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THE PSYCHOLOGY OF VOICE-ACTIVATED SHOPPING: UNDERSTANDING HOW AI-POWERED SMART SPEAKERS INFLUENCE E-CUSTOMER CHOICES

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Abstract

The study delves into the intricate realm of voice-activated shopping and the psychological mechanisms that underlie consumer decision-making in this emerging e-commerce paradigm. As the adoption of AI-powered smart speakers for shopping continues to surge, it is imperative to gain insights into the cognitive and emotional factors that shape e-customer choices. This research employs a multidisciplinary approach, drawing from consumer behavior, technology adoption, cognitive psychology, and marketing. Through a combination of surveys, user interviews, and behavioral data analysis, the study aims to unravel the impact of key psychological variables, such as convenience, trust, personalization, cognitive ease, and emotional engagement, on the choices made by e-customers in the context of voice-activated shopping. Additionally, the research will explore the utilization of behavioral economics principles, ethical considerations surrounding data privacy and security, and the influence of marketing strategies in this burgeoning domain. The findings of this study have practical implications for businesses, marketers, and technology developers looking to optimize the user experience, build trust, and effectively leverage the potential of voice-activated shopping. Ultimately, this research contributes to a deeper understanding of the evolving dynamics of e-commerce and how AI-powered smart speakers are reshaping the way consumers interact with and make choices within the digital marketplace.

Keywords: Voice-Activated Shopping, AI-Powered Smart Speakers, E-Customer Choices, Psychological Factors, Online Consumer Behavior

INTRODUCTION

AI-powered speakers, such as virtual assistants integrated into devices like Amazon Echo and Google Home, have revolutionized the e-commerce landscape (*eMarketer, 2014*). These devices enhance the shopping experience by enabling voice-activated product searches, personalized recommendations, and streamlined purchases, making it more convenient for consumers to shop online (*Forrester Research, 2019*). As a result, consumers have largely embraced AI speakers in e-commerce, appreciating the convenience, efficiency, and tailored shopping experiences they provide (*Gartner, 2022*). Their increasing adoption reflects a positive perception, as users see these devices as valuable tools that simplify the shopping process and enhance their overall satisfaction with e-commerce transactions (*McKinsey & Company, 2017*).

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Voice-activated shopping, a burgeoning e-commerce paradigm, has witnessed exponential growth with the widespread adoption of AI-powered smart speakers (*Saahil Nair, 2020*). As consumers increasingly turn to these innovative devices to streamline their shopping experiences, it becomes imperative to delve into the intricate realm of voice-activated shopping and explore the underlying psychological mechanisms that shape consumer decision-making within this evolving landscape (*Katherine N. Lemon et. al., 2016*).

The convergence of voice technology and e-commerce has ushered in a new era of convenience and accessibility for consumers (*Gil Appel et. al., 2020*). With a simple voice command, shoppers can add items to their carts, make purchases, and even receive personalized recommendations (*Werner Reinartz, 2019*). However, beyond the surface-level convenience lies a complex interplay of cognitive and emotional factors that influence e-customer choices.

This research embarks on a multidisciplinary journey, drawing insights from various fields such as consumer behavior, technology adoption, cognitive psychology, and marketing. It seeks to unravel the multifaceted impact of key psychological variables on the choices made by e-customers engaging in voice-activated shopping. These variables include convenience, trust, personalization, cognitive ease, and emotional engagement, which collectively shape the user experience and decision-making process (*Katherine N. Lemon, 2016*).

In addition to these core psychological variables, the research extends its scope to consider the application of behavioural economics principles in the context of voice-activated shopping. Behavioural economics offers a lens through which to examine how consumers make choices that may deviate from traditional economic models. By identifying behavioural biases and heuristics that impact shopping decisions, this study enriches our understanding of consumer behavior within the digital marketplace (*Min Kang, 2022*).

Ethical considerations are also paramount in the age of data-driven technologies (*Ross, 2003*). The study delves into the ethical implications surrounding data privacy and security in voice-activated shopping. It explores how consumers perceive and navigate these concerns, shedding light on the ethical responsibilities of businesses and technology developers.

