Artificial Intelligence in Shopping Applications: A Systematic Review of Consumer Behaviour, Personalization, and Ethical Implications

Murgesha B.N[1,*], Dr. Neelima Nishikant Bhoomkar[2], Dr. P Muthuraju[3], Rekha B.S[4], Shobha J[5]

[1]*Assistant Professor, Department of Commerce, Dayananda Sagar College of Arts, Science and Commerce, Bangalore-560111.*
[2]Assistant Professor, Department of Commerce, T John College Autonomous Bangalore-560083.
[3]Professor, Department of Commerce, T John College Autonomous Bangalore- 560083.
[4]Assistant Professor, Department of Commerce, RNS First Grade College Bangalore-560098
[5]Assistant Professor, Department of Commerce, T John College Autonomous Bangalore-560083.
***Corresponding Email ID:** bnm1582@gmail.com

Abstract
The integration of artificial intelligence (AI) into shopping applications has fundamentally transformed digital commerce, reshaping how consumers discover, evaluate, and purchase products. This paper presents a systematic review of AI applications in shopping environments, synthesizing findings from Scopus-indexed literature to examine the technological foundations, consumer behavioural impacts, and emerging ethical considerations. Drawing on bibliometric trends demonstrating exponential publication growth since 2020, the review identifies machine learning, natural language processing, and recommendation systems as core enabling technologies. AI-driven personalization emerges as a primary mechanism influencing consumer attitudes, trust, and purchase intentions, while ethical concerns surrounding data privacy, algorithmic transparency, and bias persist as critical challenges The analysis further reveals significant gaps in longitudinal research and cross-cultural investigations, particularly regarding the long-term effects of AI interactions on consumer loyalty and the psychological dimensions of human-AI engagement in retail contexts This paper contributes a comprehensive framework for understanding AI's transformative role in shopping applications and proposes actionable directions for future research that balance technological innovation with responsible, consumer-centric practices.

Keywords: Artificial Intelligence, Shopping Applications, E-commerce, Consumer Behaviour, Personalization, Recommendation Systems, Ethical AI

1. Introduction

The rapid evolution of artificial intelligence (AI) has significantly transformed the retail landscape, with shopping applications emerging as primary arenas for AI-driven consumer engagement. Promoted as autonomous systems with the capacity to learn, adapt, and make decisions with minimal human involvement, AI differs from traditional statistical models through its capacity for adaptive machine learning, real-time data processing, and multimodal data fusion. In the context of shopping applications, these capabilities enable unprecedented levels of personalization, predictive analytics, and automated customer interaction that collectively redefine the consumer experience.

The intersection of AI and shopping applications represents a seismic shift in how businesses understand and manage purchasing behaviours. AI-powered applications allow organizations to research consumer behaviour with a thoroughness and granularity unachievable by conventional analysis techniques from sophisticated recommendation systems that assist users in making purchasing decisions to personalized content that informs unique user experiences, AI has become integral to modern e-commerce infrastructure. The global research landscape reflects this transformation, with bibliometric analyses revealing five dominant clusters Consumer Behaviour & Smart Retail, Intelligent Commerce, Data-Driven Behaviour, Smart Experience, and Neuro-Behavioural Analytics that collectively define the field's intellectual structure.

Publication trends underscore the accelerating scholarly interest in this domain. While initial exploration began modestly, research activity experienced exponential growth after 2020, with significant increases in publication output and citation impact A bibliometric analysis of 485 Scopus-indexed articles demonstrated a 19.6% growth in 2020, 10.9% in 2021, and a peak of 37.7% in 2022, with an average of 19.8 citations per document This growth reflects both technological advances in AI and the increasing integration of these technologies into consumer-facing retail applications.

Despite this proliferation of research, the literature remains fragmented, with studies often addressing isolated aspects such as personalization, algorithmic performance, or consumer behaviour rather than

providing an integrated perspective of the field's intellectual structure and evolution Moreover, while AI-enabled recommendation systems and personalization have been shown to improve customer experience and engagement, they also pose serious challenges related to governance and ethics Matters such as algorithmic fairness, data privacy, and trust are increasingly acknowledged as central concerns in both AI research and the broader digital commerce environment.

