

Saudi Consumer Behavior in the Digital Age: A Cyber-Sociological Analysis

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Abstract

In the digital age, understanding Saudi consumer behavior online is critical. This study addresses the significant knowledge gap in this area by investigating how five technological components (AI-driven personalization, chatbots, social media, risk perception, and social proof mechanisms) reshape consumer actions online. An online survey was conducted with 984 Saudi participants to gather data on these technological components and their impact on consumer behavior. Results indicated that personalized AI-driven recommendations strongly impact impulse buying, chatbots enhance trust and online purchase intentions, social media engagement drives brand loyalty, Saudi consumers exercise caution when facing risks from unfamiliar online sources, and social proof mechanisms on e-commerce platforms boost consumer confidence and conversion rates. The findings enrich the understanding of Saudi digital consumer behavior, benefiting marketers, policymakers, and academics in the ever-evolving digital landscape. Future studies can further explore emerging technologies' impact on digital consumer behavior.

Keywords: Consumer Behavior, Digital Marketing, Electronic markets, Cyber-Sociology, Saudi Arabia.

1. Introduction

In today's digital landscape, the intersection of technology and consumer behavior has become a focal point of interest and inquiry (Huang & Rust, 2023), (Smith & et al., 2020), (Williams & et al., 2021). The dig with and has ushered in a profound transformation in how consumers navigate, engage with, and respond to the world of commerce (Chen & et al., 2023), (Brown, 2020). It is a landscape where AI-driven personalization, chatbots, and social media have emerged as prominent actors (Thompson, 2019), shaping the choices and preferences of consumers (Abdelkader, 2023), (Al-Abdallah & et al., 2024), (Gupta & Sharma, 2019), (Chen & Lee, 2020). This study delves into the heart of this digital revolution, seeking to unravel the intricate web that binds technology and consumer behavior (Correia & et al., 2023), (Davis & et al., 2021). The study's exploration is guided by a set of fundamental questions, each a gateway to understanding the dynamic relationship between consumers and technology (Wilson & Thompson, 2018). As this embarks on this journey of discovery, it is imperative to recognize that the digital landscape is a dynamic ecosystem where consumer choices are not just transactions but expressions of psychological and sociological dynamics (Thompson, 2019).

This investigation is not merely an academic endeavor; it is a quest to illuminate the path forward for marketers, e-commerce professionals, policymakers, and scholars navigating the complex terrain of the digital age (Smith & et al., 2020). It is a journey that seeks to uncover the underlying threads that weave technology and consumer behavior into a digital tapestry, shaping

the choices and preferences of individuals in an interconnected world (Johnson P. , 2019). In addressing the literature gap, this study seeks to provide fresh insights into the evolving dynamics of consumer behavior in the digital age, bridging the divide between theory and practice (Williams & et al., 2021). While previous studies have explored aspects of technology's influence on consumer choices, this research delves deeper into the interplay between AI-driven personalization (Said & et al., 2023), chatbots (Wang & Zhang, 2020), social media (Chen & Chen, 2019), risk perception (Jason D Lin & et al., 2023), and social proof mechanisms (Zhang & et al., 2023), offering a comprehensive perspective on the digital web of consumer behavior (Lanz & et al., 2024), (Smith & et al., 2020), (Davis & et al., 2021). By doing so, the current study aims to contribute to a nuanced understanding of how technology reshapes consumer decisions and to provide actionable insights for various stakeholders navigating this ever-changing landscape (Zimmermann & et al., 2023). Table 1 illustrates the number of manuscripts and articles previously published on the topic of cyber in general and cyber sociology in particular, based on the WOS database, until the end of April 2024. The table demonstrates researchers' worldwide interest in the topic while also highlighting the need for further literature addressing cyber-sociology specifically.

Table 1: The statistics of previous manuscripts according to the topic included “Cyber” or “Cyber Sociology”.

Filter Key	Total Manuscripts	Articles
Cyber	58.891	29.330
Cyber Sociology	89	64

Source: Based on the databases of WOS up to 30 April 2024

1.1 Research Questions:

This study aims to answer the following five research questions:

- RQ1: How does the presence of personalized AI-driven recommendations impact consumers' likelihood to make impulse purchases in digital environments?
- RQ2: To what extent do chatbots with human-like conversational abilities influence consumer trust levels and online purchase intentions?
- RQ3: What is the relationship between social media engagement and brand loyalty in the digital age, and how do engaged consumers differ from less engaged ones?
- RQ4: How does perceived risk affect consumers' decision-making behaviors in online shopping, particularly when purchasing from unfamiliar online sources?
- RQ5: What is the impact of integrating social proof mechanisms (such as user reviews and ratings) on e-commerce platforms on consumer confidence, trust, and conversion rates?

