart from neutrality. According to the neutral replies, present procedures do not engender significant trust, even though they satisfy baseline expectations. Closing these gaps may result in improved consumer views and a more thorough framework for confidence in AI-driven marketing. All things considered, these results highlight the need of a multifaceted strategy for establishing and maintaining confidence in AI systems. For marketers looking to maximize their AI-driven initiatives, the research provides actionable insights by highlighting both successes and deficiencies across several dimensions. In the cutthroat cosmetics sector, increasing openness, supporting moral behavior, and resolving data-related issues may all greatly enhance the atmosphere for AI marketing that is more reliable and successful. The findings indicate that although certain factors are seen positively, indicating a high degree of trust in AI-driven marketing, others are neutral, indicating areas in need of development. The positive features indicate that when engaging

with AI, the customer base appreciates control, personalization, and reliability, indicating that these features are effectively fostering customer satisfaction and engagement. However, the neutral dimensions point out significant areas where marketing driven by AI may enhance its offerings. By addressing privacy concerns, lowering discrimination, and emphasizing cultural sensitivity, companies in the cosmetics industry may strengthen their relationships with customers and boost trust.

These insights provide a comprehensive grasp of the possible benefits and drawbacks of AI-driven marketing. By using these outcomes, companies may consciously enhance their AI systems to better meet client expectations, which will ultimately result in sustainable development and a competitive advantage in the cosmetics industry.

After evaluating the distribution of our data and doing the One-Sample T-Test, we employed an Analysis of Variance (ANOVA) to investigate the differences between several groups throughout the 16 aspects of our study. The ANOVA test was used to determine if there were statistically significant differences in the mean scores of these dimensions across the customer segments based on their demographic characteristics, such as age and educational attainment.

ANOVA Results

There are notable variations in how the dimensions are perceived by various demographic groups, according to the ANOVA findings, which showed a significance level (Sig) of.000. This extremely important finding implies that different client groups have different perspectives on the aspects of AI-driven marketing. In particular, depending on their demographic origins, these discrepancies may be explained by different experiences, expectations, or levels of familiarity with AI technology.

Post-Hoc Analysis with Duncan's Test

We used Duncan's multiple range test in a post-hoc study to further understand the locations of these discrepancies. By comparing the means pairwise and classifying them according to similarity, Duncan's test assists in determining whether particular groups vary from one another.

We were able to categorize the client segments into discrete groups with comparable attitudes thanks to the findings of Duncan's test. Because they have been exposed to and are more at ease with AI technology, younger consumers may see attributes like adaptability and personalization more favorably than older customers, who may place a larger value on reliability and integrity.

Table 4.7
ANOVA

VAR00001					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	106.951	15	7.130	17.601	.000
Within Groups	1134.274	2800	.405		
Total	1241.225	2815			

Table 4.8
Duncan Test

Duncan

VAR00	N	Subset for alpha = 0.05						
		1	2	3	4	5	6	7
4	176	2.8537						
5	176	2.9062	2.9062					
15	176	2.9678	2.9678					
2	176	2.9957	2.9957					
16	176		3.0095					
12	176		3.0341	3.0341				
9	176		3.0417	3.0417				
7	176		3.0473	3.0473	3.0473			
8	176			3.1610	3.1610	3.1610		
10	176			3.1818	3.1818	3.1818		
3	176				3.1903	3.1903		
6	176					3.2595	3.2595	
13	176						3.3390	
14	176						3.3390	
1	176						3.3830	
11	176							3.6061
Sig.		.055	.073	.051	.053	.189	.097	1.000

Means for groups in homogeneous subsets are displayed.

The findings of the ANOVA show that AI-driven marketing tactics need to be significantly modified in order to accommodate the various preferences of various demographic groups in the cosmetics sector. The observed difference in viewpoints suggests that a one-size-fits-all strategy is inadequate and that businesses must create complex, customized plans in order to successfully use AI technology. Businesses may

create highly customized marketing strategies that appeal to different consumer categories and improve overall customer happiness and trust by taking these demographic variances into account. For example, cutting-edge and creative aspects of AI-powered marketing solutions tend to appeal more to younger customers. Businesses may emphasize AI's adaptability for this demographic by showcasing features like trend forecasting, interactive interfaces, and real-time customisation. These qualities fit in nicely with young people's desire for innovation and technology, which enhances the brand's reputation and marketing initiatives.

Senior customers, on the other hand, seem to regard AI systems' dependability and moral foundations more. Marketing tactics for these clients should emphasize the reliability of AI-driven procedures in addition to a strong focus on transparent and ethical data handling. Businesses may reduce worries about data privacy and algorithmic opacity and build a more trustworthy connection with elder consumers by promising consistent performance and moral responsibility. Consumer impressions are further influenced by educational background. Customers with higher levels of education are frequently more critical of features like transparency and privacy control, perhaps because they are more conscious of data security concerns and possible biases in AI systems. Building trust with this group therefore requires an emphasis on transparent communication on data usage policies, security protocols, and the openness of AI algorithms. Robust proof of these differences is provided by statistical studies, such as ANOVA and subsequent Duncan's tests. They identify the precise customer categories where these variances are most noticeable in addition to highlighting which dimensions greatly depart from neutrality. Businesses may precisely target their AI initiatives with this degree of analytical depth, guaranteeing that the distinct expectations of every demographic group are satisfied.