Ultimately, this research contributes to a deeper understanding of the evolving dynamics of e-commerce in the digital age. It sheds light on how AI-powered smart speakers are reshaping the way consumers interact with and make choices within the digital marketplace. As technology continues to advance and consumer behavior evolves, this study serves as a beacon, guiding businesses and researchers in navigating the transformative landscape of voice-activated shopping (*David A. Schweidel et. al., 2022*). Through its multidisciplinary approach and comprehensive analysis, this research lays the foundation for a more informed and consumer-centric e-commerce ecosystem.

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LITERATURE REVIEW

Smart speakers, equipped with artificial intelligence (AI) and voice recognition technology, have revolutionized the way we interact with technology in our daily lives (*George Terzopoulos, Maya Satratzemi, 2020*). These devices, often powered by virtual assistants like Amazon's Alexa, Apple's Siri, Google Assistant, and others, have rapidly gained prominence as integral components of modern households. Beyond their utility in answering questions, setting reminders, or playing music, smart speakers have also become a formidable force in the realm of e-commerce (*Paula Bräuer, Athanasios Mazarakis, 2022*).

The adoption of smart speakers for e-commerce purposes has been nothing short of remarkable. These voice-activated devices have seamlessly integrated themselves into the shopping habits of consumers, offering a novel and convenient way to interact with online marketplaces (*Abid Haleem et. al., 2022*). The appeal lies in their hands-free operation, which allows users to perform various shopping tasks using only their voices. Whether it's adding items to a shopping cart, checking product availability, or even making purchases, smart speakers have streamlined the e-commerce experience, making it more accessible and user-friendly.

One of the key factors contributing to the widespread adoption of smart speakers in e-commerce is the unparalleled convenience they offer. In a fast-paced world, consumers are constantly seeking ways to simplify their lives (*Rob Kim Marjerison et. al., 2022*). Smart speakers fulfil this need by providing a frictionless shopping experience. Users can simply speak their orders or questions aloud, and the AI-powered virtual assistant takes care of the rest. This level of convenience has prompted consumers to integrate smart speakers into their daily routines, making them a go-to tool for shopping needs (*George Terzopoulos, Maya Satratzemi, 2020*).

Moreover, personalization is at the heart of the smart speaker's appeal in e-commerce. These devices have the ability to learn from user behavior and preferences, offering tailored product recommendations and shopping experiences (*Divya Kaushal, 2021*). This personal touch enhances user engagement and satisfaction, as consumers feel that their needs are being prioritized. It's not just about buying products; it's about receiving recommendations that align with individual tastes, creating a more immersive and customer-centric shopping journey (*Erik Lindecrantz et. al., 2020*).

The adoption of smart speakers in e-commerce also intersects with the broader landscape of voice commerce, where voice commands and interactions play a central role in the consumer decision-making process (*Ransome Bawack et. al., 2021*). This shift has prompted businesses to adapt their strategies to cater to voice-activated shopping. From optimizing product listings for voice search to creating compelling voice-activated promotions, e-commerce businesses are recognizing the importance of aligning their operations with this emerging trend (*Yogesh K. Dwived et. al., 2021*).

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However, the adoption of smart speakers in e-commerce is not without its challenges and considerations. Privacy and data security concerns have come to the forefront, as users entrust these devices with sensitive information, such as payment details (*Sahi AM et. al., 2022*). Ethical considerations surrounding data handling and the potential for voice assistants to eavesdrop on conversations also warrant careful examination (*Kristen Stephens, 2021*).

Convenience and Adoption of Smart Speakers

The role of convenience in technology adoption is a well-documented phenomenon in the literature (*Mari, 2019*). Studies on the adoption of AI-powered smart speakers have repeatedly highlighted the significance of convenience as a major driver (*Simone Aiolfi, 2023*). Users appreciate the seamless and hands-free nature of interactions that smart speakers enable. This convenience extends to various tasks, including voice-activated shopping. By allowing users to effortlessly add items to their shopping lists, make purchases, and access product information through voice commands, smart speakers reduce friction in the shopping process (*Pascal Kowalczuk, 2018*). This has led to increased adoption of these devices, as users seek the convenience, they offer in managing their daily tasks, including shopping.