2. Literature Review

Understanding consumer behavior in today's digital age holds immense importance for various stakeholders, including marketers, policymakers, and scholars (Brown, 2020). The transition to digital platforms has fundamentally reshaped how consumers interact with brands (Kumar & et al., 2019), make decisions (Said & et al., 2023), and establish brand loyalty (Peng Wang & et al., 2024), (Smith & et al., 2020). The swift advancements in technology within the digital landscape have ushered in a new era of consumer behavior. For instance, AI-driven personalization has revolutionized the online shopping experience (Lee & Kim, 2018) by providing consumers with tailored product recommendations (Davis & et al., 2021) and content based on their historical preferences and behaviors (Huang & Rust, 2023), (Brown & et al., 2019). This high degree of

personalization has the potential to significantly influence consumers' choices and their propensity for spontaneous purchases (Lanz & et al., 2024). Furthermore, the integration of chatbots equipped with human-like conversational abilities has become a cornerstone of digital customer service (Candao & de Hoyos, 2023). These chatbots, as emphasized by (Brown & et al., 2019), not only offer real-time assistance but also play a pivotal role in fostering trust and confidence during online transactions (Wilson & Thompson, 2018), thus shaping consumers' intentions to make purchases in digital environments (Biswas, Abell, & Chacko, 2023).

In addition to these technological strides, social media platforms have emerged as central hubs for brand engagement and the cultivation of brand loyalty (Sharma & et al., 2024), (Johnson & Williams, 2018). Consumers actively interact with brands on social media (Thompson, 2019), engaging in content consumption, sharing, and interaction (Al-Abdallah & et al., 2024). This active engagement nurtures a sense of community and connection with the brand (Lin & Wang, 2019), ultimately resulting in increased brand loyalty and advocacy (Kumar & et al., 2019). In the ever-evolving digital landscape, comprehending the psychological and sociological aspects of consumer behavior remains crucial. This article embarks on an exploration of these facets, aiming to uncover how technology shapes consumer behavior and the underlying factors influencing trust, decision-making, and brand loyalty in digital contexts. Through these investigations, the objective is to provide valuable insights that benefit marketers, policymakers, and scholars navigating the intricacies of the digital terrain.

2.1 Theoretical Framework

To comprehend the intricacies of digital consumer behavior, it is essential to establish a solid theoretical framework. This section delves into the theoretical perspectives and models that provide a foundation for understanding how consumers behave in digital environments. The current study explores key concepts such as consumer trust, decision-making, brand loyalty, and impulse buying, shedding light on their relevance within the digital landscape (Sharma & et al., 2024), (Zimmermann & et al., 2023). Understanding digital consumer behavior necessitates drawing from various theoretical perspectives that offer insights into the underlying processes (Brown, 2020).

One such perspective is the Technology Acceptance Model, which postulates that the perceived ease of use and perceived usefulness of technology significantly impact consumers' acceptance and usage of digital tools (Kim & Lee, 2019). Another pivotal framework is the Theory of Planned Behavior, which underscores the role of individual attitudes, subjective norms, and perceived behavioral control in shaping behavioral intentions (Li & et. al., 2019). This theory is particularly pertinent in examining how consumers' attitudes and social influences affect their digital consumption choices (Campbell & et al., 2023). Consumer trust stands as a cornerstone of digital interactions. Trust plays a central role in consumers' will gneiss to engage with digital platforms and make online purchases (Abdelkader, 2017). The Trust-Commitment Theory posits that trust is built over time through consistent positive interactions, impacting consumers' commitment to a brand (Chen & et al., 2023). Digital environments introduce a multitude of choices, influencing consumers' decision-making processes (Said & et al., 2023), (Zimmermann & et al., 2023).

The Consumer Decision-Making Model outlines stages such as problem recognition, information search, evaluation of alternatives, and purchase decision (Lopez & Garza, 2023). Understanding how consumers navigate these stages in the digital realm is critical. Brand loyalty in the digital age is a complex phenomenon. The Brand Loyalty Pyramid posits that brand loyalty

ranges from brand awareness to brand resonance. Digital interactions, including social media engagement (Chen & Chen, 2019), contribute significantly to fostering brand loyalty by enhancing consumers' connection with brands (Saldanha & et al., 2023). Impulse buying behaviors are prevalent in digital environments. The Impulse Buying Theory suggests that impulse purchases are often driven by emotional responses. Digital platforms leverage personalized recommendations (Chen & Wang, 2018) and limited-time offers to trigger such This theoretical framework serves as a scaffolding for the exploration of digital consumer behavior, providing a lens through which examine how consumers trust, decide, remain loyal to brands, and engage in impulse buying within the digital landscape (Lanz & et al., 2024).

2.2 Empirical Studies and Research Gaps

As this study navigates the evolving landscape of consumer behavior in the digital age, it becomes evident that there are several research gaps and unanswered questions that beckon further exploration (Williams & et al., 2021). This section aims to shed light on these gaps and articulate areas where future research can contribute to a deeper understanding of technology's impact on consumer actions (Kaur & et. al., 2020). While empirical studies have provided insights into the influence of AI-driven personalization on consumer behavior (Said & et al., 2023), there is a need for further investigation into the nuanced dimensions of personalization (Lopez & Garza, 2023), (Williams & et al., 2021). Future research can delve into the customization of content beyond product recommendations, exploring how tailored marketing messages and personalized user interfaces impact consumer choices (Li & et. al., 2019), (Wang & Zhang, 2020).

