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Research paper

Consumer Awareness Level of Artificial Intelligence through E-Retailing: 2003-2023 Bibliometric Review

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Abstract

This study analyses the awareness level of artificial intelligence (AI) among consumers in e-retail, focusing on 1186 peer-reviewed articles published between 2003 and 2023, Sourced from leading academic databases such as Scopus. The results show the frequent keywords used by authors, were artificial intelligence, consumer awareness level, machine learning, deep learning and e-retail, China and united stated of America are the countries in this field. The research highlights the importance of AI technologies like machine learning, deep learning, and e-retail in improving shopping experiences, product recommendations, and sales assistance. The study identifies four main themes: chatbots, customers, and predictive analytics. However, there are still gaps in determining consumer awareness of AI in e-retail, which could lead to more responsible AI adoption and future research. The research aims to fill these gaps and contribute to the burgeoning field of AI in e-retail.

Keywords: *Artificial Intelligence, Consumer Awareness Level, E-retailing, Bibliometric Analysis*

1. Introduction

The majority of India's service industry has embraced artificial intelligence engagement. The bibliometric analysis will offer a thorough, methodical mapping of this field's research endeavours. In contrast to a standard BI system, artificial intelligence (AI) technology in e-retailing uses machine learning, natural language processing, and sentiment analysis to enhance the customer experience by making product recommendations and providing pertinent information (Chen et al., 2020). Conversion rates have drastically increased, increasing by 25% and 35%, as a result of the use of integrated artificial intelligence solutions in service personalisation (Smith & Anderson, 2019). Data from the premier academic database, SCOPUS, covering publications from 2000 to 2023, was gathered for this bibliometric analysis. Over 783 study papers from peer-reviewed journals, periodicals, and brief surveys make up the database, which shows that the number of these studies has increased over the past ten years. Important authors, articles, and trends in the literature were identified through the use of thematic mapping and co-citation analysis. Consumer awareness of artificial intelligence in e-retailing is one of the most studied issues in problem level analysis. Furthermore, a significant number of authors, including Wang Y and Zang Y, are regularly mentioned. In addition to providing the most recent information on the state of the art in AI for raising consumer awareness in e-retailing, this comprehensive bibliometric analysis identifies research gaps and potential avenues for further study for academics and industry professionals. bibliometric analysis employing the most popular databases, such as Scopus, from 2003 to 2023. In order to conduct this inquiry, we can observe below: The investigation's leading questions were determined to be as follows.

1. Q1. What is the theoretical evolution of literature and the level of consumer awareness regarding artificial intelligence in e-retailing?
2. Q2. What are the key themes and transformations that have occurred in this field?
3. Q3. Who are the most influential authors, sources, and countries contributing to this area of research?

2. Background of Study

A growing body of work examines how consumers perceive AI-enabled services and how awareness shapes behavior. Studies show that consumer awareness is uneven, while some users recognize algorithmic personalization and value convenience, many lack understanding of how data is collected and used (Chen et al., 2022; Silva et al., 2020). Awareness influences trust and perceived risk, which in turn affect purchase intentions (Wang et al., 2018). Research also highlights demographic and contextual moderators: younger and more tech-savvy consumers tend to be more receptive to AI features, whereas privacy-sensitive users express greater hesitancy (Xu & Zhang, 2021). Artificial intelligence plays a vital role in e-retailing. Artificial intelligence applications used in e-retailing are personalization,