H_1: *Greater convenience provided by smart speakers significantly increases the customer choice through voice-activated shopping.*

Trust and Data Privacy

Trust plays a pivotal role in the successful integration of technology into consumers' lives. When it comes to AI-powered smart speakers, users need to trust that their personal data, including payment information, is secure (*Yuqi Liu, 2021*). The literature extensively discusses the importance of trust in technology adoption. Ethical considerations surrounding data privacy and security have been subjects of in-depth exploration. Studies have consistently shown that concerns related to data privacy and security can act as significant barriers to the adoption of AI-powered smart speakers for shopping purposes. Establishing and maintaining user trust through transparent data handling practices is crucial for encouraging users to engage in voice-activated shopping with confidence (*Maram Saeed Alzaidi, 2022*).

H_2: *Increased concerns about trust and data security significantly deter customer choice in favour of using smart speakers for e-commerce.*

Personalization and User Experience

Personalization has become a cornerstone of modern e-commerce. Extensive research has highlighted that consumers appreciate tailored shopping experiences that align with their preferences and past behavior (*Ragnhild Eg, 2023*). AI-powered smart speakers have the capability to provide highly personalized recommendations and shopping assistance based on user profiles and historical data. This personalization enhances the user experience significantly. Studies have shown that when users receive recommendations and shopping assistance that are closely aligned with their

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preferences, they are more likely to express satisfaction and make successful purchases (*Head et al., 2020*). Consequently, personalization stands out as a vital factor that shapes the way consumers approach voice-activated shopping.

H_3: Enhanced personalization in smart speakers significantly influences customer choice in favour of engaging with e-commerce

Cognitive Ease and Usability

Cognitive ease, a concept rooted in cognitive psychology, relates to the ease with which individuals can process information and make decisions. In the context of voice-activated shopping, research has delved into how user interfaces and the clarity of voice commands impact cognitive ease (*Pei-Shan Soon, 2023*). Intuitive voice interfaces that reduce cognitive load contribute to a more positive user experience. Users appreciate the simplicity and clarity of voice commands, which enable them to make decisions more quickly and with less cognitive effort. This not only enhances the user experience but also plays a role in the decision-making process, influencing the choices consumers make in the digital marketplace.

H4: Improved cognitive ease, characterized by clear voice interactions, significantly increases the adoption of voice-activated shopping.

Emotional Engagement and Brand Loyalty

Emotional engagement with technology and brands has been a subject of considerable study (*Aaleya Rasool, 2020*). The literature suggests that users can form emotional connections with AI-powered smart speakers, and these connections can significantly influence their shopping decisions and brand loyalty. Emotional engagement often stems from the quality of interactions and the reliability of the technology. Users who have positive emotional responses to voice interactions with smart speakers tend to trust the technology more and, subsequently, exhibit higher brand loyalty (*Fulya Acikgoz, 2023*). Thus, emotional engagement has emerged as a crucial factor in the complex landscape of consumer decision-making within voice-activated shopping experiences.

H_5: Higher emotional engagement with smart speakers leads to increased brand loyalty and more frequent use of voice-activated shopping.

Behavioural economics principles have been applied to understand consumer decision-making in various contexts, and their relevance extends to voice-activated shopping. Research has identified cognitive biases and heuristics that may influence choices in e-commerce (*Lucia A. Reisch, Min Zhao, 2017*). These biases, such as anchoring or social proof, shed light on how consumers make decisions that may deviate from traditional economic models. By understanding these behavioural biases within the context of voice-activated shopping, businesses and marketers can design strategies that leverage these biases to nudge users toward more favourable choices (*Anna Leschanowsky, 2023*). This integration of behavioural economics principles provides a nuanced understanding of consumer behavior in the digital marketplace and offers actionable insights for optimizing shopping experiences.