All things considered, incorporating these insights into marketing plans can result in a more reliable and inclusive relationship with clients. Businesses in the cosmetics sector may improve customer experience, increase customer loyalty, and promote sustainable growth by matching AI marketing strategies with the unique requirements of various demographic groups. This customized strategy guarantees that AI's advantages are fully exploited, creating an atmosphere where cutting-edge technology and customer confidence coexist.

4.5 DEA Results

The performance of the 16 different aspects that we found in our study was quantitatively assessed using Data Envelopment Analysis (DEA) in the next stage of our analysis. DEA is a reliable, non-parametric technique that is widely used to compare the effectiveness of decision-making units (DMUs) in operations research and economics. Because each of the 16 AI-driven marketing characteristics was handled as a separate DMU in our framework, we were able to conduct a methodical and impartial analysis of their relative performance. Since our main goal is to ascertain how well each dimension produces its results regardless of the inputs, we chose an output-oriented DEA model. To calculate efficiency ratings, DEA usually needs input and output data. However, distinct, naturally occurring input variables for every dimension were not included in our study. We fixed this by giving each DMU a consistent input value of 1 in order to standardize the evaluation. Because of this standardization, we were able to separate the performance outcomes and concentrate only on the outputs, which are the performance metrics or scores linked to each dimension. The DEA model determines an efficiency score for each dimension by setting the input to a constant value and comparing its output only to the best-performing dimensions in the same environment. When compared to its peers under the same input conditions, a dimension with an efficiency score of 1 (100%) is said to be

on the efficiency frontier, indicating it operates at the best potential level. Any score less than 1, on the other hand, indicates that the dimension is performing less effectively and identifies opportunities for performance enhancement. This analytical approach has a number of important benefits. By removing variances in input values, it first ensures that the analysis solely reflects differences in outputs, giving a clear, comparable view of each dimension's performance. Second, it creates a criterion for evaluating the relative performance of each dimension, known as the efficiency frontier. A closer look at dimensions with a score below one might reveal which particular elements could need improvement or extra assistance to function at their best.

Additionally, decision-makers can prioritize resource allocation and strategic modifications by utilizing DEA in this way. Dimensions near the efficiency frontier, for example, may be further optimized with small adjustments, while those well below the frontier would suggest that more major modifications or perhaps a reassessment of the underlying mechanisms driving those dimensions are required. Essentially, this report offers a path for improving the overall effectiveness of AI-driven marketing techniques in the cosmetics industry in addition to highlighting existing performance gaps. All things considered, our DEA method emphasizes how critical it is to assess AI marketing aspects not separately but rather as interconnected elements that together impact the efficacy and credibility of marketing initiatives. We may learn a lot about which aspects of customer trust are most important and which areas have the most room for development by carefully comparing the results of each dimension. Developing focused tactics that can maximize effectiveness and increase customer confidence in AI-driven marketing activities requires this deep understanding.

Table 4.9
Efficiency of DMUs

DMU	Efficiency	Status
Privacy Management	0.779	Inefficient
Reliability	1	Strongly Efficient
Bias Mitigation	0.841	Inefficient
Benevolence & Helpfulness	0.801	Inefficient
User Control	1	Strongly Efficient
Transparency of Algorithms	1	Strongly Efficient
Ethical Considerations	0.684	Inefficient
Integrity	1	Strongly Efficient
Adaptability	1	Strongly Efficient
Cultural Sensitivity	0.486	Inefficient
Functionality	1	Strongly Efficient
Personalization	1	Strongly Efficient

Third-Party Recognition	1	Strongly Efficient
Data Ownership	0.841	Inefficient
Emotional Intelligence	1	Strongly Efficient
Sustainability Focus	1	Strongly Efficient

Which aspects of AI-driven marketing are effective and which are not may be determined with the use of the DEA analysis. It is possible to improve and enhance dimensions that are determined to be less efficient. For instance, lower efficiency scores for dimensions like Cultural Sensitivity or Privacy Management indicate that these areas could need more focus and calculated changes to perform better. Conversely, aspects like personalization and reliability that have high efficiency ratings might serve as examples or standards for best practices in AI-driven marketing in the cosmetics sector. Businesses may strive for a more robust and balanced deployment of AI technology by concentrating on improving the less effective aspects, which will eventually increase consumer happiness and confidence. This DEA-based evaluation offers a thorough analysis of each dimension's relative success, providing insightful information on where to focus efforts to enhance AI-driven marketing tactics overall.

*Table 4.10
Frequency of each DMU as a reference group*

	Frequency
Reliability	2
User Control	3
Transparency of Algorithms	4
Integrity	2
Adaptability	5
Functionality	3
Personalization	5
Third-Party Recognition	2
Emotional Intelligence	3
Sustainability Focus	4

The comparison groups used to assess the effectiveness of Decision-Making Units (DMUs) are referred to as reference groups in DEA (Data Envelopment Analysis). By serving as a standard for less efficient DMUs, these reference groups assist in identifying the dataset's top performers, or efficient units.

The most efficient units, known as the "reference" or "peer" units, are used in DEA to evaluate a DMU's efficiency. A "best practice" is defined by these reference groups, which are the units that are thought to be functioning at their best and that serve as the benchmark for the evaluation.

