



AI in E-Commerce: A Bibliometric Review of Trends, Themes, and Emerging Research Directions

¹Dr Richa Kalpesh Saxena, ²Soham Mehta, ³Swara Markande, ⁴Tanish Gada, ⁵Vaani Aggarwal

¹Assistant Professor, Marketing & Operations, NMIMS, Anil Surendra Modi School of Commerce, Mumbai Campus, India

^{2,3,4,5} B.Sc. Finance, NMIMS, Anil Surendra Modi School of Commerce, Mumbai Campus, India

Corresponding Author Email: swaramarkande07@gmail.com



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ABSTRACT

This bibliometric analysis aims to trace the trends in development, research themes and knowledge gaps in AI in e-commerce using a bibliometric methodology. In total, 483 articles were gathered from the database ScienceDirect, using the Systematic Literature Review (SLR) with PRISMA guidelines, and analysed using Biblioshiny and VOSviewer. The results have indicated that the studies in question remained scarce and fragmented until approximately 2017 and experienced a considerable increase after that time, surpassing 100 publications per annum in 2025. Procedia Computer Science and multiple business and retail-oriented publications proved to be among the sources that had the highest impact, confirming the interdisciplinary nature of the topic. Artificial intelligence, e-commerce and machine learning proved to be the most frequently used keywords, whereas the digital transformation, supply chain and SMEs proved to be the themes that had already been well-developed in comparison to such niche themes as chatbots and accessibility. As seen from the literature review, artificial intelligence has been utilized across almost all facets of e-commerce, from logistics to consumer experience, personalization, and fraud detection, although the literature review is limited in terms of the geographical area covered and also in that it fails to take into consideration the differential impact that AI has on different segments of consumers. As a result of this literature review, this study suggests a future research agenda encompassing topics such as generative AI, responsible AI, and cross-cultural adoption.

Keywords: Artificial Intelligence; E-commerce; Bibliometric Analysis; Consumer Behavior; Fraud Detection; Literature Review



1. INTRODUCTION

E-commerce platforms have evolved beyond passive browsing interfaces; artificial intelligence now enables them to anticipate consumer preferences before a query is entered. This shift is happening because of Artificial Intelligence (AI), which is transforming e-commerce from a simple digital storefront into a sophisticated, data-driven ecosystem. E-commerce, in basic terms, means buying and selling goods and services over the internet, while AI refers to technology that can do things normally requiring human thinking, like spotting patterns, learning from past data, and making predictions. Earlier, shoppers had to scroll through endless product listings on their own to find what they needed. Now, AI performs much of that work by studying what people search for, click on, and buy, and then using that information to recommend products, personalise ads, and even assist with customer service. This is why the connection between AI and consumer behaviour has become such an important area to study, since businesses are constantly trying to figure out what customers want and how to reach them faster. Raji et al. (2024) point out that AI-driven personalisation plays a big role in shaping consumer behaviour and shifting market trends in e-commerce. Peruchini et al. (2024) add to this by showing how tools like chatbots, recommendation systems, and prediction models are changing the way customers actually interact with online platforms. Artificial intelligence is no longer confined to back-end system operations; it has become an integral component of the consumer-facing shopping experience.

Since AI plays such a big role in these decisions, it is pertinent to examine how the decisions themselves are made. In this context, it is helpful to consider Operations Research (OR), which is a set of methods that uses data and mathematical optimization techniques to solve problems and make decisions, especially under constraints. Within e-commerce companies, decisions are constantly being made about inventory levels, forecasts, pricing strategies, and delivery plans. All these decisions are interrelated, but they also have to be made against the background of factors which are not always predictable. OR provides companies with a framework for dealing with these issues and, since nowadays e-commerce platforms produce an immense amount of data from each purchase and visit to their site, AI is able to add value to this approach by enhancing its effectiveness with data analytics capabilities. Put simply, AI is very effective at finding patterns in the data and predicting what can happen in the future, while OR translates the results of the analysis into actual decision-making and actions. This combination is especially valuable within the e-commerce sector, which operates in the digital environment where each transaction and search is data driven. Recent advances in OR also suggest that researchers began looking into how AI can help to make the process of modelling and optimisation more efficient (Fan et al., 2024). Moreover, the research suggests that incorporating AI in the process of making OR-based decisions can provide actual improvement in terms of accuracy and efficiency (Jiang, 2023).