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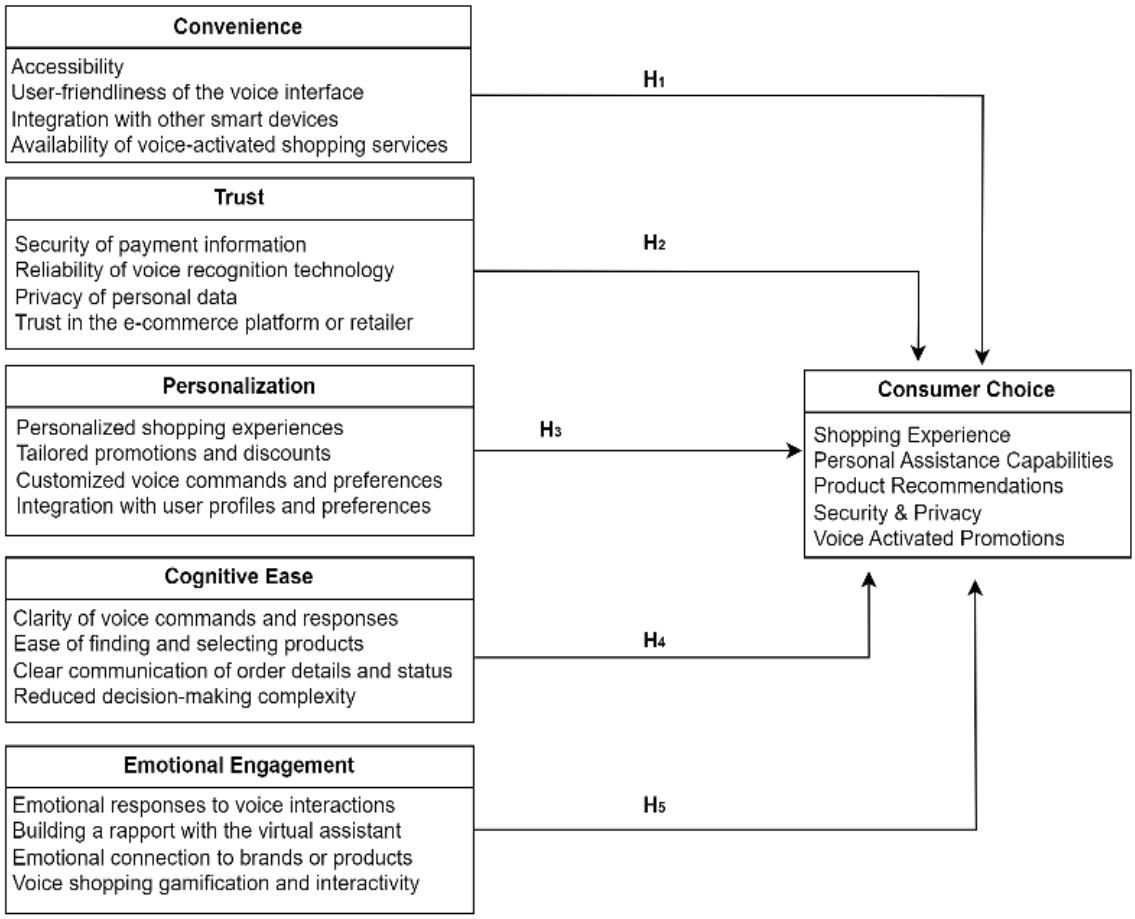

Figure 1: Research Framework

METHODOLOGY

This study employs a cross-sectional research design to examine the complex relationships among variables in the context of voice-activated shopping. The primary objective is to understand how convenience, trust, personalization, cognitive ease, and emotional engagement collectively influence customer choices. Data is collected through a combination of surveys and behavioural data analysis to provide a comprehensive view of user preferences and behavior.

A structured questionnaire is developed to measure the variables of interest, including convenience, trust, personalization, cognitive ease, and emotional engagement. Likert-scale questions are employed to assess user perceptions and attitudes. Behavioural data is collected from users' interactions with AI-powered smart speakers and e-commerce platforms. This data includes the frequency of voice-activated shopping, the types of products or services purchased, and user satisfaction.

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A sample of 380 participants is carefully selected to ensure diversity and representation across various demographic groups, familiarity levels with voice-activated shopping, and frequency of smart speaker use. This diverse and well-structured sample enhances the robustness of the study's findings and allows for a comprehensive examination of the factors influencing customer choices in voice-activated shopping.