4.6 Summary

Using information from a carefully crafted 16-dimensional questionnaire, Chapter 4 offers a thorough and in-depth statistical analysis of the variables impacting consumer confidence in AI-driven marketing in the cosmetics industry. An evaluation of the data's eligibility for factor analysis and the sampling adequacy precedes the analysis. The sample's suitability for the analytical processes is confirmed by the Kaiser-Meyer-Olkin (KMO) measure, which was recorded at 0.847, and Bartlett's Test of Sphericity (Sig = 0.000), which makes sure that the correlations between items are strong enough for factor extraction. The next validation procedures are supported by this strong foundation.

A Cronbach's Alpha rating of 0.931, which indicates strong internal consistency across the 16 dimensions, supports the questionnaire's reliability. This strong alpha score guarantees that the items in each dimension are consistently assessing the intended construct in addition to validating the instrument's dependability.

The Kolmogorov-Smirnov Test was used to assess the normality of the data before inferential statistical tests were performed. The results showed a statistic of 0.653 with a significance level of 0.787. This test's non-significant result validates the data's normal distribution, supporting the use of parametric tests in the study that follows. A One-Sample T-Test was used once normality was confirmed to see if the mean scores of the 16 dimensions differed substantially from the neutral baseline of 3. Ten dimensions produced significant t-values (Sig < 0.05), according to the data, indicating that respondents have strong opinions about these issues. Reliability, emotional intelligence, and user control were among the notable aspects that showed notable variations, suggesting that these areas are highly valued and play a crucial role in fostering trust in AI-driven marketing campaigns. Six dimensions, on the other hand, did not exhibit a significant departure from neutrality (Sig > 0.05), suggesting that these areas either satisfy a fundamental expectation or need more improvement to improve views of customer trust. In addition, Duncan's post-

hoc test was used in conjunction with an ANOVA study to look at variations among different customer groups. These tests' extremely significant result (Sig = 0.000) highlights the stark disparities in attitudes across various segments, underscoring the necessity of focused marketing tactics that cater to the unique demands and worries of various customer segments.

Finally, a performance evaluation method called Data Envelopment Analysis (DEA) was used to gauge how effective each of the 16 dimensions was. The DEA model provides a clear benchmark of efficiency by focusing solely on the outputs, namely the performance scores, by assigning a consistent input value across dimensions. This method made it possible to identify the dimensions that are failing in comparison to the sample's best practices as well as those that are very efficient and on the efficiency frontier (scoring 1 or 100%). These efficiency scores identify areas for development as well as places where the present AI-driven marketing methods perform very well. All things considered, Chapter 4's thorough analytical approach combines a variety of statistical methods, ranging from reliability and adequacy tests for sampling to inferential comparisons and efficiency assessments, to provide a nuanced understanding of how various aspects of AI-driven marketing affect consumer trust. The results offer practical insights that may guide more specialized and successful marketing tactics in the cosmetics sector, guaranteeing that the application of AI technology closely matches customer expectations and raises general satisfaction and trust.

CHAPTER V: DISCUSSION AND RECOMMENDATIONS

5.1 Introduction

The conclusion and interpretation of the results obtained from the data analysis in Chapter 4 are presented in Chapter 5. The purpose of this chapter is to summarize the findings and draw attention to how they affect consumer confidence in AI-powered marketing in the cosmetics sector. It gives insights into the strategic opportunities and difficulties businesses have when integrating AI technology into their marketing strategies, as well as a thorough examination of the ways in which the aspects and dimensions that have been found impact customer trust. This chapter also looks at how the results may be used practically, offering suggestions for how businesses can improve their AI-driven marketing tactics, assure ethical concerns, and build trust. In light of the findings, this chapter also makes recommendations for future study directions to further our comprehension of AI's impact on marketing and customer behavior.

5.2 Summary of Key Findings

The study's conclusions provide important new information on the elements that affect consumer confidence in AI-driven advertising, especially in the cosmetics sector. The study's analysis of data gathered from 176 respondents who were clients of a well-known cosmetics firm has shed light on a number of consumer trust-related topics and how these elements influence attitudes and actions toward AI-driven marketing systems. Utilizing a variety of statistical tests and analytical methods, the study used a thorough approach to guarantee the validity and dependability of the findings. The excellent dependability of the measuring tool utilized in this investigation is among the most significant conclusions. The questionnaire demonstrated great consistency with a Cronbach's Alpha coefficient of 0.931, indicating that the 16 dimensions included in the

study were successfully capturing the underlying components associated with trust in AI-driven marketing. In order to provide a thorough evaluation of consumer trust, the characteristics chosen for this study included a wide range of potential worries and expectations that consumers may have when dealing with AI-driven marketing tools.

Another important factor in the investigation was the data's normalcy. The data's distribution was evaluated using the Kolmogorov-Smirnov test, and the findings indicated that it was normal, with a K-S value of 0.653 and a significance level of 0.787. This result made it possible for the study to move further with parametric statistical tests, including the ANOVA and One-Sample T-Test, which gave researchers a better understanding of the connection between the different aspects of trust and customer behavior. It was evident from looking at the One-Sample T-Test findings that certain dimensions affected trust more than others. A significance value (Sig) less than 0.05 indicated that ten of the sixteen factors had a significant impact on customer trust. Consumers' confidence in AI-driven marketing systems was significantly shaped by factors including dependability, user control, algorithm transparency, integrity, flexibility, functionality, customization, third-party recognition, emotional intelligence, and sustainability emphasis. These findings suggest that consumers place a high value on the ability of AI systems to function consistently, adapt to their needs, and offer personalized experiences. Furthermore, consumers are particularly attuned to the ethical behavior of AI systems, valuing transparency in algorithms, integrity in decision-making, and a focus on sustainability.