recommendations, and automation. The data were analyzed between 2007 and 2023; the literature documents rapid growth in AI applications for e-commerce. Core technical areas include recommender systems (collaborative filtering, content-based, and hybrid methods) that drive personalization and conversion (Jannach & Adomavicius, 2020), natural language processing techniques powering chatbots and virtual assistants (Cui et al., 2017), and predictive analytics for inventory, pricing, and fraud detection (Choi et al., 2019; Ngai et al., 2011). Empirical studies report that well-designed recommendation and personalization systems can increase click-through and conversion rates, and improve user satisfaction by reducing search costs (Zhao et al., 2021; Patel & Singhal, 2020). Qualitative and case-study research complements these findings by showing how firms operationalize AI to deliver seamless customer journeys (Lee et al., 2020). Ethical concerns feature prominently in interdisciplinary research. Key topics include algorithmic bias, opacity of decision-making, data protection, and informed consent. Studies indicate that incidents of perceived unfairness or data misuse can substantially erode consumer trust and decrease engagement with AI-driven services (Floridi et al., 2018; Ngai et al., 2011). Legal and regulatory responses—such as data protection regimes and proposed AI governance frameworks—are beginning to shape firm practices, but the literature notes significant variation across jurisdictions and limited empirical work on how regulation affects consumer awareness and behavior. Research on technology adoption and consumer response to new IT systems is rooted in classic models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). TAM posits that perceived usefulness and perceived ease of use shape attitudes and behavioral intention toward technology adoption (Davis, 1989). UTAUT extends these constructs by adding social influence, facilitating conditions, and moderating factors such as age and experience (Venkatesh et al., 2003). These theoretical frameworks remain widely used to explain consumer willingness to engage with AI-driven retail tools (e.g., chatbots, recommendation engines), and they provide a natural lens for studying awareness and acceptance of AI in e-retailing.

Alongside adoption theory, recent scholarship has emphasized the ethical and societal challenges of AI. Floridi and colleagues (Floridi et al., 2018) and Mittelstadt (2016) frame AI not only as a technical innovation but also as a socio-technical system that raises concerns about fairness, transparency, accountability, and data protection. This ethical literature highlights that consumer acceptance depends not only on perceived benefits but also on the extent to which AI systems are trustworthy, explainable, and privacy-preserving.

This study addresses these gaps by systematically mapping the literature on consumer awareness of AI in e-retailing using bibliometric methods, explicitly coding and analyzing the prevalence and co-occurrence of ethics-related themes (privacy, fairness, explainability) within the bibliometric networks, and interpreting findings through the lenses of TAM/UTAUT to clarify how scholarly attention to consumer awareness has shifted over time. By doing so, the paper aims to bridge technical, behavioral, and provide targeted directions for research and regulation.

3. Materials and Methods

The first thing to note while examining the collected literature is the variety of methodological approaches that are offered. In contrast to the more qualitative methods of ethnography and theory-building using huge data and statistical mechanisms, there are quantitative techniques. Most of these studies evaluate AI algorithms, look at consumer behavior patterns, and assess how well AI-based personalization influences purchasing decisions (Zhao et al., 2021). Additionally, case studies and interviews—two types of qualitative research—offer comprehensive details on how customers interpret and utilize AI technologies in e-commerce. The application of methods like A/B testing, which are infrequently employed in other domains, has been thoroughly documented in the literature. The research examined how different AI solutions, such as recommendation systems or changeable pricing/promotion plans, affected consumers' purchasing decisions (Kumar et al., 2019). This study's experimental research setup aids in drawing conclusions about the causal relationship between consumers' awareness levels and practitioners' use of AI.

The purpose of this paper's bibliometric analysis methodological approach is to make it possible to identify, extract, analyze, and interpret the information obtained from scholarly publications related to the impact of consumer awareness of AI in e-retailing. This section describes the particular information collection techniques, analysis strategies, and tools used to improve the accuracy and quality of the evaluation.

Data collection: Scopus, one of the top academic databases, provided the main data for this bibliometric analysis. The coverage of peer-reviewed journals and excellent research publications in the author's field made these databases useful (Harzing & Alakangas, 2016). The following actions were taken as part of the data collection process:

1. Formulation of the search query: Every pertinent piece of information was included in the search query. Using the following terms, the search method narrowed down the results by combining Boolean operators with keywords found in titles and/or abstracts: Consciousness, machine learning, deep learning, e-commerce, e-retailing, and consumer awareness level.
2. Inclusion and Exclusion Criteria: To incorporate the most recent advancements in the subject, the search was limited to articles released within the last 20 years (2003–2023). The papers were published only in English and included short surveys, peer-reviewed journal articles, and reviews. Newspapers, magazines, theses, dissertations, and other types of non-research publications, editorials, and grey literature were not taken into consideration.
3. Data extraction: An initial 6,430 articles were retrieved from Scopus, of which 1,186 met the inclusion criteria. Aria and Cuccurullo (2017) used bibliometric software tools like Bibliometrix in the R environment to collect bibliographic data from the identified papers, including titles, authors, abstracts, year of publication, and number of citations.