This paper aims to address these gaps by providing a comprehensive systematic review of AI in shopping applications. The analysis is guided by three primary research questions:

1. What AI technologies are most prevalent in shopping applications, and how do they function?
2. How does AI influence consumer behaviour, including attitudes, trust, and purchase intentions?
3. What are the key ethical, social, and strategic challenges associated with AI integration in shopping applications?

By synthesizing existing findings, this study aims to clarify AI's multifaceted role in shopping applications, provide actionable insights for optimizing business strategies, and identify critical future research directions.

2. Literature Review

2.1 Theoretical Foundations

The study of AI in shopping applications is grounded in several complementary theoretical frameworks. The Technology-Organization-Environment (TOE) framework provides a comprehensive lens for understanding AI integration, highlighting how technological capabilities, organizational readiness, and environmental conditions collectively influence adoption and implementation in the context of digital commerce, the technological dimension emphasizes AI-driven tools such as machine learning, recommendation systems, and natural language processing that enhance personalization and consumer engagement. The organizational dimension focuses on firm's internal capabilities, including technological expertise and digital infrastructure, while the environmental dimension concentrates on external forces such as market competition and regulatory frameworks.

Consumer behaviour theory complements this perspective by examining how individuals select, buy, use, and dispose of products or services. Classical theories emphasizing rationality in decision-making have been augmented by contemporary notions acknowledging the preponderant role of psychological, social, cultural, and personal factors The digital transformation has further complicated these dynamics, with Omni channel retailing and social commerce creating extensive behavioural datasets that provide insights into consumer choices and mental processes.

2.2 AI Technologies in Shopping Applications

The application of AI in shopping environments encompasses a diverse array of technologies, each serving distinct functions in the consumer journey. Machine learning algorithms form the computational backbone, enabling systems to learn from data and improve performance autonomously without manual programming Natural language processing powers conversational interfaces, including Chatbot's and virtual assistants that provide immediate assistance and support, making the shopping experience more efficient and enjoyable Computer vision technologies enable visual search, augmented reality try on experiences, and automated checkout systems in intelligent unmanned convenience stores.

Recommendation systems represent one of the most visible and impactful AI applications in shopping. These systems employ three major algorithmic approaches: content-based filtering, collaborative filtering, and hybrid filtering Content based filtering excels when comprehensive metadata is available for items, matching user preferences with item features. Collaborative filtering uses historical interactions between users and items to learn representations and predict future interactions, capturing complex preferences but facing challenges with cold starts and data sparsity. Hybrid systems combine multiple techniques to leverage complementary benefits, providing more accurate and robust recommendations.

The evolution of recommendation systems reflects broader technological trends. The period from 2009 to 2018 saw breakthroughs in deep learning, coupled with the rise of big data and cloud computing, facilitating the application of neural networks to unstructured data like social media content and images More recently, graph neural networks (GNNs) have emerged as trending topics, while knowledge graphs and the cold start problem represent crucial areas for future research.

2.3 AI and Consumer Behaviour

The influence of AI on consumer behaviour is mediated by several interconnected mechanisms. Sophisticated recommendation systems assist users in making purchasing decisions by reducing search costs, increasing purchase likelihood, and enhancing overall satisfaction Personalized content creates unique user experiences that foster deeper connections between consumers and brands Behaviour nudges, enabled by strategic information organization, guide consumer choices through subtle interventions.

Empirical studies demonstrate the far-reaching influence of AI-driven interactions on customer choices, brand awareness, and loyalty development. Personalized recommendations have been shown to reduce search expenses, lift purchase likelihood, and provide enhanced satisfaction AI-powered customer service tools, such as catboats and virtual assistants, provide immediate assistance that strengthens the

relationship between consumer and brand, encouraging repeat business and promoting loyalty The advanced personalization capabilities of AI tools allow for consumer experiences tailored to individual needs and preferences, leading to greater customer loyalty and engagement.

However, these outcomes are contingent upon several mediating factors. Algorithm transparency, perceived user autonomy, and privacy concerns significantly contribute to building consumer trust, a critical driver of AI success in retail Consumers perceive AI solutions as more impartial compared to humans due to the absence of biases and emotions in AI decisions, a perception that can increase consumer trust and satisfaction with AI-mediated interactions Yet, this perception must be balanced against concerns about data collection practices and algorithmic manipulation.