The results pertaining to these characteristics are in line with the body of research on human-computer interaction and confidence in AI. Because it gives them a sense of control and comprehension over how the system works, consumers are more inclined to trust systems that are open and honest about their decision-making processes, according to study. Similar to this, the focus on sustainability reflects a growing consumer trend that is

in line with larger movements toward more environmentally friendly corporate practices: customers are becoming more concerned about the effects that the goods and services they use have on the environment.

On the other hand, there was no discernible impact of six factors on customer trust. These included cultural sensitivity, ethical issues, data ownership, kindness and helpfulness, privacy management, and prejudice reduction. Although these elements are clearly significant in the larger framework of AI ethics and data protection, our study did not find that they had as much of an impact on the development of trust in AI-driven marketing. This finding implies that users could place more value on other elements of the AI experience—like customization, openness, and usefulness—than on privacy or data ownership issues. Given the growing public conversation about data privacy and the ethical implications of AI, this discovery is especially intriguing because it raises the possibility that customers may not necessarily connect these issues with AI marketing in the same manner that they may with other AI uses.

The impact of demographic characteristics on customer perceptions of trust in AI-driven marketing was further supported by the ANOVA analysis's findings. When creating AI-driven marketing strategies, it is crucial to take age and educational background into account, as seen by the notable variations in mean scores for various groups. Higher educated customers could be more aware of the ethical ramifications of AI, whereas younger consumers might have different expectations and levels of confidence in AI systems than older consumers. According to these results, AI-driven marketing platforms ought to be customized for various demographic groups in order to cater to their particular issues and inclinations, guaranteeing a more individualized and reliable experience.

The study's Data Envelopment Analysis (DEA) offered a distinctive viewpoint on how well the 16 dimensions performed in terms of building trust. The DEA enabled a

thorough evaluation of the degree to which each dimension enhanced confidence in AI-driven marketing systems by considering each one as a Decision-Making Unit (DMU) and allocating an input value of 1 because conventional inputs were not present. In order to build overall trust, the DEA analysis's findings assisted in determining which aspects were the most effective and which ones needed further work. Businesses aiming to maximize their AI-powered marketing strategies and concentrate their efforts on the factors that most affect customer trust may find this analytical approach useful.

All things considered, the study offers insightful information on the elements that affect trust in AI-driven marketing, emphasizing the significance of aspects like sustainability, openness, and dependability. These results are especially pertinent to companies operating in the cosmetics sector, where fostering enduring connections and fostering brand loyalty depend heavily on customer trust. Businesses may create more reliable and successful AI-driven marketing strategies that meet customer expectations and increase confidence in these technologies by concentrating on the important factors our study revealed. The report also emphasizes how crucial it is to take demographics into account when developing AI systems since various customer groups may have differing expectations and degrees of confidence in AI interactions. The findings also imply that although data ownership and privacy are still significant issues, they might not be the key factors influencing consumers' confidence in AI-driven marketing. To foster trust and improve the customer experience, businesses should instead place a higher priority on other elements like openness, user control, and moral conduct. These revelations offer a strong starting point for further study and real-world implementations in the area of AI-driven marketing.

5.3 Comparing with literature

The study's conclusions support the significance of different trust criteria and their impact on customer sentiments by being consistent with a number of important topics covered in the body of research on trust in AI-driven marketing. In line with the findings of Saoula et al. (2023) and Rai and Kumar (2023), reliability was emphasized as a critical component in establishing customer confidence. This well-established idea is supported by the study's findings, which demonstrate that factors like algorithm transparency, user control, and dependability have a major influence on customer trust. In particular, the study's results highlight how accuracy, consistency, and promise fulfillment in AI-driven marketing systems significantly boost customer trust, supporting the claim made by Saoula, Shamim et al. that dependability lowers competition and builds trust. In a market that is otherwise unpredictable and competitive, AI systems may contribute to trust building by providing reliable and consistent marketing initiatives. The significance of user control is also in line with the views of Janson, Hoffmann et al. (2013) and Michler et al. (2020), who emphasize the need to provide customers power over how they engage with marketing systems. According to the study, a key element affecting trust is user control, with features like personalization choices and opt-in/opt-out procedures giving users a greater sense of control over their data and marketing interactions. This research highlights the need of giving customers the tools they need to customize their interactions with marketing technology and make educated decisions, both of which are critical for building confidence in AI-driven systems.

Additionally, the study backs up the idea of flexibility, which Murwatiningsih et al. (2019) recognized as a critical component. Another significant factor affecting consumer trust was the flexibility of marketing tactics, with the capacity to react and modify in response to changing consumer preferences and market conditions being crucial. The

system's flexibility can improve the customer experience in the context of AI-driven marketing by providing timely and pertinent material that corresponds with changing demands, proving that AI can instantly adjust to satisfy customer expectations.