The research model is based on the theoretical framework, which posits that convenience, trust, personalization, cognitive ease, and emotional engagement collectively influence customer choices in voice-activated shopping. The Structural Equation Modelling (SEM) framework is employed to test the relationships between the independent variables (convenience, trust, personalization, cognitive ease, and emotional engagement), the dependent variable (customer choices), and potential mediating (e.g., user satisfaction) and moderating variables (e.g., user demographics, frequency of smart speaker use).

Confirmatory Factor Analysis (CFA) is used to assess the reliability and validity of the measurement scales for each construct (i.e., convenience, trust, personalization, cognitive ease, emotional engagement, user satisfaction, and other relevant variables). The SEM analysis examines the direct and indirect effects of the independent variables on the dependent variable. The model also accounts for potential mediation and moderation effects. Path coefficients, standardized coefficients, and goodness-of-fit statistics are calculated to assess the model's accuracy in explaining the data. The hypotheses generated for this study, such as the impact of convenience, trust, personalization, cognitive ease, and emotional engagement on customer choices, are tested using the SEM framework.

RESULTS

Table 1 provides an overview of the participants' demographic characteristics, encompassing gender, age, educational attainment, and income. Furthermore, it presents descriptive statistics related to their utilization of AI speakers of various types. Table 1 indicate that among the participants, the gender distribution skewed toward males (69.21%) as opposed to females (30.79%). Age-wise, the majority fell within the 21-30 years bracket (53.42%), with the remaining participants distributed across other age groups. In terms of education, the majority were graduates (61.84%), followed by postgraduates (36.05%). Regarding income, a substantial portion of participants reported earnings between 10,001 and 20,000 (42.63%), while Amazon Alexa emerged as the most popular AI speaker choice (32.37%), followed by Google Assistant (25.00%) and Apple Siri (22.63%), with a minority opting for other AI speaker options. These findings offer valuable insights into the participant demographics and their preferences in AI speaker usage.

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Table 1: Demographics

Item		Frequency	Percentage	Mean	Std. Error of Mean
Gender	Male	263	69.21	1.31	0.024
	Female	117	30.79		
Age	Below 20 years	10	2.63	2.62	0.047
	21-30 years	203	53.42		
	31-40 years	114	30.00		
	41-50 years	36	9.47		
	Above 50 years	17	4.47		
Education	Graduate	235	61.84	1.40	0.027
	Post Graduate	137	36.05		
	Others	8	2.11		
Income	Less than 10,000	112	29.47	2.18	0.060
	10,001-20,000	162	42.63		
	20,001 - 30,000	65	17.11		
	30,001 - 40,000	17	4.47		
	40,001 - 50,000	15	3.95		
	More than 50,000	9	2.37		
AI-Speaker	Amazon Alexa	123	32.37	2.30	0.058
	Google Assistant	95	25.00		
	Apple Siri	86	22.63		
	Others	76	20.00		

SEM Analysis

In this research, we employed structural equation modelling (SEM) and confirmatory factor analysis (CFA) techniques to analyze the data and assess the interrelationships among variables. The Confirmatory Factor Analysis (CFA) method serves as a means to validate the underlying factor structure of a set of observed variables (Joseph, Marko, Torsten, & Christian, 2012). In this study, we developed a comprehensive equation model to investigate the artificial intelligence influence on consumer choices, comprising five latent variables. Firstly, "Convenience," as an exogenous latent variable, was assessed through observed variables such as accessibility (c1), user-friendliness of the voice interface (c2), integration with other smart devices (c3), and the availability of voice-activated shopping services (c4). Similarly, "Trust," another exogenous variable, was examined by considering observed variables such as security of payment information (t1), reliability of voice recognition technology (t2), privacy of personal data (t3), and trust in the e-commerce platform or retailer (t4). "Personalization," the third independent variable, was evaluated using observed variables including personalized shopping experiences (p1), tailored promotions and discounts (p2), customized voice commands and preferences (p3), and integration with user profiles and preferences (p4). Additionally, "Cognitive Ease," an independent variable, was assessed through observed variables like the clarity of voice commands and responses (ce1), ease of finding and selecting products (ce2), clear communication of order details and status (ce3), and reduced decision-making complexity (ce4). Finally, the fifth independent variable, "Emotional Engagement," was explored through observed variables such as emotional responses to voice interactions (ee1), building rapport with the virtual assistant (ee2), emotional

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connection to brands or products (ee3), and voice shopping gamification and interactivity (ee4). This sequential approach provides a structured framework for comprehensively examining the educational use of Facebook, incorporating factors of convenience, trust, personalization, cognitive ease, and emotional engagement.