One of the primary motivations behind the research on AI in e-commerce is associated with the rapidly evolving nature of this sphere and its crucial significance in the modern world. Generative AI and large language models are expected to influence customer actions in terms of searching for products, comparing various offers, and making purchases, not just browsing the offers manually (Mogaji & Jain, 2024). At the same time, due to the application of the same AI tools that increase efficiency, the problem of frauds committed with the help of AI is becoming quite topical in the area. The issue of risks and opportunities connected to the use of artificial intelligence in the sphere is one of the reasons why the topic is becoming crucial, as both businesses and scholars have to evaluate the extent of reliability of the technology and the need for regulation. Therefore, the fact that the topic is currently in its initial phase of evolution is the reason why studying it right now might bring valuable insights into its future development.

The analysis of the literature suggests that AI has already been applied in almost all aspects of e-commerce. While some studies concentrate on the use of big data and AI to solve logistics problems, others concentrate on the influence of AI technologies on customer behaviour and market trends. Various works investigate customer experiences that are enhanced due to the application of chatbots, recommendations systems, and predictions

models. One of the reviewed works investigates how AI helps visually impaired people shop online with the use of voice assistants. Other works cover the application of AI technologies to build resilient supply chains and raise the issues of data governance in the process. Also, various papers describe how AI can be used for inventory management, personalized shopping, pricing, and decision-making, the adoption of AI by small and medium enterprises, and machine learning techniques for fraud detection in online transactions. Overall, the reviewed papers provide the information on how AI is used in the field but remain concentrated in a few regions and overlook how differently AI affects various types of consumers.

For this study, a bibliometric approach was used, following the steps of the Systematic Literature Review (SLR) method and using the PRISMA framework, which guarantees that the selection process is transparent and repeatable. In order to gather the data for the analysis, a total of 520 papers were collected from the database ScienceDirect applying the keywords "Artificial Intelligence" and "E-commerce." After excluding duplicate and irrelevant documents, the number of publications was reduced to 483, which was then subjected to further analysis with the help of Biblioshiny and VOSviewer software.

According to the analysis of bibliographic data, the development of the research in this sphere is quite intensive; however, the publication activity was growing exponentially from a very low base: only a few publications were made before 2017, but from 2017 the number of articles increased significantly and reached more than 100 publications per year by 2025. The majority of publications are concentrated in the journal *Procedia Computer Science*, in addition to a number of business and retail journals. It proves that this sphere is researched not only from a technological, but also from a business perspective. As for the research keywords, the most common terms are such as artificial intelligence, e-commerce, machine learning. Well-studied topics in this field include digital transformation, supply chain and SMEs, while such keywords as chatbots, accessibility, customer engagement, omnichannel strategy have quite narrow coverage.

The structure of this paper is designed to guide the readers through from the background of the problem to the main findings and recommendations. After the Introduction, the Literature Review explores the existing research on AI applications in e-commerce and defines the gaps that this paper intends to fill. The Methodology is devoted to describing the way the data were collected and analysed by means of the bibliometric and systematic literature review techniques. Then follows the Data Analysis chapter presenting the results of this analysis, in particular, the trends in publications, the key words, and thematic mapping. The paper concludes with Future Research Agenda, showing the possible directions for this research, and the Conclusion.

Research Objectives

- To explore the dynamics of development of the research on AI application in e-commerce.
- To reveal the most influential journals, keywords, and topics in this research area.
- To learn about current applications of AI in e-commerce in terms of logistics, customer experience, and fraud detection.
- To identify the gaps in the existing research in terms of geography, consumer heterogeneity, and AI application in both fraud detection and fraud.
- To define directions of future research based on the results of this study.