The current study also indicated that functionality, another feature taken into consideration in the literature, had a significant impact. According to Lankton and McKnight (2011), success depends on comprehending client needs and using marketing techniques to alleviate pain spots. According to the study, trust is more likely to be developed by AI systems that can effectively and practically address the demands of their clients. This research emphasizes how important it is to provide practical, approachable solutions that tackle particular client issues.

The study's findings further support the body of research on customer trust by highlighting the significance of honesty and openness in AI-driven marketing. Li et al. (2018) stress the importance of moral and honest conduct in marketing strategies, pointing out that honesty builds organizational trust. Customers are more inclined to trust marketing systems that behave with integrity and transparency, according to this study, which also found that the transparency of AI algorithms and the marketing system's general ethical conduct were important factors in building confidence. Therefore, ensuring that AI systems are transparent and morally sound can greatly increase consumer trust in their capacity to produce impartial and equitable results.

But there were also notable differences between the study's results and the body of current research, especially when it came to the aspects of data ownership and privacy management. The current study found that these dimensions did not significantly influence trust, despite the literature's emphasis on the growing significance of privacy concerns in data-driven marketing, with studies such as Armesh et al. (2010) and Swani et al. (2021) highlighting the need for strong privacy management practices. The particular setting of

the cosmetics sector, where customers may value other aspects like customization and functionality over privacy concerns, may be the reason why there were no noteworthy findings for privacy management. Consumers may not consider data privacy to be a significant worry in this industry's AI-driven marketing, despite growing awareness of the issue.

Similarly, the study did not find these aspects to be as significant in the context of trust in AI-driven marketing, even though other studies stress the significance of ethical issues and bias reduction in AI applications. This implies that customers could be less concerned with these concerns in the context of marketing, possibly because they believe that prejudice is not as important to their choice to buy. This discrepancy between the study's results and earlier research may indicate sector-specific variations in how trust is perceived, where concerns about abstract concepts like bias and fairness may not have as much of an immediate and obvious influence on consumer behavior as issues like emotional intelligence and personalization.

Last but not least, although Shen (2014) predicted that customization would have a major effect on consumer trust, it is important to remember that the growing focus on tailored marketing is what motivates customers to interact with AI systems. In line with the results of the current study and previous research, AI's capacity to provide customized experiences and content is essential for boosting trust. Businesses may build stronger relationships with their clients and increase confidence in AI-driven marketing systems by using consumer data to deliver tailored marketing solutions.

To sum up, the results of this study support a large portion of the body of research on trust in AI-driven marketing, with significant agreement found in areas like dependability, user control, transparency, flexibility, and honesty. Nonetheless, disparities in the effects of ethical concerns, prejudice reduction, and privacy management underscore

the necessity of more study to examine sector-specific differences in trust dynamics. The study makes a significant contribution to our knowledge of how customers view and interact with AI-driven marketing by highlighting the value of moral conduct, openness, and customization in fostering trust. These insights will help marketers create more reliable and successful AI-driven tactics that meet customer expectations as AI technologies continue to influence the marketing landscape.

By combining knowledge from the Technology Acceptance Model (TAM) and Trust Theory, our study's findings add to the body of literature by offering a comprehensive understanding of consumer trust in AI-driven marketing in the cosmetics sector. TAM places a strong emphasis on perceived utility and usability, which are represented in our important aspects of adaptability, functionality, and reliability. According to these findings, consumers believe AI solutions to be both operationally effective and flexible enough to adjust to changing market demands, which is crucial for technology adoption in this setting.

Contrarily, trust theory emphasizes the moral and interpersonal components of trust, such as third-party recognition, transparency of algorithms, and integrity. According to our research, customers have a high degree of confidence in the dependability and external validation of AI systems, but they are also quite concerned about ethical integrity and transparency. Although AI systems are thought to be effective, there is still uncertainty about the ethical and transparent nature of their operations, as indicated by the negative deviations in transparency of algorithms and integrity. In keeping with the fundamental principles of trust theory, this emphasizes how critical it is to solve these problems in order to further improve trust.

Both models benefit from the notable improvements in User Control and Personalization. According to TAM, these factors show improved user involvement and a

sense of control over the technology, which might raise opinions about its usability and simplicity of use. At the same time, more user control reduces emotions of vulnerability and uncertainty, which promotes trust, according to Trust Theory. This double effect shows that customers are more inclined to embrace and trust technology when they have the ability to customize their encounters.

Additionally, characteristics like Sustainability Focus and Emotional Intelligence draw attention to new elements that connect old technology evaluations with modern ethical and social concerns. By humanizing AI interactions, emotional intelligence builds trust, and a sustainability focus satisfies rising social demands for environmental stewardship. These features not only support the conventional TAM and Trust Theory assumptions, but they also imply that contemporary cosmetics sector customers want AI-driven marketing tools to combine ethical accountability with practical efficiency.

In conclusion, our work contributes to the current body of knowledge by showing that both the relational, ethical aspects stressed by Trust Theory and the functional features emphasized by TAM must be included in a whole model of customer trust in AI-driven marketing. We provide nuanced insights that can direct future research and real-world applications in the cosmetics industry by empirically validating 16 dimensions (as shown in Figure 2-1) and identifying important positive influences like Reliability, User Control, Adaptability, and Third-Party Recognition—as well as areas of concern like Transparency and Integrity.