The study utilized AMOS 24 software to implement Structural Equation Modelling (SEM) for assessing the proposed conceptual model. SEM enables the exploration of the directional connections between various dimensions of AI speakers' influencing factors (Convenience, Trust, Personalization, Cognitive Ease and Emotional Engagement as independent variables) and the impact on consumer choices (treated as the dependent variable). This approach allows for a thorough analysis of how these components interrelate with each other.

Figure 2 illustrates three causal connections between the use of AI-Powered Smart speakers influence on the e-consumer choices. The beta values and *P*-values associated with these causal relationships are extracted from Table 4. All five dimensions of AI Powered speakers influence exhibit a substantial and statistically significant impact on the dependent variable, AI in HRM, with beta values of 0.41, 0.43, .35 and 0.31, respectively. These findings indicate a strong influence of these dimensions on the e-customer's choice, with corresponding beta values of 0.32, 0.53, 0.91 and 0.27 demonstrating their significant impact.

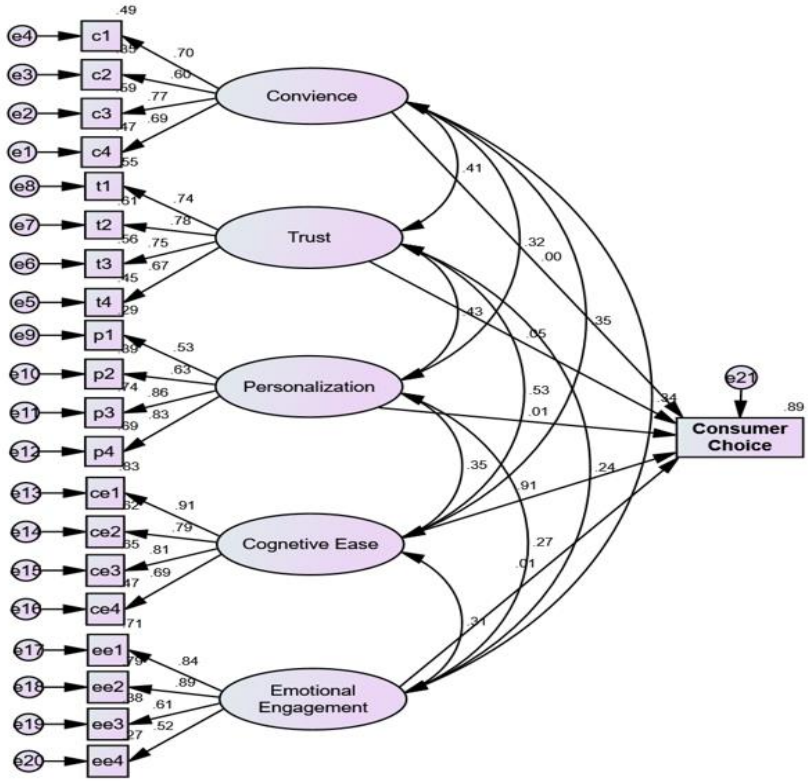

Figure 2: Research Framework Model

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The model fit indices suggest that the proposed model exhibits a good fit to the data. The Comparative Fit Index (CFI) and Incremental Fit Index (IFI) both exceed the recommended threshold of 0.90, indicating a strong fit, while the Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), and Relative Fit Index (RFI) also surpass the 0.90 benchmark, affirming the model's robustness. The Chi-Square to Degrees of Freedom ratio (CMIN/DF) falls well below 3.0, signifying a satisfactory fit. Additionally, the Root Mean Square Error of Approximation (RMSEA) is below 0.8, further supporting the model's adequacy. In summary, the model demonstrates a favourable fit to the data across multiple fit indices, implying that it provides a reasonable representation of the underlying structure and relationships within the observed variables.