2. LITERATURE REVIEW

As Artificial Intelligence is rapidly growing in various fields, its impact has also been positively affecting the E-commerce sector. Sakhvidi and Saadat (2024) highlight how international E-commerce has allowed customers from all across the world to purchase goods and services within a few clicks. The positive effects can be seen in this area, as either done by performing analysis on how the customers feel and their behavior about shopping — which can also be described as customer sentiments and their reaction to their sentiments — and operational

efficiency, which has covered the journey from warehouses to delivery to the customer, including the smooth running of the business. Previously, the studies performed by researchers in this field from different angles also include overcoming the difficulties faced in Logistics, which is one of the most practical challenges faced in E-commerce, and how some of these problems are solved with the help of Big Data (Hurtado et al., 2019). This shows how AI in itself is a major research focus and how data-driven tools are being used to fix issues relating to tracking or the flow of inventory. Another study analyses the relationship between E-commerce and Consumer Behavior using AI and discusses how AI is impacting and influencing how people shop and, in turn, its impact on the markets as a wider approach (Raji et al., 2024). A further study also focuses on examining how customer experience has been enhanced in E-commerce with the use of chatbots, prediction models, and customer recommendations (Peruchini et al., 2024), and seeks to understand how customer experience is changed with the help of these tools as they enhance customer satisfaction, trust and loyalty.

Not all papers focus on just the positives like profits or increasing efficiency of the company. Sarkar (2026) studies how AI is capable of being efficient in automated logistics and makes the supply chain resilient, but also introduces some challenges that are critical about the markets and data governance, and explores frequently ignored areas about Artificial Intelligence in E-commerce. Roumeliotis et al. (2024) employ Large Language Models (LLMs) to understand customer satisfaction with respect to E-commerce through a comparative analysis of GPT and LLaMA models. A broad view on how inventory management, personalized shopping, adaptive pricing and visual search are being positively affected by the use of AI in E-commerce has been studied by Rane et al. (2024). Giang et al. (2025) study comprehensively how factors such as technological, environmental and organizational affect the adoption of E-commerce and also its impact on digital transformation. Aljarboa (2024) focuses on the Small and Medium Enterprises (SMEs) side and investigates how factors like entrepreneurship, availability of resources and the performance of businesses are affected.

An interesting study on how online shopping becomes a barrier between visually impaired people and E-commerce, and how voice assistants overcome this barrier, is discussed by Chaudhary and Jain (n.d.). This is often an overlooked issue faced by visually challenged customer groups and is addressed through the use of Artificial Intelligence.

Most of the studies mentioned above focus in one way or another on studying or enhancing customer satisfaction or analyzing trends in the market, but Reddy et al. (2024) focus on a different direction and concentrate on detecting fraudulent transactions using machine learning techniques, helping B2C services to identify frauds and unauthorized activities and prevent them. This serves as a reminder that AI is not just about growth, personalization and convenience but also about safety, security and building trust between businesses and customers. Luo (2026) also focuses on the same area and summarizes various risks relating to cybersecurity in connection to E-commerce and its supply chain operations, and also discusses how different entities are functioning in maintaining cybersecurity.

Research Gaps

- Even though these studies focus on customers and AI, there is a gap in how different customers with different requirements are treated uniformly by AI systems without understanding the social consequences.
- Another gap concerns geographical location, as these studies are predominantly Asia-focused and have been performed to a much lesser extent in other countries.
- A further contradictory gap is the dual role of Artificial Intelligence as both a fraud detection tool and a fraud-enabling tool within E-commerce.

3. METHODOLOGY

The data for this study were gathered from ScienceDirect for the period from 2000 to 2026. The initial search was performed using two broad keywords — "Artificial Intelligence" and "E-commerce" — and resulted in a sample size of 520 papers. A screening process was performed in multiple stages to ensure that only relevant papers remained for the final data analysis. This included a stepwise removal of irrelevant papers from the initial sample: 483 papers were finalised after the removal of 8 duplicates; 7 papers were removed on the basis of language (i.e., non-English publications); and the remaining 22 were excluded because they related to Artificial Intelligence but not to E-commerce, or vice versa, or were completely unrelated to the topic, or had incomplete information.

The finalised and narrowed dataset of 483 papers was then formatted to the compatibility of Biblioshiny and saved in Excel format, after which the dataset was analysed. The final data were first imported and checked in Biblioshiny, where the tool generated 40 author keywords that served as the source for Performance Analysis. Trend Analysis was performed using Biblioshiny based on different criteria. The indicators Most Relevant Sources, Most Relevant Words, and Annual Scientific Production were taken as the analysis criteria for the sample size of 483 papers, and the results are discussed below. A Science Mapping analysis was also performed in which Thematic Mapping was used to visually organise and group the main themes together with their related sub-themes.