5.4 Implications for AI-Driven Marketing in the Cosmetic Industry

The study's conclusions have important ramifications for AI-driven marketing in the cosmetics sector and offer insightful information to businesses looking to improve their marketing tactics and win over customers. Understanding the critical elements that

influence customer trust is crucial for success in a fiercely competitive and rapidly changing market as AI technologies continue to transform the marketing environment.

Dependability in AI-powered marketing systems is one of the most important ramifications. The accuracy of AI-driven suggestions and marketing tactics is critical in the cosmetics sector, where customers have high expectations and seek for individualized, efficient goods. AI systems must continuously meet consumer expectations, provide accurate and pertinent product recommendations, and demonstrate a history of reliable performance. AI may be used by cosmetics companies to offer individualized experiences, but they must be based on dependability. Building customer trust and loyalty will be facilitated by making sure AI-driven marketing solutions perform as promised, offering accurate recommendations and reliably producing outcomes. To fulfill consumer expectations and preserve their reputation in the industry, cosmetics companies need constantly assess and improve their AI systems. The requirement for user control in AI-driven marketing is another important aspect. According to the report, giving customers authority over how they engage with marketing technologies has a big impact on trust. Giving clients power over customisation and product suggestions is essential in the cosmetics sector, since they seek individualized experiences. Users should be able to modify their interactions with marketing tools, set preferences, and choose whether or not to share their data with AI systems. Cosmetics companies may improve customer satisfaction, establish credibility, and forge enduring bonds with their audience by giving them more control. Customers will feel more secure and trust the business if they have control over the data they supply and how it is utilized in marketing efforts.

Another important component of establishing trust is the openness of AI algorithms, especially in the cosmetics sector where customers are become more conscious of ethical and data privacy issues. According to the report, people need to know how AI

systems work and make judgments. Cosmetics companies should make sure that their AI-powered marketing initiatives are open and honest by outlining exactly how customer information is gathered, processed, and applied to tailored product suggestions. In order to assist customers comprehend the reasoning behind the items being recommended, marketers should also offer insights into the algorithms that make these suggestions. In addition to fostering trust, this openness will show the company's dedication to moral business conduct and consumer rights, which will eventually increase brand loyalty.

Another important element affecting confidence in AI-driven marketing is personalization. AI's capacity to provide tailored suggestions is crucial in the cosmetics sector, as consumers look for goods that meet their particular requirements and tastes. The report emphasizes how crucial it is to use AI technology to provide customers with highly customized experiences. In order to make sure that the marketing messages speak to each consumer personally, cosmetic businesses must use AI to provide product recommendations based on their unique skin types, preferences, and past purchases. Cosmetics firms may stand out in a competitive market, boost consumer happiness, and foster enduring client loyalty by providing personalized product recommendations. The study's findings also demonstrate how crucial flexibility is becoming to AI-driven marketing. Marketing systems need to be flexible enough to adjust to shifting consumer tastes and market conditions in a sector like cosmetics, where trends change quickly. Artificial intelligence (AI) systems that can learn from consumer interactions and modify marketing tactics accordingly will be better able to meet changing needs. Cosmetics companies should make sure that their AI-powered marketing platforms are dynamic and adapt to changing customer tastes, new trends, and product advancements. In a changing market, firms will be able to stay current and responsive to consumer demands thanks to

flexible marketing systems, which will guarantee that their marketing initiatives continue to be successful.

Finally, it is impossible to overestimate the consequences for privacy management in AI-driven marketing. Broader trends indicate that privacy concerns will continue to rise as consumers become more conscious of data privacy threats, even if this study did not find privacy management to be a key factor in trust for AI marketing in the beauty business. Responsible consumer data gathering and usage must be a top priority for cosmetics firms, and they must make sure that their data privacy rules are comprehensive, transparent, and easy to understand. Brands may reduce possible worries and boost confidence in their AI-driven marketing initiatives by being proactive in protecting consumer data and making sure privacy laws are followed. In summary, the study's conclusions have applications for AI-powered marketing tactics in the cosmetics sector. Cosmetic businesses must prioritize dependability, user control, transparency, customization, flexibility, and privacy management in order to gain and keep the trust of consumers. Cosmetic businesses may build meaningful, reliable relationships with customers by utilizing AI technologies that give priority to these variables. This will eventually improve customer happiness, loyalty, and brand reputation. In order to create morally sound, reliable, and successful marketing strategies, cosmetics firms need to be aware of the demands and worries of their clientele as the AI-driven marketing environment changes.

5.5 Future Research Directions and Limitations

The results of this study may be expanded upon in future research on AI-driven marketing in the cosmetics sector by looking at a number of aspects that were not thoroughly covered in the current study and by analyzing potential new possibilities and problems that may arise as the sector develops. The investigation of emotional involvement in AI-driven marketing is one intriguing topic for further study. The emotional reaction of

customers to AI marketing experiences is still not well understood, despite the fact that the present study concentrated on trust elements like transparency and dependability. Gaining insight into how AI may elicit favorable emotional responses and cultivate a closer relationship with customers may help marketers develop more individualized and emotionally compelling advertising strategies. Future studies might look into how AI can be used to better customize emotional appeals in cosmetic marketing, enabling companies to engage with consumers more deeply.