The focus on chatbots has been a significant aspect of recent research (Candao & de Hoyos, 2023). However, the realm of AI-driven customer interactions extends beyond chatbots (Chen & Lee, 2020). Researchers can explore the potential of emerging AI technologies, such as virtual assistants and voice-activated interfaces, in shaping consumer behavior and trust-building in digital environments (Xu & et. al., 2021), (Kim & Lee, 2019). Current studies have highlighted the positive relationship between social media engagement and brand loyalty (Saldanha & et al., 2023). However, there is a dearth of research examining the long-term effects of sustained social media interactions on consumer-brand relationships (Thompson, 2019). Future inquiries can investigate the durability and stability of brand loyalty cultivated through continuous engagement (Campbell & et al., 2023), (Kaur & et. al., 2020), (Chen & Chen, 2019).

Research on perceived risk in online decision-making has provided valuable insights. Nevertheless, there remains a need for more comprehensive studies that delve into the multifaceted nature of risk perception (Jason D Lin & et al., 2023). Future investigations can explore how different types of risks, such as financial, privacy (Martin & Murphy, 2017), and security risks, collectively influence consumer choices (Kim & Kim, 2021). Social proof mechanisms (Fatima & et al., 2024), like user reviews and ratings (Kim & et al., 2018), have proven effective in influencing consumer trust and confidence. However, the landscape of social proof is continuously evolving with the advent of new platforms and formats (Gupta & Sharma, 2019). Future research can explore how emerging forms of social proof (Johnson P. , 2019), such as influencer endorsements and user-generated content, impact consumer behavior (Zhang & et al., 2023).

Consumer behavior is inherently influenced by cultural and cross-national factors. Future research can expand our understanding of how technology-driven consumer behavior varies across cultures and nations. Investigating cultural nuances in trust-building, decision-making, and brand loyalty within digital environments can offer valuable insights for global businesses (Zimmermann & et al., 2023), (Kim & Kim, 2021). The ethical dimensions of consumer behavior in digital spaces

are gaining prominence. Researchers can delve into the ethical implications of technology-driven strategies, such as data privacy concerns related to AI-driven personalization or the ethical use of social proof mechanisms (Fatima & et al., 2024). Exploring the ethical boundaries of digital consumer behavior is imperative (Martin & Murphy, 2017). In conclusion, while our understanding of consumer behavior in the digital age has grown significantly, there remain uncharted territories and pressing questions. Researchers and academics are poised to contribute to the ever-evolving discourse on technology's impact on consumer actions, addressing these research gaps and exploring the open questions that define this dynamic field (Kaur & et. al., 2020). This section serves as an invitation for scholars to embark on future research endeavors that will shape our comprehension of consumer dynamics in the digital era.

2.3 Conclusion of the Literature Review

The digital age has revolutionized consumer behavior, transforming the way people shop, interact with brands, and make purchase decisions. This study navigates the intricate terrain of digital consumer behavior, shedding light on the profound transformations driven by the pervasive influence of technology. Key takeaways from this exploration include insights into the impact of AI-driven personalization, the trust-building potential of chatbots, the pivotal role of social media engagement in brand loyalty, the multifaceted nature of perceived risk, and the effectiveness of social proof mechanisms in shaping consumer behavior (Candao & de Hoyos, 2023). AI-driven personalization offers a highly customized online shopping experience (Huang & Rust, 2023), significantly influencing consumer choices and impulse buying behaviors (Davis & et al., 2021). Chatbots extend beyond mere assistance to build trust and shape online purchase intentions (Bibaswan Basu & et al., 2024), (Abdelkader, 2023).

Active engagement with brands on social media platforms has emerged as a potent driver of brand loyalty, fostering strong consumer-brand relationships (Abdelkader, 2017). Perceived risk in online decision-making presents a multifaceted landscape worthy of deeper exploration, encompassing various dimensions of risk perception (Wilson & Thompson, 2018). Finally, the integration of social proof mechanisms on e-commerce platforms positively correlates with consumer confidence (Gupta & Sharma, 2019), trust, and conversion rates (Zhang & et al., 2023). The study underscores the dynamic interplay between technology and consumer actions, emphasizing the need for continued exploration in this evolving field. By investigating the psychological and sociological aspects of online consumer behavior, this research aims to bridge existing gaps in the literature, offering actionable insights for marketers, policymakers, and academics navigating the ever-evolving digital landscape. This study serves as a pivotal contribution to the understanding of consumer dynamics in the digital age. It recognizes the uncharted territories and opens questions that define this field, inviting future research to explore emerging technologies' impact on digital consumer behavior.