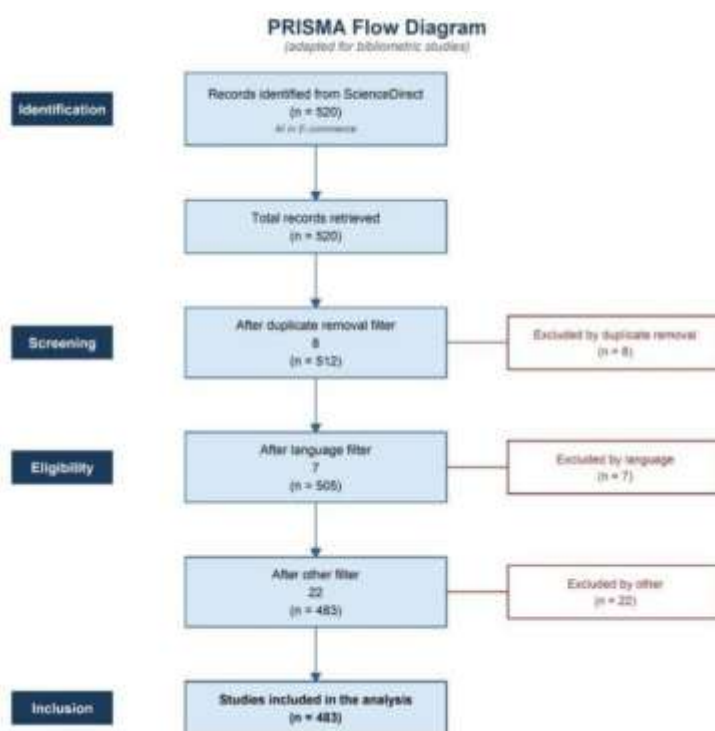


Figure — PRISMA flow diagram of the paper selection process (author's work).

4. DATA ANALYSIS AND RESULTS

Publication Trends

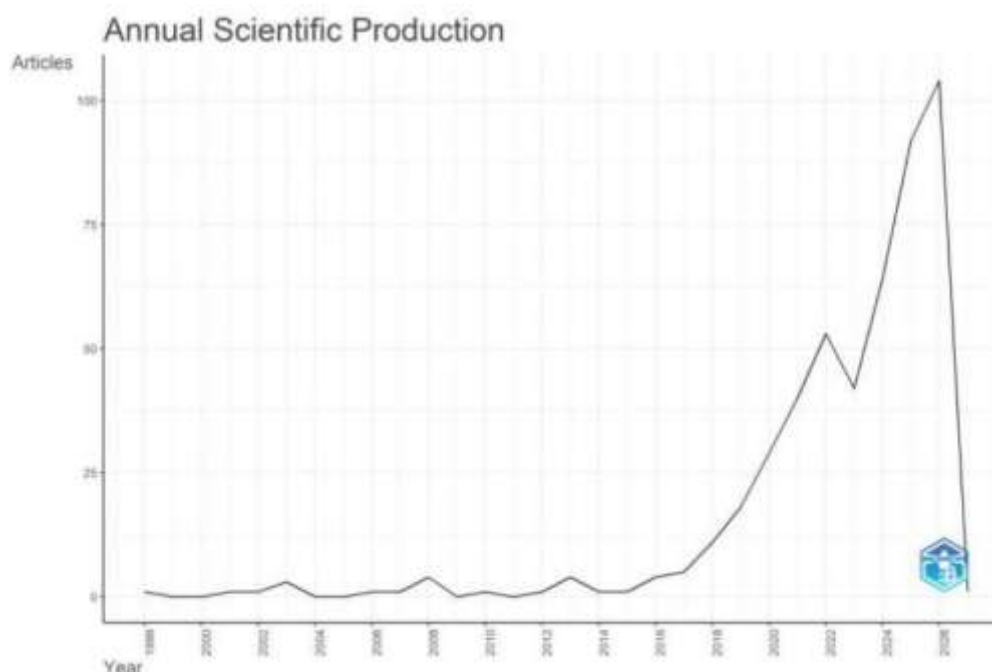


Figure 1. Annual scientific production (extracted from Biblioshiny – author's work).