3.1 Analytical Techniques

The bibliometric methods listed below were used to examine the information gathered:

1. Citation Analysis: To determine how frequently the articles, authors, and journals were cited in the field, marketing publications from the previous year were retrieved for analysis using citation analysis. To ascertain the significance and extent to which the article in question was utilized by other writers in their works, citation counts were utilized (Garfield, 2006). To ascertain each author's influence on the specialty, the H-index of each significant Author was calculated.

2. Co-citation Analysis: The intellectual framework of the field of study was investigated using co-citation analysis. In the process of studying related articles and identifying the primary themes within theme generation or extraction, this technique allows one to determine how frequently two articles are cited together, providing a highly effective way to understand the organizational relationship between two articles (Small, 1973).

3. Keyword Analysis: To find important topics and trends in the literature, a hybrid analysis of keywords was conducted. According to Zhang et al. (2016), this effort involved creating a relationship between keywords based on the words' typical recurrence in the same articles as well as unique, newly developing research phrases and subjects.

The study utilizes a substantial dataset comprising 1,186 articles and employs multiple bibliometric techniques, including citation analysis, co-citation analysis, keyword analysis, and network analysis, to provide a comprehensive and systematic overview of artificial intelligence in e-retailing. These methods collectively enable a deeper understanding of publication trends, influential authors and institutions, thematic structures, and evolving research directions within the domain.

3.2 Tools and Software

Several software programs and bibliometric tools were used to carry out the analysis and display the findings: To do the analysis and display the findings, several bibliometric instruments and software programs were used:
1. Bibliometrix (R Package): Data extraction, pre-processing, and analysis were conducted using Bibliometrix, a R tool for bibliometric scientific mapping. This provides tools for keyword analysis, co-citation, and citation (Aria & Cuccurullo, 2017).
2. Microsoft Excel: Excel was utilized for preliminary analysis, data sorting, and data cleansing. This helped in the creation of statistical metrics and the management of large data sets.

3.3 Data Analysis Procedure

To guarantee the precision and dependability of the results, the data analysis was conducted according to a methodical process: To guarantee the precision and dependability of the results, the data analysis was conducted according to a methodical process:
1. Data Cleaning: Records with duplicates, missing fields, and superfluous items could be filtered by cleaning the extracted data. This stage gave the data set a high delivery, which improved the outcomes of the next analyses.
2. Descriptive Analysis: To comprehend the data gathered, descriptive analysis was carried out to determine the dataset's fundamental statistics. It involved figuring out the most productive writers and organizations, the distribution of papers across different publications, and the category annual publication rate.
3. Network Construction: Visualization of relationships among authors, institutions, and countries to detect collaborative trends.
4. Interpretation: Examination of bibliometric indicators to identify patterns in research evolution, intellectual linkages, and thematic shifts.

3.4 Scopus Database

Word searched: 'Artificial Intelligence' 630,002 documents were obtained.

- Year 2003- 2023, which resulted in 1,219 documents
- After the inclusion of open access, it resulted in documents
- Type of 1186 document
- Keywords: Consumer awareness, perception, artificial intelligence, machine learning, deep learning, E-retailing, and e-commerce
- Source type and language: Journals and English, which resulted in articles before the extraction of duplicates.

3.5 General Description

Table 1 provides a thorough review of all 1186 papers from 2003, of which 1101 are articles and three are brief surveys. 21.76% is the yearly growth rate. The bibliography has 54178 references, 4714 keywords, and 3307 author keywords, with an average of 29.49 citations per document. There are 127 single-author documents and 126 single-author publications. The (a) word cloud and (b) tree map are displayed in Figure 2. The researchers have concentrated on topics including artificial intelligence, consumer awareness level, e-commerce, machine learning, deep learning, and e-retailing in the theme of consumer awareness of artificial intelligence in retail.