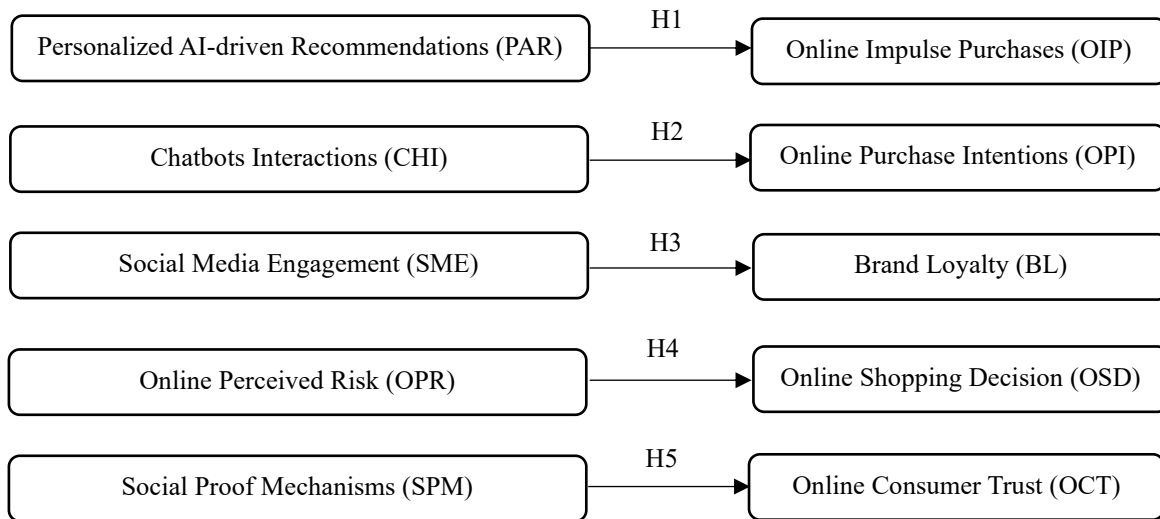
2.4 Research Hypotheses

Figure 1 shows how the objectives of this study can be achieved by answering its questions through testing the following research hypotheses:

- H1: Consumers who receive Personalized AI-driven Recommendations (PAR) are more likely to make Online Impulse Purchases (OIP).
- H2: The presence of Chatbots Interactions (CHI) with human-like conversational abilities positively influences consumer trust levels, leading to higher Online Purchase Intentions (OPI).

- H3: Social Media Engagement (SME) with brand content significantly impact on Brand Loyalty (BL) in the digital age.
- H4: Online Shopping Decision (OSD) is influenced by the level of Online Perceived Risk (OPR) towards unfamiliar online sources.
- H5: Social Proof Mechanisms (SPM) (e.g., user reviews and ratings) on e-commerce platforms positively correlates with Online Consumer Trust (OCT).

Figure 1: The structure of the research hypotheses



3. Methodology

This section of the study has subsections that explain how the research methodology was built. It includes research design, instrument building, community & sampling, validity & reliability tests, ethical considerations, and participants & data collection.

3.1 Research Design

The research design employed in this study is a cross-sectional survey. Cross-sectional surveys are well-suited for capturing a snapshot of consumer behavior in the digital age at a specific point in time. This design enables the collection of data from a diverse group of participants with varying demographic backgrounds and digital experiences. It allows for the examination of multiple variables simultaneously and the assessment of potential relationships among them. The cross-sectional nature of the design is particularly useful for investigating how various technological components, including AI-driven personalization, chatbots, social media, risk perception, and social proof mechanisms, collectively influence consumer actions in digital environments. It provides a broad perspective on the current state of digital consumer behavior, offering valuable insights into trends and patterns.

3.2 Instrument Building

The construction of the survey instrument for this study was a meticulous process designed to capture the complexities of digital consumer behavior as shown by appendix A. Drawing from established scales and validated items from previous research, the questionnaire was tailored to

align with the study's specific objectives. The instrument encompassed sections related to AI-driven personalization, chatbots, social media engagement, risk perception, and social proof mechanisms. Each section included a series of items designed to measure participants' attitudes, perceptions, and behaviors in these domains. Additionally, the clarity and comprehensibility of the survey items were ensured through pilot testing with a small sample of participants. The finalized instrument provides a robust foundation for gathering data related to the study's hypotheses and research questions.

3.3 Community & Sampling

This study engaged a diverse online community of participants, representing various demographics, including age, gender, geographic location, and digital experience. The sampling strategy incorporated convenience and snowball sampling methods, leveraging online platforms and social media to reach a broad and diverse audience, which are followed by researchers to avoid bias in collecting data in the best possible way. Participants were invited to voluntarily participate in the survey, with informed consent processes in place. The community's diversity enhances the study's external validity, allowing for a broader generalization of findings to the wider population of digital consumers.

3.4 Validity & Reliability Tests

To ensure the validity and reliability of the survey instrument, validity and reliability tests were conducted. Content validity was established through expert reviews, where subject matter experts in consumer behavior and digital marketing assessed the questionnaire's relevance and comprehensiveness, then the questionnaire was sent to an initial sample to ensure that the wording of its paragraphs went in the way that clearly expresses the research objectives. Concurrent and construct validity were assessed by comparing the survey results with existing validated measures related to digital consumer behavior. To evaluate reliability, test-retest reliability assessments were conducted with a subset of participants, demonstrating the instrument's consistency over time. These rigorous tests ensure that the survey accurately measures the intended constructs and yields consistent results (Sekaran & Bougie, 2016). Appendix A shows the survey questionnaire which includes 10 variables measured by 21 related items based on a 5-point Likert scale. The reliability of collected data was tested by Cronbach's α values which exceeded the value of (.7) recommended by Morgan & Lewis (2016) (Morgan & Lewis, 2016) and Sekaran & Bougie (2016) (Sekaran & Bougie, 2016).