3. Methodology

This study employs a systematic literature review methodology following established guidelines for synthesizing Scopus-indexed research. The review process was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure transparency and replicability The Scopus database was selected as the primary source due to its comprehensive coverage of peer-reviewed literature and its widespread use in bibliometric analyses of AI and consumer behaviour research.

3.1 Search Strategy

The search strategy incorporated keywords identified through preliminary scoping of the literature and consultation of existing systematic reviews. Search terms included combinations of "artificial intelligence," "AI," "shopping application," "e-commerce," "consumer behaviour," "personalization," "recommendation system," and "retail technology." Boolean operators were employed to refine the search, ensuring comprehensive coverage while maintaining specificity. The search was limited to English-language peer-reviewed articles, reviews, and conference papers, consistent with the approach of previous bibliometric studies in this domain.

3.2 Inclusion and Exclusion Criteria

Studies were included if they: (1) addressed AI applications in shopping or e-commerce contexts; (2) examined consumer behavioural outcomes, technological implementations, or ethical implications; (3) were indexed in Scopus; and (4) were published in peer-reviewed journals or conference proceedings. Studies were excluded if they: (1) focused solely on technical algorithm development without consumer applications; (2) addressed AI in non-retail contexts; or (3) were not available in English.

3.3 Data Extraction and Analysis

Data extraction was conducted using standardized forms to capture study characteristics including author information, publication year, research design, AI technologies examined, key variables, and main findings. The analysis employed both descriptive statistics to characterize the literature and thematic synthesis to identify patterns, themes, and gaps Bibliometric indicators including publication trends, citation impact, and keyword co-occurrence were analysed to map the intellectual structure of the field.

4. Results

4.1 Publication Trends and Research Landscape

The analysis reveals a distinct upward trend in publications exploring AI in shopping applications. From 1995 to 2006, publications remained minimal, averaging just 10.6 documents per year, reflecting the nascent stage of both fields Around 2007, the number of publications began to rise, fuelled by technological advancements and the expansion of social media. The most significant surge occurred between 2017 and 2022, driven by rapid developments in AI, particularly in personalized marketing and customer service automation.

A bibliometric analysis of 279 Scopus-indexed articles between 2013 and 2026 demonstrated a strong annual growth rate of 27.69%, reflecting rapid scholarly expansion of AI applications in digital marketing and consumer behaviour research The dataset exhibits dynamic growth, with publication output rising 19.6% in 2020, 10.9% in 2021, and peaking at 37.7% in 2022, before regaining momentum with a 29.6% increase in 2024.

Geographic distribution of research output reveals significant concentration. China leads with 1,309 published articles, followed by India with 676 and the United States with 506. However, the United States ranks first in total citations with 2,976, followed by China with 2,243 Leading institutions include Zhejiang University, Bina Nusantara University, Wuhan University, and The Hong Kong Polytechnic University The geographic patterns suggest that while Asian institutions dominate in publication volume, Western institutions maintain influence through citation impact.

4.2 Key AI Technologies and Applications

The thematic analysis identifies several key AI technologies prevalent in shopping applications. Machine learning algorithms for predictive analytics and consumer segmentation dominate the research landscape Natural language processing and sentiment analysis power conversational AI applications including Chatbot's and virtual assistants Recommendation systems represent one of the most studied applications, with research evolving from early collaborative filtering approaches to advanced graph neural networks and deep learning models.

The evolution of AI in shopping applications can be categorized into interconnected developmental phases. The first phase (2010–2015) was characterized by the integration of Web 2.0 technologies with e-commerce platforms, where social networking functionalities enabled consumer participation and peer influence. The second phase (2015–2020) saw the emergence of intelligent personalization through advanced machine learning algorithms. The current phase is characterized by autonomous commerce ecosystems where AI enables real-time, context-aware interactions.

Emerging applications include intelligent unmanned convenience stores (IUCVSs) that employ computer vision, automated payment systems, and smart entry/exit technologies to function as a "silicon shopkeeper" AI-driven smart shopping carts with real-time tracking and inventory forecasting represent another innovation enhancing retail efficiency The integration of generative AI is emerging as a disruptive technology enabling hyper-personalization while also raising authenticity threats.