Table 1: Main Information About Data

Description		Results
MAIN INFORMATION ABOUT DATA		
Timespan		2000:2023
Sources (Journals, Books, etc)		574
Documents		1186
Annual Growth Rate %		21.76
Document Average Age		5.35
Average citations per doc		29.49
References		54178
DOCUMENT CONTENTS		
Keywords Plus (ID)	4714	
Author's Keywords (DE)	3307	
AUTHORS		
Authors	3234	
Authors of single-authored docs	126	
AUTHORS COLLABORATION		
Single-authored docs	127	
Co-Authors per Doc	3.22	
International co-authorships %	24.73	
DOCUMENT TYPES		
article	1101	
review	81	
short survey	3	

Source: Author's elaboration

3.6 Publication by Years, Countries, Sources, and Authors

When we analyze the data in depth, among the 1186 articles examined in this study, comparatively fewer articles were published about artificial intelligence in e-retailing between 2000 and 2003. It appears that the number of publications on this audit-related topic increased dramatically between 2004 and 2016; however, the number of articles declined in 2006 and 2008. The year with the most articles on artificial intelligence in e-commerce is 2020. Publications were sluggish before 2011, but they have significantly increased since 2012. in Figure 4 (overtime for annual production). The top ten nations and the geographic distribution of research contributions on artificial intelligence in e-commerce are displayed in Figure 3. With 5673 publications, China leads the field, followed by the United States (4072), Bangladesh (2352), India (3130), and the United Kingdom (2064). The majority of the sources for published publications about artificial intelligence are displayed in Table 2. The IEEE ACCESS magazine has 31 papers about artificial intelligence, followed by sustainability (Switzerland) with 23, and research application and electronic commerce (20).

Fig. 1: Word cloud (A) and tree map (B). Source: Authors' elaboration using bibliometric R-studio

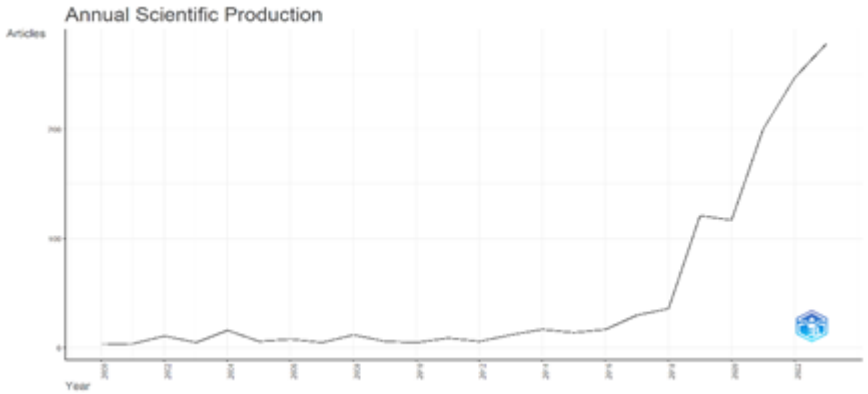

Fig. 2: Annual Scientific Production

Source: Authors' elaboration using bibliometric R-studio

Illustrates the geographic distribution of scholarly contributions on artificial intelligence (AI) in e-retailing. The data indicate that China and the United States dominate the field, with China contributing 5,673 publications and the United States 4,072. This concentration reflects these countries' strong research ecosystems, government investment in AI, and the presence of leading technology companies. Emerging economies such as India (3,130), Bangladesh (2,352), and the United Kingdom (2,064) also show substantial contributions, suggesting growing scholarly interest in AI's applications for digital commerce in both developed and developing markets.