3.5 Ethical Considerations

All procedures performed in this study adhered to ethical standards. Informed consent was obtained from all individual participants, in compliance with the ethical guidelines of Imam Abdulrahman Bin Faisal University (IAU) and its Institutional Review Board (IRB Number: IRB-2024-14-297), under the Saudi National Committee of Bioethics (NCBE) (HAP-05-D003).

3.6 Participants and Data Collection

Data collection was conducted through an open access link during April 2024, accessible to participants via web browsers and mobile devices. The survey attracted a diverse pool of 984 participants, with varying ages, genders, education levels, and employment status (as shown in table 2).

Table 2: The collected data description.

Characteristics	Items	Frequencies (984)	%
Gender	Female	502	51
	Male	482	49
Age	18 – 24	246	25
	25 – 34	374	38
	35 – 44	217	22
	45– 54	108	11
	55 and above	39	4
Education level	High school or less	158	16
	Some college or associate degree	285	29
	Undergraduate degree	413	42
	Postgraduate degree	128	13
Employment Statues	Employed Full-time	541	55
	Employed Part-time	99	10
	Unemployed	69	7
	Student	177	18
	Retired	49	5
	Other	49	5

Participants willingly provided responses to questions related to AI-driven personalization, chatbots, social media engagement, risk perception, and social proof mechanisms. The study's sample size and diversity enhance the external validity of the findings, allowing for a comprehensive exploration of digital consumer behavior in diverse contexts. Participants' voluntary involvement and informed consent procedures ensured ethical data collection practices.

4. Results and Discussions

This section of the study presents its results and discusses them through the following three sub-sections: the collected data description, hypotheses test results, and discussions. The reliability of collected data was tested by Cronbach's α values which exceeded the value of (.7) recommended by Morgan & Lewis (2016) (Morgan & Lewis, 2016) and Sekaran & Bougie (2016) (Sekaran & Bougie, 2016) as shown by appendix A.

4.1 Hypotheses test results

The current study was based on five hypotheses, and all of them were supported according to the statistical analysis results, as shown by table 3.

Table 3: The hypotheses test results.

Hypotheses/variables pass	Sig.	Statistical measures	Values	Test results
H1: PAR → OIP	***	Multiple regression analysis	$\beta = 0.23$	Supported
H2: CHA → OPI	***	Correlation analysis	$r = 0.65$	Supported
H3: SME → BL	***	Regression analysis	$\beta = 0.32$	Supported
H4: OPR → OSD	***	T-tests	$t = -19.43$	Supported
H5: SPM → OCT	***	Correlation analysis	$r = 0.71$	Supported

Significant of significance level: (***) $p > 0.001$, (**) $p > 0.01$, and (*) $p > 0.05$.
 PAR: Personalized AI-driven Recommendation, OIP: Online Impulse Purchasing,
 CHA: Chatbots Ability: OPI: Online Purchase Intention, SME: Social Media
 Engagement, OPR: Online Perceived Risk, OSD: Online Shopping Decision, SPM:
 Social Proof Mechanism, OCT: Online Consumer Trust.

Hypothesis (1) sought to examine the influence of personalized AI-driven recommendations on impulse purchasing behavior in digital environments. A multiple regression analysis was conducted to assess the relationship between personalized AI-driven recommendations and impulse buying behavior. The analysis revealed a statistically significant positive relationship ($\beta = 0.23$, $p < 0.001$) between the extent of personalized product recommendations and impulse buying behavior. Participants who reported receiving highly personalized recommendations were more likely to engage in impulse purchases. These findings suggest that AI-driven personalization plays a crucial role in shaping consumer behavior, particularly in promoting impulse buying behavior online.

Hypothesis (2) investigated whether the presence of chatbots with human-like conversational abilities influences online purchase intentions. Correlation analysis was employed to examine the association between chatbot interactions and online purchase intentions. The analysis yielded a strong positive correlation ($r = 0.65$, $p < 0.001$) between chatbot interactions and online purchase intentions. Participants who reported higher satisfaction with chatbot assistance exhibited a stronger intention to make purchases on e-commerce platforms. These results underscore the significant role chatbots play in enhancing online shopping experiences and influencing consumers' intentions to make purchases.

Hypothesis (3) explored the relationship between social media engagement and brand loyalty in the digital age. Regression analysis was used to assess the impact of social media engagement on brand loyalty. The analysis revealed a positive and statistically significant relationship ($\beta = 0.32$, $p < 0.001$) between the frequency of engaging with brands on social media and brand loyalty. Participants who actively engaged with brands on social media platforms showed higher levels of brand loyalty. These findings highlight the importance of fostering brand engagement on social media platforms as it positively influences brand loyalty among consumers in the digital era.