Table 2: Fit indices of the conceptual model

CMIN/DF	RMSEA	CFI	IFI	GFI	AGFI	RFI
2.594	0.65	0.916	0.930	0.884	0.921	0.912
<3.0	<0.8	>0.90	>0.90	>0.90	>0.90	>0.90

The fit indices presented in Table 2 indicate that the conceptual model exhibits strong overall fit. The Comparative Fit Index (CFI) and Incremental Fit Index (IFI) both exceed the recommended threshold of 0.90, indicating a strong fit between the model and the observed data. Additionally, the Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), and Relative Fit Index (RFI) all surpass the 0.90 benchmark, further affirming the model's adequacy in explaining the data.

The Chi-Square to Degrees of Freedom ratio (CMIN/DF) falls below the recommended cutoff of 3.0, indicating that the model fits the data well. The Root Mean Square Error of Approximation (RMSEA) is slightly higher than the ideal threshold of 0.08 but remains below 0.1, suggesting reasonable model fit. In summary, the fit indices collectively suggest that the conceptual model provides a good representation of the observed data, with only a minor discrepancy indicated by the RMSEA, which still falls within an acceptable range for model fit assessment.

Table 3: Conceptual Model Results

Hypothesis	Path	Std. Co-efficient	*p Value*	R^2
H1	Convenience <--- e-Consumer Choice	0.722	***	0.512
H2	Trust <--- e-Consumer Choice	0.821	***	0.424
H3	Personalization <--- e-Consumer Choice	0.924	***	0.714
H4	Cognitive Ease <--- e-Consumer Choice	0.822	***	0.425
H5	Emotional Engagement <--- e-Consumer Choice	0.728	***	0.415

Table 3, shows the results of the statistical analysis reveal substantial and highly statistically significant relationships between several key factors and e-Consumer Choice. Firstly, Convenience, indicated by a strong standardized coefficient of 0.722 and an R^2 of 0.512, plays a pivotal role, suggesting that as Convenience increases, e-Consumers are significantly more likely to choose a particular product or service. Secondly, Trust exhibits a robust influence, with a standardized coefficient of 0.821 and an R^2 of 0.424, highlighting

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those higher levels of Trust correlate strongly with increased e-Consumer Choice. Thirdly, Personalization emerges as a dominant factor, supported by a significant standardized coefficient of 0.924 and a remarkably high R^2 of 0.714, signifying that personalized offerings have a profound impact on e-Consumer decisions.

Furthermore, Cognitive Ease and Emotional Engagement, each characterized by substantial standardized coefficients of 0.822 and 0.728, respectively, and respectable R^2 values of 0.425 and 0.415, underpin the importance of a user-friendly experience and emotional resonance in influencing e-Consumer Choice. Collectively, these findings underscore the critical significance of Convenience, Trust, Personalization, Cognitive Ease, and Emotional Engagement in shaping e-Consumer choices, providing valuable insights for businesses aiming to optimize their strategies in the digital realm.

Implications

Based on the favourable fit indices presented in Table 2, this study's beneficiaries, which may include researchers, practitioners, and decision-makers in the relevant field, can draw several valuable insights. The strong overall fit of the conceptual model suggests that it accurately represents the relationships within the data. Researchers can have confidence in the model's ability to explain and predict outcomes. Practitioners can use the model to inform decision-making and strategy development, relying on the identified factors and their impact. Decision-makers can leverage this information to optimize resource allocation and prioritize efforts in areas that have the most significant influence on the studied phenomenon. Overall, these findings offer a reliable foundation for informed decision-making, potentially leading to more effective policies, strategies, or interventions in the studied domain.

CONCLUSION

This study has provided valuable insights into the factors influencing e-Consumer choice and the overall fit of the conceptual model used for analysis. The results have shown that Convenience, Trust, Personalization, Cognitive Ease, and Emotional Engagement are all significant determinants of e-Consumer choice, with each factor demonstrating a strong positive influence.

These findings contribute to a better understanding of consumer behavior in the digital realm and offer practical implications for businesses and decision-makers aiming to enhance their e-commerce strategies. By recognizing the pivotal role of these factors and the overall model validity, stakeholders can make more informed decisions, potentially leading to improved product offerings and customer experiences in the online marketplace. Future research may further refine and expand upon these findings to continue advancing our comprehension of e-Consumer behavior and choice.

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