3.7 Co-occurrence networks

Figure 5 illustrates the most common AI keywords using R-studios. Conditional neural networks and large data are related to artificial intelligence. Natural language processing, chatbots, recommendation systems, deep learning, big data, sentiment analysis, text mining, and machine learning are all subsets of artificial intelligence. Decision trees, support vector machines, neural networks, and logistic regression. Fraud is associated with artificial neural networks and ensemble learning, whereas e-commerce is connected to the Internet of Things. Li Y has a collaborative network with Wang Y, Zang Y, Zang J, and Li J, as depicted in Figure 6 authors' cooperation networks. The networks of cooperation between institutions (A) and between nations (B) are depicted in Figures 7, 8. The Tsinghua University has partnered with the University of Queensland, Peking University, and the City University of Hong Kong in a collaboration between institutions (a). Beijing Jaotong University and Beijing University work together. A connection exists between King Abdulaziz University and the National Institute of Technology in Patna. Regarding international cooperation as depicted in (b) and (c), China, Korea, Indonesia, Italy, the Netherlands, Belgium, Spain, Mexico, Romania, Israel, Thailand, and Poland are the clusters that most shine out. connects South Africa to Bangladesh.

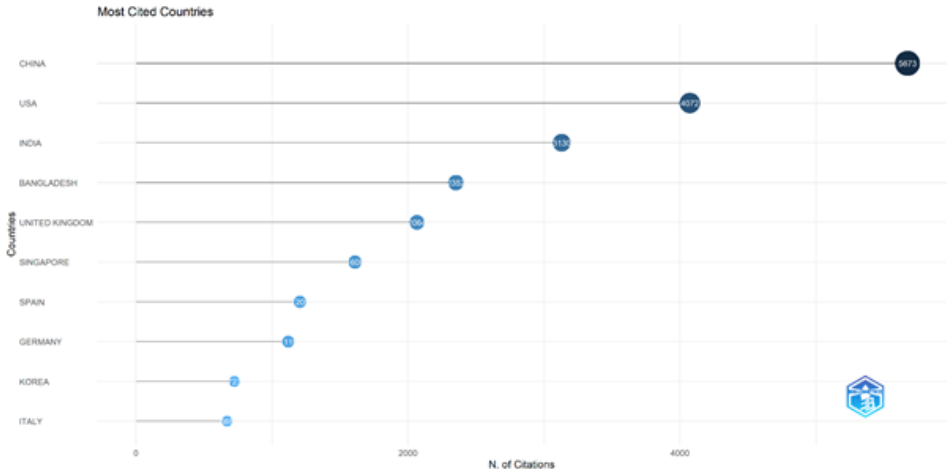

Fig. 3: Most Cited countries

Source: Author's elaboration using bibliometric R-studio

This indicates that the chart displays countries whose research publications have received the highest number of citations. China has the highest citation count (5073), making it the most influential country in this research area. The USA follows with 4127 citations, showing a strong research presence. India ranks third with 1816 citations, indicating a growing academic contribution. Bangladesh and the United Kingdom with moderate citation counts. Singapore, Spain, Germany, Korea, and Italy with fewer citations comparatively. The overall trend shows that Asian countries (China, India, Bangladesh, and Korea) are highly active in this research field.

Table. 2: Most important sources

Sources	Articles
IEEE ACCESS	31
SUSTAINABILITY (SWITZERLAND)	23
ELECTRONIC COMMERCE RESEARCH AND APPLICATIONS	20
INTERNATIONAL JOURNAL OF ADVANCED COMPUTER SCIENCE AND APPLICATIONS	19
LECTURE NOTES IN COMPUTER SCIENCE (INCLUDING SUBSERIES LECTURE NOTES IN ARTIFICIAL INTELLIGENCE AND LECTURE NOTES IN BIOINFORMATICS)	19
EXPERT SYSTEMS WITH APPLICATIONS	17
DECISION SUPPORT SYSTEMS	14
JOURNAL OF THEORETICAL AND APPLIED INFORMATION TECHNOLOGY	14
APPLIED SCIENCES (SWITZERLAND)	12
INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND EXPLORING ENGINEERING	12

Source: Author's elaboration using bibliometric R-studio

Table 2 presents a list of the top publication sources contributing research articles within the analyzed domain. It highlights the most productive journals and conference proceedings based on the number of published articles. According to the data, IEEE Access leads with 31 articles, indicating it is the most prominent and preferred platform for publishing research in this area. It is followed by Sustainability (Switzerland) with 23 articles, reflecting growing interest in the intersection of sustainability and technology. Electronic Commerce Research and Applications ranks third with 20 articles, emphasizing the relevance of AI and digital technologies in e-commerce studies. Other notable sources, including the International Journal of Advanced Computer Science and Applications and Lecture Notes in Computer Science, each contributed 19 articles, showing their consistent engagement with emerging AI and computer science research. Journals such as Expert Systems with Applications (17 articles) and Decision Support Systems (14 articles) also feature prominently, underscoring the importance of applied and decision-based AI systems.