4.3 Consumer Behavioural Outcomes

The synthesis of findings reveals several key consumer behavioural outcomes associated with AI in shopping applications. Consumer attitudes toward AI are shaped by perceptions of usefulness, ease of use, trust, and privacy concerns Trust emerges as a primary mediator of AI adoption, with algorithm transparency and perceived user autonomy serving as critical antecedents Privacy concerns represent a significant barrier, with consumers becoming increasingly aware of how their data is utilized and how algorithmic systems influence their actions.

Behavioural intentions, including purchase likelihood, repurchase intention, and willingness to engage with AI-powered interfaces, are positively influenced by personalized recommendations and efficient customer service AI-driven personalization enhances customer satisfaction, loyalty, and conversion rates, while also improving the overall efficiency of the shopping experience The ability of AI to deliver better customer experiences serves as a critical brand differentiation factor, distinguishing companies that can provide superior service in a competitive market.

However, these positive outcomes are not universal. The effectiveness of AI applications depends on implementation quality, consumer characteristics, and contextual factors. Algorithmic bias, data privacy concerns, and implementation complexity present ongoing challenges The psychological impacts of AI interactions on consumers remain underexplored, particularly regarding how factors such as perceived intelligence and social behaviour of AI technologies influence consumer responses.

4.4 Ethical and Strategic Challenges

The integration of AI in shopping applications raises significant ethical and strategic challenges. Data privacy concerns represent the most prominent issue, with consumers expressing apprehension about how their personal information is collected, stored, and utilized Algorithmic transparency and fairness are critical for maintaining consumer trust, particularly as AI systems increasingly influence consumer choices without explicit user awareness.

Algorithmic bias represents another significant concern. AI systems trained on historical data may perpetuate or amplify existing biases, leading to discriminatory outcomes in product recommendations, pricing, or access to services The potential for manipulation through AI-driven behaviour nudges raises ethical questions about consumer autonomy and informed consent These concerns necessitate the development of ethical AI governance frameworks and hybrid human-machine processes that weigh innovation against consumer protection.

The strategic challenges of AI implementation in shopping applications include the complexity of integration, the need for substantial technological investment, and the requirement for organizational adaptation Companies must navigate the tension between leveraging AI's capabilities for competitive advantage while maintaining consumer trust and meeting regulatory requirements. The evolution of frameworks such as GDPR and similar data protection regulations adds additional complexity to the implementation landscape.

5. Discussion

5.1 Synthesis of Findings and Implications

The findings of this systematic review demonstrate that AI has become integral to the functioning of modern shopping applications, with impacts spanning technological infrastructure, consumer behaviour, and ethical considerations. The exponential growth of research in this domain reflects both the increasing sophistication of AI technologies and their deepening integration into consumer-facing retail contexts.

The dominance of machine learning, natural language processing, and recommendation systems as research foci aligns with their practical importance in shopping applications These technologies collectively enable the personalization that drives consumer engagement and conversion, creating value for both consumers and businesses The emergence of more advanced applications, including intelligent unmanned stores and generative AI for customer experience, suggests continued evolution of the technological landscape.

The mediating role of consumer trust and privacy concerns represents a critical finding with significant implications for practice. AI's effectiveness in influencing consumer behaviour is contingent on consumer

willingness to engage with these technologies, a willingness that is shaped by perceptions of transparency, fairness, and privacy protection Companies must therefore invest not only in AI capabilities but also in governance frameworks that demonstrate responsible data use and algorithmic accountability.

5.2 Gaps and Future Research Directions

The review identifies several significant gaps in the current literature. First, longitudinal research on the long-term effects of AI on consumer behaviour remains scarce Understanding how consumer attitudes and behaviours evolve in response to ongoing AI interactions is crucial for predicting the sustainability of AI-driven business models. Cross-cultural investigations are also infrequent, limiting understanding of how cultural factors mediate AI acceptance and effectiveness in shopping applications.

Second, the psychological dimensions of consumer-AI interactions require deeper investigation. While studies have recognized the influence of AI on consumer behaviour, there remains limited examination of nuanced psychological effects including trust development, emotional responses, and the formation of consumer-AI relationships The impact of AI's continuous learning capabilities on consumer behaviour and engagement represents a particularly fertile area for investigation.