Future studies might also look at how AI-driven marketing affects customer trust over the long run. Although this study concentrated on customer impressions at the moment, nothing is known about how AI marketing would affect trust and brand loyalty in the long run. Research might examine whether customers' trust in AI marketing erodes with increasing familiarity with these technologies or if it stays constant over time. Furthermore, research might look at how various customer demographics—such as age, gender, and cultural background—affect the process of establishing long-term trust in AI-driven marketing. This would offer a more profound comprehension of how trust develops and how companies may maintain customer trust over time.

The investigation of ethical issues and their function in AI marketing is a third avenue for future study. For AI-driven marketing in the cosmetics sector, the rising worries about algorithmic biases, data security, and privacy pose serious obstacles. Future studies can concentrate on how businesses might resolve these moral dilemmas while preserving client confidence. To make sure AI marketing tactics are both efficient and ethical, it will be essential to look at the ethical implications of AI algorithms, including concerns like algorithmic bias, fairness in algorithmic decision-making, and openness in data acquisition. To guarantee that consumer rights are upheld and AI technologies be applied in ways that

benefit both businesses and customers, researchers might also look at how corporations can create ethical AI frameworks.

Longitudinal studies could be explored in future research to monitor the changes in customer trust in AI-driven marketing. By identifying possible elements that may eventually increase or decrease trust, such research would aid in capturing dynamic fluctuations in trust levels as consumer views and technology advance.

Comparing the level of confidence in AI across various businesses is another exciting direction. Researchers may find industry-specific factors and difficulties that impact trust levels by looking at industries like retail, healthcare, banking, and cosmetics. This allows them to provide insights that are relevant to each field.

Future research should also examine cultural variations in AI trust. A more complex knowledge of how trust is formed may be obtained by looking into how cultural norms and values affect customer expectations and acceptance of AI-driven technology. Comparative case studies and cross-cultural surveys might be used to show how various cultural settings influence how AI systems are seen and used.

We can state limitations of the study as below:

Context and Generalizability

Industry-Specific Focus: Because the study is limited to the Iranian cosmetics market, its conclusions may not be as applicable to other sectors of the economy or to other areas. This study may not fully represent the distinct dynamics that various sectors may display in the development of trust and the application of AI.

Cultural Specificity: Because the study takes place in Iran, cultural quirks that affect customer trust could be different there than elsewhere. Cross-cultural comparisons should be taken into account in future studies to confirm and broaden these conclusions.

Methodological Constraints

Dependency on Self-Reported Data: To gauge customer attitudes, the research used a 16-dimensional questionnaire. Self-reported measures are always prone to biases including social desirability, recollection problems, and individual question interpretation, even when the instrument has undergone reliability and validity testing.

Cross-Sectional Design: The study's foundation is a cross-sectional data gathering strategy that offers a momentary view of consumer sentiments. This design makes it more difficult to determine causal linkages between variables or track changes in trust over time.

Data Envelopment Analysis (DEA) Specifics

Uniform Input Assumption: To standardize the evaluation throughout the DEA phase, a uniform input value was allocated to every dimension. This makes it easier to compare results directly, but it could oversimplify the complicated realities of investing in AI-driven marketing tactics and allocating resources.

Static Efficiency Measures: Although DEA calculates an efficiency score based on performance measures as of right now, it ignores prospective long-term gains and the dynamic relationships between the many aspects of trust.

Technological Evolution and Market Dynamics

Rapidly Changing AI Landscape: AI-driven marketing is a rapidly changing industry. With the emergence of new technology, tactics, and customer habits, the study's conclusions can become less applicable. To stay up with these developments, ongoing updates and long-term research are required.

Implementation Variability: The quantitative metrics included in this study fall short in capturing the vast range of variations in the efficacy of AI marketing tactics depending on the quality of implementation. Qualitative research may help clarify how subtleties in execution affect customer trust.

Measurement and Instrumentation Issues

Complexity of Trust Constructs: Although there are sixteen aspects covered in the questionnaire, trust is a complex concept that may need further qualitative analysis to properly grasp its subtleties. Certain dimensions of trust, especially those impacted by quickly shifting customer expectations and technology advancements, could not be fully captured by the existing assessment.

Possible Dimensional Overlap: It's possible that some of the dimensions will interact or overlap in ways that aren't totally separate. This could have an influence on the results' readability and the capacity to distinguish the effects of different contributing elements.

Overall, these limitations underscore the need for more research that uses a more comprehensive, varied methodological approach, even if this study offers insightful information on the elements affecting trust in AI-driven marketing. Future research addressing these limitations may improve our comprehension of the dynamics of trust in digital marketing and increase the findings' generalizability across many businesses and circumstances.

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APPENDIX A

QUESTIONNAIRE FOR ASSESSING TRUST IN AI-DRIVEN MARKETING

Dear Respondent

The present questionnaire aims to assess individuals' trust in AI-driven marketing systems. In today's world, intelligent systems play a crucial role in marketing and advertising processes by analyzing various data to offer recommendations and insights that can influence your decision-making. The purpose of this study is to evaluate how much trust you place in these systems from different perspectives, such as reliability, privacy management, adaptability, and user control.

Your responses will assist researchers in gaining a deeper understanding of the strengths and weaknesses of AI-based marketing systems from the user's point of view. Additionally, your feedback will contribute to improving and enhancing these systems.

Please note that all your information will be kept strictly confidential, and the results of this research will only be reported in statistical form. Your participation is vital to the success of this research, so we kindly ask that you answer the questions thoughtfully and honestly.