Figure 1 indicates that research in this area remained limited and sporadic from the late 1990s until the mid-2010s, with annual production rarely exceeding two or three papers in any particular year. A noticeable change occurs around 2017, when publication activity begins to increase significantly. The number of publications grows from single digits to about 20 articles by 2019, continuing to rise to a peak of 53 articles in 2021, a pattern consistent with the broader post-2020 increase in AI- and digitalization-related research. After a slight decrease to roughly 41 articles in 2022, the series experiences its most accelerated growth, reaching around 92 articles in 2024 and exceeding 100 articles in 2025. The drop observed in 2026 is due to partial-year indexing at the time the data were pulled, not a real decrease, and should be interpreted with that in mind. Overall, the trend shows that the field has evolved from a specialized, low-productivity area of study to one marked by consistent and rapidly growing scholarly attention over the past approximately eight years.

Most Relevant Sources



Figure 2. Most relevant sources (extracted from Biblioshiny – author’s work).

As shown in Figure 2, publication outlets are dominated by Procedia Computer Science (31 articles), which by itself accounts for nearly as many publications as the next several sources combined. Next comes the Journal of Business Research (13 articles), followed by a group of journals each publishing 10 to 11 articles: the Journal of Retailing, Technological Forecasting and Social Change, and the Journal of Retailing and Consumer Services. Telecommunications Policy and Transportation Research Procedia each contributed 9 articles, while Decision Support Systems, Electronic Commerce Research and Applications, and Heliyon each contributed 7. The prominence of a computer science conference proceedings publisher, coupled with several retail and business-focused journals, indicates that the literature is genuinely interdisciplinary — spanning technical and computational domains as well as management- and consumer-oriented publications — rather than being confined to one academic discipline.

Keyword Analysis

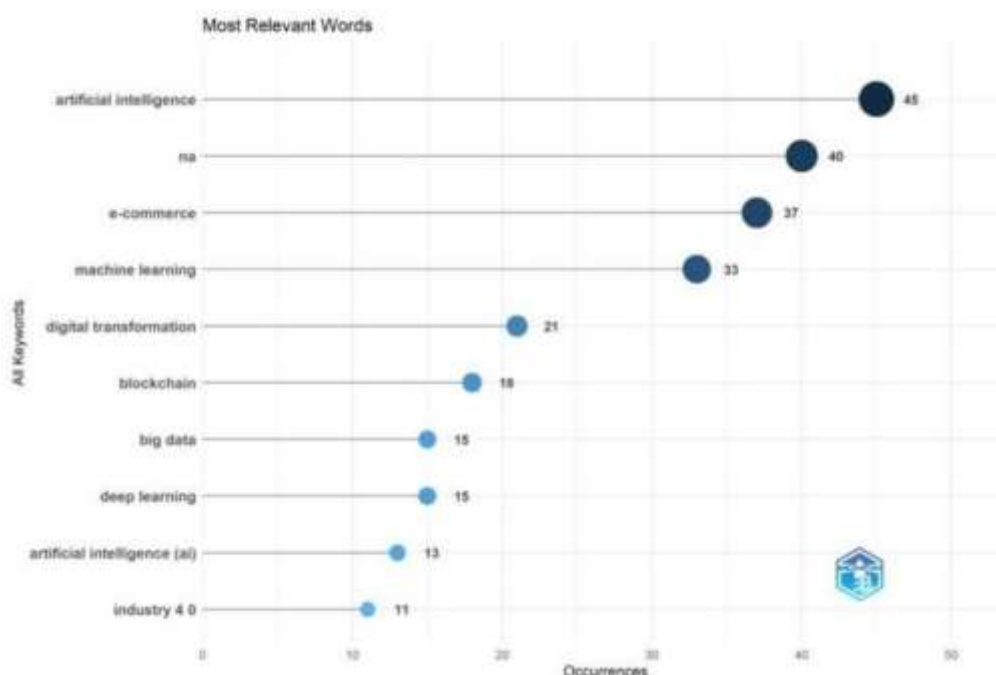


Figure 3. Most relevant words (extracted from Biblioshiny – author's work).

Figure 3 shows the ten most commonly occurring author keywords. "Artificial intelligence" is the most frequently used term (45 times), with "e-commerce" (37) and "machine learning" (33) coming next. In addition to the core AI-related terms, "digital transformation" (21), "blockchain" (18), "big data" and "deep learning" (15 each), the disambiguated term "artificial intelligence (AI)" (13) and "industry 4.0" (11) complete the top ten. Collectively, these suggest that the corpus is centered on AI/ML technologies used in e-commerce and wider digital transformation initiatives, while blockchain and Industry 4.0 serve as related but less central topics.