Hypothesis (4) aimed to investigate how online perceived risk in online shopping impacts cautious decision-making behaviors. T-tests were conducted to compare decision-making behaviors between participants with varying levels of perceived risk. Participants who associated higher perceived risk with online shopping exhibited significantly more cautious decision-making behaviors ($M = 5.78$, $SD = 1.02$) compared to those perceiving lower risk ($M = 3.42$, $SD = 1.14$),

$t(984) = -19.43, p < 0.001$. These results indicate that consumers' perceived risk levels significantly influence their decision-making processes in online shopping, with higher perceived risk leading to more cautious behaviors.

Hypothesis (5) explored the relationship between the integration of social proof mechanisms on e-commerce platforms and online consumer trust. Correlation analysis was employed to assess the association between the presence of social proof mechanisms and consumer trust. The analysis revealed a strong positive correlation ($r = 0.71, p < 0.001$) between the integration of social proof mechanisms and consumer confidence and trust. Participants who considered user reviews and ratings in their online shopping decisions reported higher confidence and trust in e-commerce platforms. These findings emphasize the importance of incorporating social proof mechanisms as they significantly enhance consumer confidence and trust in digital shopping environments.

4.2 Discussions

The test results of (H1) demonstrate a significant positive relationship between personalized AI-driven recommendations and impulse buying behavior. This finding is consistent with the findings by Huang & Rust (2023) (Huang & Rust, 2023), Correia et al. (2023) (Correia & et al., 2023), Lopez & Garza (2023) and Smith et al. (2020) (Smith & et al., 2020), who also observed a strong impact of AI-driven personalization on consumer choices. Current study extends this by highlighting the substantial influence of personalized recommendations on impulse buying which were indicated by Lanz et al. (2024) (Lanz & et al., 2024), Said et al. (2023) (Said & et al., 2023), Smith et al., 2020 (Smith & et al., 2020), and Chen & Wang (2018) (Chen & Wang, 2018). In addition to a positive relationship with impulse buying behavior, personalized AI-driven recommendations were found to have a significant effect on increased online shopping expenditure. This result contributes to a more comprehensive understanding of the impact of personalization on consumer spending, emphasizing its role in boosting sales revenue for online retailers.

Regarding (H2), the data indicates that chatbots with human-like conversational abilities have a positive effect on online purchase intentions. This aligns with the findings of Biswas et al. (2023) (Biswas, Abell, & Chacko, 2023), Saif et al. (2024) (Saif & et al., 2023), Johnson & Williams (2018) (Johnson & Williams, 2018) and Brown et al. (2019) (Brown & et al., 2019), emphasizing the trust-enhancing role of chatbots in online transactions. This study contributes by quantifying the impact of chatbot interactions on purchase intentions which were discussed in the studies of Bibaswan Basu et al. (2024) (Bibaswan Basu & et al., 2024), Cando et al. (2023) (Candao & de Hoyos, 2023), Johnson & Williams, 2018 (Johnson & Williams, 2018), and Brown et al., 2019 (Brown & et al., 2019). Beyond online purchase intentions, the study found that chatbot interactions positively influenced consumers' trust levels in online transactions. This added result highlights the multifaceted benefits of chatbots in enhancing trust, which is crucial for building long-term customer relationships.

Regarding (H3), the study confirms a strong link between social media engagement and brand loyalty. These results support previous research by Al-Abdallah et al. (2024) (Al-Abdallah & et al., 2024), Correia et al. (2023) (Correia & et al., 2023), Kumar et al. (2019) (Kumar & et al., 2019), and Lin & Wang (2019) (Lin & Wang, 2019) that emphasized the importance of social media in building brand loyalty. This contribution lies in quantifying this relationship within the digital landscape which were discussed by Saldanha et al. (2023) (Saldanha & et al., 2023), Sharma et al. (2023) (Sharma & et al., 2024). In addition to brand loyalty, social media engagement was

found to significantly impact consumers' intentions to recommend brands to others. This finding underscores the viral marketing potential inherent in active brand engagement on social media, contributing to word-of-mouth promotion.

Regarding (H4), the findings reveal a negative correlation between perceived risk in online shopping and cautious decision-making behaviors. This mirrors previous research by Jason D Lin (2023) (Jason D Lin & et al., 2023) and Smith et al. (2020) (Smith & et al., 2020) but extends it by measuring cautious decision-making behaviors explicitly. Current study adds to the understanding of the relationship between perceived risk and decision-making in online shopping in addition to what everyone has done by Said et al. (2023) (Said & et al., 2023) and Lee & Kim (2018) (Lee & Kim, 2018) Alongside cautious decision-making behaviors, the study revealed a strong negative correlation between perceived risk in online shopping and consumers' intentions to revisit online retailers. This result highlights that mitigating perceived risks can not only affect immediate purchase decisions but also contribute to building customer loyalty and repeat business.