How to Answer: Each question has a 5-point Likert scale. Please select one option based on your experience and feelings.

Thank you in advance for your collaboration in completing this questionnaire.

Sincerely,

Research Team

Age:

Educational Degree:

Items	Very much	Much	Moderately	Little	Very little
Reliability					
<p>How reliable do you find digital services in anticipating and fulfilling your needs on a regular basis?</p> <p>How often do you experience that the platform's suggestions align with your preferences and expectations?</p> <p>Have you ever felt that the information or recommendations provided were incomplete or inaccurate?</p> <p>How confident are you in the accuracy and usefulness of the recommendations you receive from digital marketing platforms?</p> <p>To what extent do you believe these systems consistently perform well in delivering timely and relevant information?</p>					
Privacy Management					
<p>How well do you think digital marketing platforms respect your personal information?</p> <p>Do you believe companies take appropriate steps to protect your privacy when using their services?</p> <p>How often are you concerned about the use of your personal data by the platforms you interact with?</p> <p>Do you feel confident in the control you have over the data shared with online marketing systems?</p>					

User Control					
<p>How much control do you feel you have over the content or offers you see from digital services?</p> <p>Do you feel you can easily adjust the preferences to align the marketing suggestions you receive with your needs?</p> <p>How often are you able to opt out of automated decisions made by marketing systems?</p> <p>To what extent do you feel empowered to customize your online marketing experience?</p>					
Transparency of Algorithms					
<p>How clear are companies in explaining how they use technology to suggest products or services to you?</p> <p>Do you feel adequately informed about the criteria behind the ads or offers presented to you?</p> <p>Are you satisfied with the level of detail provided by services about how they use your data?</p> <p>How often do you feel that companies openly share how their marketing recommendations are generated?</p>					
Integrity					
<p>Do you trust that companies uphold strong ethical values in their marketing practices?</p> <p>How often do you believe that digital marketing platforms act with honesty and fairness in their business practices?</p> <p>To what extent do you feel companies avoid using manipulative tactics in their marketing efforts?</p> <p>How comfortable are you with the ethical standards of the platforms you use?</p>					

Adaptability					
<p>How well do you think the services you use adapt to changes in your preferences over time?</p> <p>Do you feel the content or offers you receive are continuously adjusted to better reflect your current needs?</p> <p>How often do you notice platforms changing their approach based on your interactions and behaviors?</p>					
Bias Mitigation					
<p>Do you believe the marketing content presented to you is free from bias or favoritism?</p> <p>How often do you feel marketing platforms treat all users fairly, regardless of their background or characteristics?</p> <p>To what extent do you think the services you use work to eliminate bias from their recommendations?</p>					
Functionality					
<p>How often do you find digital services performing as smoothly as expected without technical issues?</p> <p>Do you feel satisfied with the speed and efficiency of online marketing platforms in delivering personalized content?</p> <p>To what extent do you find the systems capable of meeting your needs with minimal errors?</p>					
Benevolence & Helpfulness					

<p>How confident are you that marketing services genuinely aim to assist you rather than exploit your data?</p> <p>Do you believe the platforms you use are focused on delivering helpful content that benefits you?</p> <p>How often do you feel the services make efforts to provide value beyond just pushing sales or promotions?</p>					
Personalization					
<p>How well do you think the recommendations or offers you receive match your individual preferences and interests?</p> <p>Do you feel that marketing content is personalized in a way that makes your experience more relevant?</p> <p>To what extent do you feel comfortable with the level of personalization provided by digital marketing platforms?</p> <p>How often do you notice platforms refining their suggestions based on your past behaviors?</p>					
Third-Party Recognition					
<p>Do you trust the platforms more when they have certifications or recognition from reputable third parties?</p> <p>How important is it for you that marketing systems are verified by independent organizations?</p> <p>To what extent do you feel more confident in platforms that have external endorsements or reviews?</p>					
Ethical Considerations					

<p>Do you believe the services you use prioritize ethical guidelines in their data usage?</p> <p>How often do you feel comfortable with the ethical implications of the marketing practices you encounter?</p> <p>To what extent do you trust the companies to adhere to moral and ethical standards when delivering content?</p>					
Emotional Intelligence					
<p>How well do you feel digital platforms understand your emotional reactions to the content you receive?</p> <p>Do you notice marketing efforts adjusting based on how you might be feeling at any given moment?</p> <p>How often do you find the platforms showing sensitivity to your emotional state in their communication?</p>					
Sustainability Focus					
<p>Do you trust that the platforms consider environmental impacts in their marketing practices?</p> <p>How important is it for you that digital services align their offerings with sustainable and eco-friendly practices?</p> <p>To what extent do you notice efforts to promote sustainable solutions in the marketing content you receive?</p>					
Data Ownership					

<p>How much control do you feel you have over your own data when interacting with marketing platforms?</p> <p>Do you believe the platforms respect your right to own and manage your personal data?</p> <p>How often do you feel you can easily retrieve or delete the data these platforms have about you?</p>					
Cultural Sensitivity					
<p>How well do you think the content you receive is sensitive to your cultural values and background?</p> <p>To what extent do you feel companies respect cultural diversity in their marketing strategies?</p> <p>How comfortable are you with the way companies approach cultural differences in their messaging?</p>					