Thematic Mapping

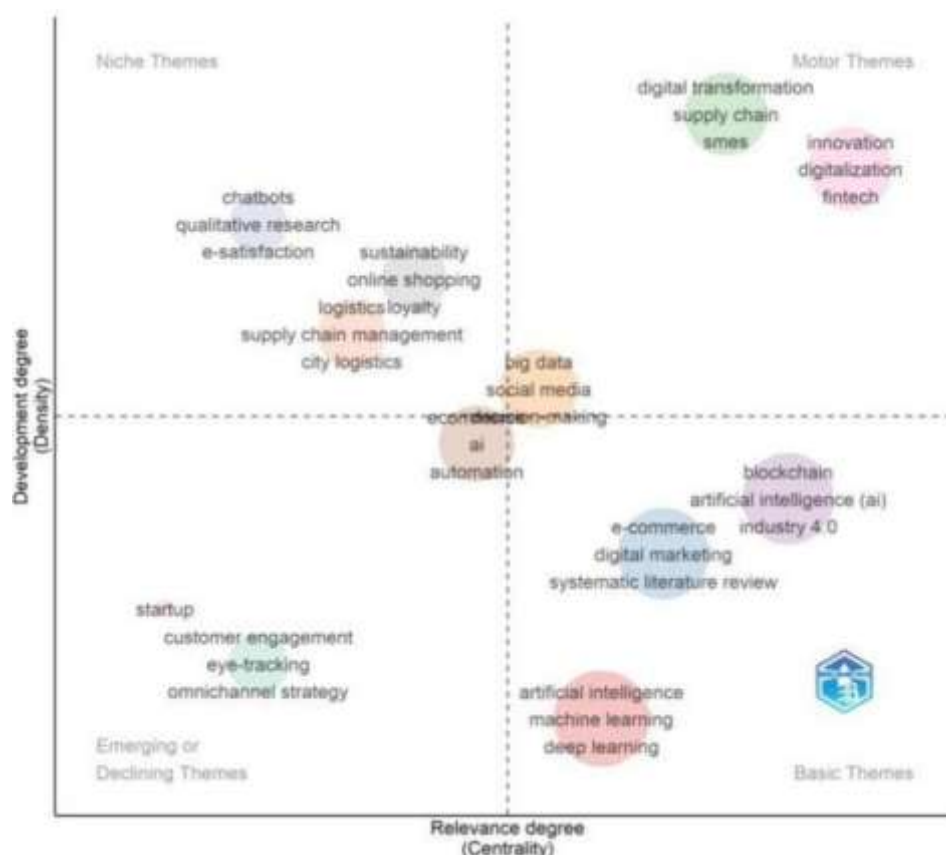


Figure 4. Thematic map of the keywords (extracted from Biblioshiny – author's work).

Figure 4 presents the thematic map of the keyword network, positioned along centrality (relevance) and density (development) axes, consistent with the Walktrap-clustering approach commonly used in bibliometric mapping (Cobo, Jürgens, Herrero-Solana, Martínez, & Herrera-Viedma, 2018).

The motor themes quadrant (upper right; high centrality, high density) contains two well-developed clusters: one centred on digital transformation, supply chain, and SMEs, and a second on innovation, digitalization, and fintech. These are well-established, internally cohesive themes that are also strongly connected to the rest of the field, indicating they function as core, mature drivers of the literature.

The niche themes quadrant (upper left; low centrality, high density) includes a cluster of chatbots, qualitative research, and e-satisfaction, alongside a broader cluster spanning sustainability, online shopping, loyalty, logistics, supply chain management, and city logistics. These themes are internally well developed but only loosely connected to the field's central themes, suggesting specialised sub-streams of research that have matured somewhat in isolation.

The basic themes quadrant (lower right; high centrality, low density) is the most populated and includes three sub-clusters: blockchain, artificial intelligence (AI), and industry 4.0; e-commerce, digital marketing, and systematic literature review; and, most prominently given its larger bubble size, artificial intelligence, machine learning, and deep learning. Their position indicates these are foundational, cross-cutting topics central to the field but not yet tightly consolidated into a single well-bounded research stream, consistent with a still-diversifying, fast-growing area of inquiry.