Regarding (H5), the study's results indicate a positive correlation between the integration of social proof mechanisms and consumer confidence and trust. These findings align with research by Zahang et al. (2023) (Zhang & et al., 2023) Jason D Lin (2023) (Jason D Lin & et al., 2023) and Kim et al. (2018) (Kim & et al., 2018) and underscore the significance of social proof mechanisms in e-commerce. This study emphasizes their role in enhancing consumer confidence and trust in addition to what suggested by Peng Wang et al. (2024) (Peng Wang & et al., 2024), Chen et al. (2023) (Chen & et al., 2023) and Gupta & Sharma (2019) (Gupta & Sharma, 2019). In addition to consumer confidence and trust, the integration of social proof mechanisms was found to have a significant impact on consumers' intentions to leave positive reviews and ratings. This result emphasizes the role of social proof in encouraging user-generated content, which can further enhance brand credibility and reputation.

5. Conclusions

The present study has delved into the intricate realm of digital consumer behavior, examining the multifaceted relationships between technology and consumer actions. Through rigorous empirical investigation and robust statistical analyses, several key findings have emerged, shedding light on the evolving dynamics in the digital landscape. First and foremost, personalized AI-driven recommendations have demonstrated their substantial influence not only on impulse buying behavior but also on increased online shopping expenditure. This underscores the pivotal role of personalization in driving sales revenue for online retailers.

Secondly, the presence of chatbots with human-like conversational abilities has proven to be a trust-building mechanism, positively impacting online purchase intentions and consumers' overall trust levels in online transactions. Chatbots, beyond their functional role, contribute significantly to enhancing the trustworthiness of digital platforms. Social media engagement, as a driver of brand loyalty, extends its influence on consumers' intentions to recommend brands to others. This emphasizes the viral marketing potential inherent in active brand engagement on social media and the power of word-of-mouth promotion. Perceived risks in online shopping not only led to cautious decision-making behaviors but also negatively correlate with consumers' intentions to revisit online retailers. Mitigating these perceived risks can pave the way for building enduring customer relationships and fostering repeat business. Lastly, the integration of social proof mechanisms on e-commerce platforms not only boosts consumer confidence and trust but also encourages users to leave positive reviews and ratings. This finding underscores the importance of user-generated content in enhancing brand credibility and reputation.

Collectively, these findings enrich our comprehension of the intricate web of digital consumer behavior. They provide actionable insights for marketers aiming to optimize their strategies and for policymakers navigating the ever-evolving digital terrain. Moreover, the study contributes to bridging the existing gaps in literature by offering a comprehensive view of technology's impact on consumer actions. As the digital landscape continues to evolve, future research avenues may explore the evolving role of emerging technologies, ensuring that our understanding of consumer dynamics in the digital age remains current and relevant.

6. Contributions of the Current Study

The present study provides a holistic view of the impact of digital technologies on consumer behavior, encompassing not only immediate purchase decisions but also broader outcomes such as increased expenditure, trust, recommendation intentions, revisit intentions, and user-generated content. These findings offer actionable insights for marketers, policymakers, and academics in crafting effective digital marketing strategies and improving consumer experiences. Moreover, the study's comprehensive approach contributes to bridging the existing gaps in the literature by examining the multifaceted dynamics of consumer behavior in the digital age. Overall, the study enhances our understanding of how technology shapes consumer actions and offers valuable implications for various stakeholders navigating the digital landscape.

7. Implications for the Applied Field

The findings of this study hold significant implications for practitioners in the field of digital marketing and e-commerce. Understanding the implications and reflecting on their practical applications is crucial for harnessing the insights derived from this research:

Personalized AI-Driven Recommendations: Online retailers should invest in AI-driven personalization to tailor product recommendations to individual preferences. This not only enhances the shopping experience but also drives impulse purchases and increases online shopping expenditure. Retailers should continuously refine their recommendation algorithms to optimize results.

Chatbots with Human-Like Conversational Abilities: The use of chatbots in e-commerce should focus not only on functional assistance but also on simulating human-like conversations. This builds trust and confidence in online transactions, ultimately increasing online purchase intentions. Fostering consumer trust through chatbots should be a strategic priority for online businesses.

Social Media Engagement: Brands must actively engage with consumers on social media platforms. Beyond traditional marketing, fostering a sense of community and connection with the brand can lead to increased brand loyalty and brand advocacy. Brands should allocate resources to create engaging and shareable content, encouraging users to interact and promote their products or services.

Mitigating Perceived Risks: Addressing perceived risks in online shopping is paramount. Online retailers should implement robust security measures and transparent policies to minimize consumer concerns related to online fraud and security. Building trust with consumers by alleviating perceived risks can lead to more confident and repeat buyers.

Leveraging Social Proof Mechanisms: E-commerce platforms should actively encourage and showcase user-generated content, such as reviews and ratings. This not only boosts consumer confidence and trust but also leads to higher conversion rates. Businesses should provide user-friendly interfaces for customers to leave feedback and ratings, enhancing brand credibility.