Third, ethical AI governance frameworks tailored to shopping applications are underdeveloped. Research must address how to balance AI's personalization capabilities with consumer privacy protection, how to ensure algorithmic fairness in dynamic retail environments, and how to maintain consumer autonomy in AI-mediated decision-making contexts The integration of emerging regulatory frameworks into personalization strategy design represents an important practical challenge requiring scholarly attention.

5.3 Limitations

This review has several limitations. First, the reliance on Scopus-indexed literature may exclude relevant studies published in other databases or non-English sources Second, the rapid pace of AI development means that some findings may quickly become dated. Third, the review's focus on consumer-facing applications may underrepresent AI applications in supply chain, inventory management, or other operational contexts that indirectly affect consumer experience.

6. Conclusion

This systematic review has examined the multifaceted role of AI in shopping applications, synthesizing findings from Scopus-indexed literature to understand technological implementations, consumer behavioural impacts, and ethical considerations. The analysis reveals that AI has become fundamental to modern shopping experiences, enabling personalization, automation, and data-driven decision-making at unprecedented scale.

The exponential growth of research in this domain reflects both technological advances and the increasing recognition of AI's transformative potential for retail. Machine learning, natural language processing, and recommendation systems emerge as core enabling technologies, while consumer trust and privacy concerns represent critical mediating factors in AI adoption. Ethical challenges including algorithmic bias, data privacy, and consumer autonomy require ongoing attention from both researchers and practitioners.

Future research directions should prioritize longitudinal investigations of AI's long-term effects on consumer behaviour, cross-cultural comparative studies, and the development of ethical governance frameworks that balance innovation with consumer protection. As AI continues to evolve, understanding its influence on shopping applications will remain a crucial area of scholarly inquiry with significant practical implications for business and society.

References

[1] Riandhi, A. N. (2025). AI and consumer behaviour: Trends, technologies, and future directions from a Scopus-based systematic review. Cogent Business & Management, 12(1), 2544984.

[2] Personalization strategies in e-commerce: Impact on customer experience and purchasing behaviour. Scopus-indexed systematic review.

[3] Phapale, K., Rathod, C., & Vhankade, V. (2024). Streamlining grocery shopping: Personalized recommendations for enhanced cart performance. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 10(3), 381-386.

[4] Mapping research trends in online shopping behaviour during the fourth industrial revolution: A bibliometric analysis. Scopus-indexed study, 2025.

[5] Artificial Intelligence (AI) and Social Commerce in Digital Business Ecosystems: A Science-Mapping Analysis of Global Research Evolution and Emerging Trends. ScienceDirect, 2026, 100227.

[6] Patil, S., Sonawane, A., & Revandkar, A. (2025). Smart Multiagent Shopping System. International Journal of Advanced Research in Science, Communication and Technology, 106-113.

[7] Kohli, T. P., Malhotra, S., & Pingali, V. (2025). Revolutionising retail: A review of Intelligent Unmanned Convenience Stores and their market implications. Technological Forecasting and Social Change, 219.

[8] The new era of Artificial Intelligence in consumption: Theoretical framing, review and research agenda. Management Review Quarterly, 2025.

[9] AI in e-commerce: Bibliometric analysis of 1,458 Scopus articles (1995-2024). Scopus-indexed study.

[10] Madanchian, M. (2024). The impact of artificial intelligence marketing on e-commerce sales. Systems, 12(10), 429.
[11] Dele-Rotimi, A. O. (2026). Enhancing customer value through artificial intelligence and machine learning: Personalization, big data analytics, and customer experience management. International Journal of Applied Resilience and Sustainability, 2, 1290-1321.
[12] Olusanya, M. O., & Isinkaye, F. O. (2025). A review and bibliometric study on the trends and thematic analysis of e-commerce recommenders. International Journal of Knowledge Management, 21(1).
[13] Zulfiqar, M. I., et al. (2025). AI-driven smart shopping carts with real-time tracking and inventory forecasting for enhanced retail efficiency. IEEE Access, 13, 55576-55585.
[14] Mouammine, Y. (2026). AI in customer experience and digital marketing: A bibliometric and thematic review (2004-2025) with sensory marketing lens. Cogent Business & Management, 13(1), 2613596.
[15] Singh, V., Sharma, R., & Rawat, S. R. (2026). Charting the knowledge landscape of artificial intelligence driven personalization and consumer purchase intention in e-commerce: A bibliometric analysis. International Journal of Business Management, 5(1), 1041-1070.