Finally, the emerging or declining themes quadrant (lower left) contains a small cluster of startup, customer engagement, eye-tracking, and omnichannel strategy, indicating either nascent research directions that have not yet gained traction or previously active themes now receiving less attention. Terms sitting near the origin — including big data, social media, decision-making, e-commerce, AI, and automation — straddle the quadrant boundaries, reflecting their transitional or connective role linking the basic AI/ML themes to the more specialised niche and motor clusters.

5. FUTURE RESEARCH AGENDA

Based on the bibliometric analysis, the research on Artificial Intelligence in e-commerce has experienced significant growth, with more than 100 publications per year by 2025, spanning technology, management, consumer, and operations research. While artificial intelligence, machine learning, and deep learning remain key topics, there is growing emphasis on supply chain, digital manufacturing, and the Internet of Things. More mature areas include digital transformation, SMEs, innovation, and fintech. These results indicate a number of directions for further research.

1. Generative AI and LLMs

The use of generative AI, large language models, and AI agents is not yet well established in the keyword analysis, despite growing evidence that they are reshaping product search, decision-making, and shopping engagement (Mogaji & Jain, 2024). Further research is needed on AI shopping assistants, conversational commerce, AI-generated content, multimodal search, and consumers' acceptability of delegating buying power to autonomous agents.

2. Personalization, Privacy, and Trust

The more personalization grows, the greater the data collection, and the more significant the trust and privacy concerns become. Mamdouh (2024) discovered that trust and perceived usefulness significantly influenced young consumers' use of AI-powered retail platforms in Egypt. Future research should test an integrated model of personalization → privacy concerns → trust → purchase intention → loyalty, especially as personalization becomes more intrusive.

3. Responsible AI, Ethics, and Autonomy

Significant gaps remain in algorithmic bias, manipulation, and accountability. Research should explore the potential of AI recommendation systems to foster impulsive purchasing, including algorithmic bias, and examine how AI-driven targeting algorithms produce uneven effects on particular socioeconomic groups.

4. Enabling Inclusive and Accessible E-Commerce

There are areas of accessibility that remain underexplored beyond the visually impaired consumers and voice assistants studied by Chaudhary and Jain (n.d.). Future research should investigate AI accessibility tools (voice shopping, computer vision, automatic translation) and whether they generate measurable improvements in shopping independence and purchase completion among consumers with diverse abilities and disabilities.

5. Geographical and Cultural Diversity

Most research has been carried out in an Asian context. The works of Mamdouh (2024) and Aljarboa (2024), on consumer trust in Egypt and SME adoption in Saudi Arabia respectively, demonstrate the significance of non-Asian samples. Comparative cross-country and cross-cultural designs are needed to assess the factors influencing AI adoption in different markets, such as infrastructure, digital literacy, regulation, and trust.



6. SME and Resource-Constrained Adoption

While SMEs are motor themes, most of the literature focuses on AI capability rather than constraints. Aljarboa (2024) found a strong relationship between AI adoption and performance among Saudi e-commerce SMEs, mediated by entrepreneurial orientation and dynamic capabilities. Future studies should explore adoption costs, technical competency gaps, AI-as-a-service approaches, and SME survival and competitiveness over time.

7. Intelligent Supply Chains

While AI capabilities have been shown in some segments of the supply chain, studies need to be expanded and integrated to realise intelligent supply chains that range from inventory optimisation to warehouse automation, reverse logistics, and carbon-aware fulfilment, while accounting for the computing costs of AI applications.

8. AI and Fraud: Detection versus Enablement

AI is simultaneously detecting fraud and facilitating it, creating an arms race between fraud detection and fraud enablement through adversarial machine learning. The possibility of adversarial attacks on detection models, synthetic identities, AI-generated fake reviews, and deepfake scams should be investigated (Reddy et al., 2024; Luo, 2026).

9. From Chatbots to Autonomous Agents

Research on chatbots has focused on service, trust, and satisfaction. Future research ought to focus on autonomous agents that search, compare, negotiate, and buy on consumers' behalf, as well as related issues of delegation, liability when AI makes a mistake, and platform loyalty (Roumeliotis et al., 2024).

10. Terminology Standardization

The presence of overlapping keywords (e.g., "artificial intelligence" and "artificial intelligence (AI)") indicates that future bibliometric analyses would benefit from the use of a controlled thesaurus for normalizing keywords and from clearer conceptual differentiation between AI, machine learning, deep learning, generative AI, and autonomous agents.