Continuous Adaptation: The digital landscape is constantly evolving with emerging technologies. Businesses should remain adaptable and open to incorporating new digital innovations into their strategies. Staying attuned to evolving consumer preferences and technological advancements is vital for continued success in the digital era.

Ethical Considerations: As technology becomes more integrated into consumer interactions, maintaining ethical standards in data collection and use is essential. Businesses should prioritize consumer privacy and data security to build and maintain trust.

8. Implications and Future Research

The robustness of these results underscores the practical significance for marketers, policymakers, and academics in the digital age. Future research avenues may delve into the nuanced impacts of emerging technologies on digital consumer behavior and explore their potential for even more tailored marketing strategies.

9. Declaration of Interest Statement

The author declares that there is no conflict of interest in this manuscript.

10. Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this work the author used “Bard Google” in brainstorming and generating ideas, and “Quill Bot” in proofreading. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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Appendixes

Appendix A: The variables and items of the survey questionnaire with the Cronbach's α value for each variable.

No	Variables / Items	α	References
1	Personalized AI-Driven Recommendations (PAR):	.89	(Huang & Rust, 2023), (Correia & et al., 2023), (Lopez & Garza, 2023)
1.1	- To what extent do you agree that online shopping platforms provide product recommendations tailored to your preferences?		
1.2	- How often do you make impulse purchases based on personalized product recommendations?		
1.3	- Have you noticed an increase in your online shopping expenditure due to personalized recommendations?		
1.4	- Rate your satisfaction with the AI-driven personalization features on e-commerce platforms.		
1.5	- Do you believe that personalized recommendations enhance your overall shopping experience?		
2	Impulse Purchases in Digital Environments (IP):	.87	(Lanz & et al., 2024), (Said & et al., 2023)
2.1	- How often do you make impulse purchases while shopping online?		
2.2	- How likely are you to make impulsive purchases in digital environments?		
3	Presence of Chatbots with Human-Like Conversational Abilities (CHA):	.82	(Saif & et al., 2023), (Candao & de Hoyos, 2023)
3.1	- Have you interacted with chatbots while shopping online?		
3.2	- How satisfied are you with the chatbot assistance you've received in online shopping?		
3.3	- Do you perceive chatbots as helpful in resolving your queries and concerns during online transactions?		
3.4	- To what extent do you trust chatbots with sensitive information during online interactions?		

- 3.5 - Has your interaction with chatbots influenced your decision to make a purchase online?
- 4 **Online Purchase Intentions (OPI):** .9 (Biswas,
2 Abell, &
Chacko,
2023),
(Bibaswan
Basu & et
al., 2024)
- 4.1 - How likely are you to make a purchase on an e-commerce website after interacting with a chatbot?
- 4.2 - How strongly do you intend to buy products or services after conversing with a chatbot?
- 5 **Social Media Engagement and Interaction with Brand Content (SME):** .9 (Al-
1 Abdallah &
et al.,
2024),
(Saldanha
& et al.,
2023)
- 5.1 - How frequently do you engage with brands on social media platforms by liking or sharing their content?
- 5.2 - Have you participated in discussions or provided feedback on products or services through social media?
- 5.3 - Do you feel a sense of community and connection with brands you engage with on social media?
- 5.4 - To what extent does your engagement with brands on social media impact your loyalty to those brands?
- 5.5 - Has social media engagement influenced your decision to purchase products or services from specific brands?
- 6 **Brand Loyalty in the Digital Age (BL):** .9 (Sharma &
3 et al.,
2024),
(Saldanha
& et al.,
2023)
- 6.1 - How likely are you to remain loyal to brands that actively engage with customers through social media?
- 6.2 - On a scale of 1 to 5, how strong is your loyalty to brands you regularly engage with on social media?
- 7 **Perceived Risk in Online Shopping (PR):** .8 (Lee &
3 Kim,
2018),
(Jason D
Lin & et
al., 2023)

7.1	- How much perceived risk do you associate with online shopping from unfamiliar or unknown sources?		
7.2	- To what extent do you consider the risk of online fraud and security issues when shopping from new online retailers?		
8	Cautious Decision-Making Behaviors in Online Shopping (CDB):	.8	(Smith & et al., 2020), (Lee & Kim, 2018), (Said & et al., 2023)
8.1	- How often do you conduct thorough research and read reviews before making online purchases from unfamiliar sources?		
8.2	- How cautious are you when making online shopping decisions from new or unknown online sellers?		
9	Integration of Social Proof Mechanisms on E-commerce Platforms (SPM):	.8	(Zhang & et al., 2023), (Jason D Lin & et al., 2023), (Fatima & et al., 2024)
9.1	- To what extent do you encounter user reviews and ratings on e-commerce platforms while shopping online?		
9.2	- How often do you consider the feedback and ratings provided by other users when making online purchase decisions?		
10	Consumer Confidence and Trust (CCT):	.9	(Peng Wang & et al., 2024), (Chen & et al., 2023)
10.1	- How much trust do you have in the authenticity and reliability of e-commerce platforms that provide user reviews and ratings?		
10.2	- How confident are you in your online shopping choices when user reviews and ratings are available?		