Overall Direction

Future research should address the question 'How, for whom, and under what circumstances does AI enhance e-commerce results?', and should be conducted through interdisciplinary, longitudinal, experimental, and cross-cultural research with an integrated focus on technology and consumer psychology, ethics and accessibility, sustainability, and regulation.

6. CONCLUSION

This study set out to trace the development of the research on AI in e-commerce, to identify the most influential journals, keywords, and topics, and to examine the current applications of AI in logistics, customer experience, and fraud detection, while also identifying gaps in the existing literature. The first objective was met by analysing annual scientific production from the dataset of 483 papers gathered from ScienceDirect. The results show that research in this area remained limited and sporadic until approximately 2017. Thereafter, a noticeable increase in publication activity occurred, rising from a few publications per year to a peak of 53 articles in 2021. Following a slight decrease to 41 articles in 2022, the series again accelerated, reaching about 92 articles in 2024 and exceeding 100 publications per year by 2025. This trend correlates with the post-2020 development of research in the fields of digitalisation and AI in general, confirming that this is among the fastest-developing topics in digital business research.



The second objective — identification of the most influential journals, keywords, and topics — was achieved through source and keyword analysis. The most influential source was *Procedia Computer Science* (31 articles), followed by the *Journal of Business Research* (13 articles) and a group of journals publishing 10 to 11 articles each, including the *Journal of Retailing*, *Technological Forecasting and Social Change*, and the *Journal of Retailing and Consumer Services*. The co-presence of computer science and business-related journals confirms the genuinely interdisciplinary nature of the topic. The keyword analysis revealed artificial intelligence, e-commerce, and machine learning as the most frequently mentioned keywords, alongside digital transformation, blockchain, big data, and deep learning. The thematic mapping identified digital transformation, supply chain, and SMEs, as well as innovation and fintech, as well-established motor themes, while chatbots and accessibility remain niche areas and customer engagement and omnichannel strategy are among the emerging or declining themes.

The third objective was addressed through the literature review, which demonstrates that AI is already being used to solve logistics problems through big data; to influence consumer behaviour and market trends; to enhance customer experience through recommendation engines, chatbots, and prediction models; to assist visually impaired users through voice assistants; to improve supply chain management while raising data governance concerns; to enable inventory management, personalized shopping, and pricing decisions; and to support SME adoption. Further studies examine machine learning for fraud detection. Collectively, these studies confirm that AI is already impacting almost every stage of the e-commerce value chain. However, the third objective is addressed only at a broad level with respect to geography and consumer diversity, as bibliometric analysis is better suited to identifying broad patterns than to examining these aspects in depth.

This study has implications across academic, managerial, social, and policy domains. Academically, it provides a comprehensive overview of a relatively young and rapidly changing area that other scholars can use to orient themselves without analysing hundreds of papers individually. Specific gaps are identified — including insufficient geographic coverage and the dual role of AI in enabling and detecting fraud — that future research can build upon. Managerially, the study helps e-commerce businesses understand what value can be derived from AI (personalization, logistics, fraud detection) and in which directions to invest, including generative AI tools. The finding that AI can also be used to commit fraud indicates that businesses should build proper safeguards when implementing AI-driven systems.

In social terms, the study demonstrates how AI is influencing e-shopping practices by increasing access for people with visual impairments through voice assistants, while also revealing the privacy problem that arises with increased personalization. The results are also connected with sustainable development through AI-based supply chains and demand forecasting. On the policy side, authorities may need to focus on AI-enabled fraud detection and prevention, and develop more robust data governance standards, given that most existing research has been conducted in a limited number of regions that do not reflect regional differences in AI adoption.

The main limitation of this study is that only one database — ScienceDirect — was used, meaning that papers indexed only in Scopus or Web of Science may have been missed. Language exclusion (only English-language papers were retained) likely reinforced the same geographic concentration identified as a research gap. Additionally, the bibliometric approach is better suited to revealing broad tendencies than examining the specifics of individual studies. For future researchers, combining multiple databases, involving several reviewers in the screening and coding process, and pairing broad bibliometric mapping with a more focused in-depth review of key papers would allow a more thorough and well-rounded study of this field.

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