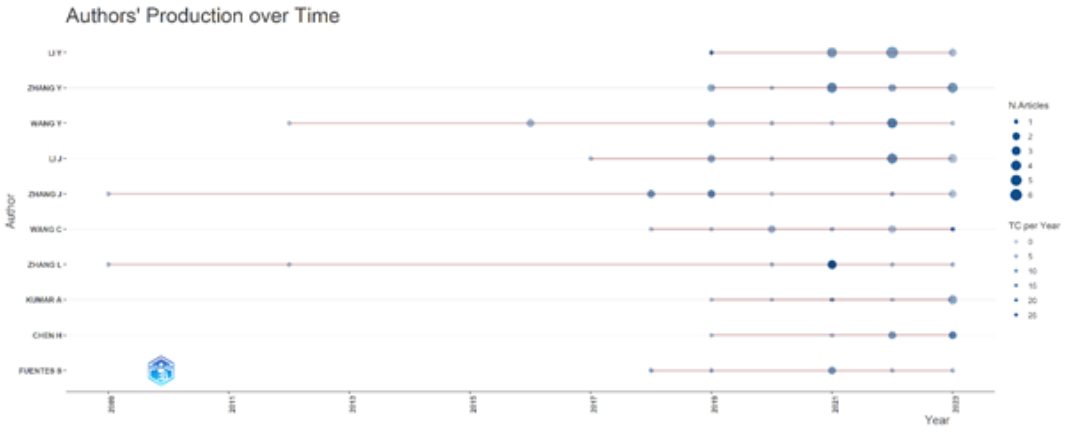

Fig. 4: Author's Production over Time

Source: Author's elaboration using R-studio

Figure 4 presents a decade-long overview of publication activity and scholarly impact among selected authors from 2008 to 2018. Each dot represents one or more articles published by an author in a given year, with the size of the dot indicating the number of articles and the color intensity reflecting the total citations per year. Larger dots suggest higher productivity, while darker shades denote greater citation impact. For instance, authors like LIU Y and ZHANG Y show consistent output across multiple years, often with sizable and darker dots, indicating both volume and influence. In contrast, authors such as FEWTRELL S may have fewer publications but with notable citation strength, suggesting impactful contributions.

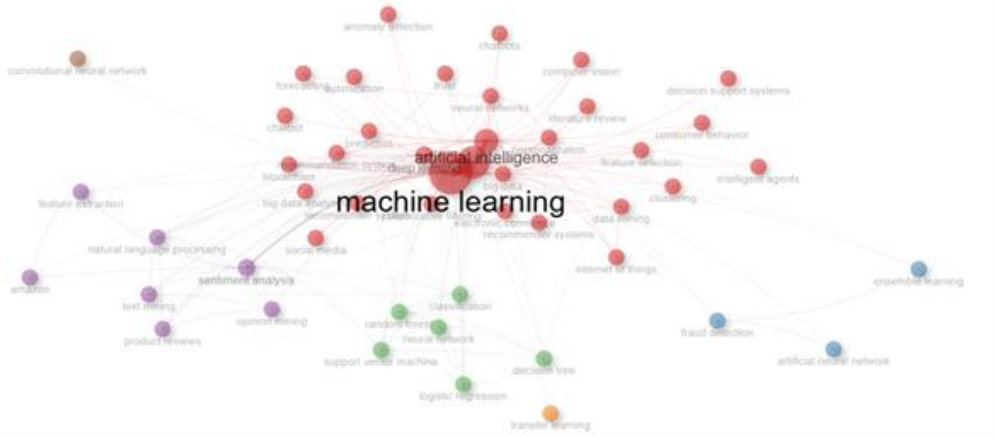

Fig. 5: Co-occurrences Keywords

Source: Authors' elaboration using Bibliometrix R Studio

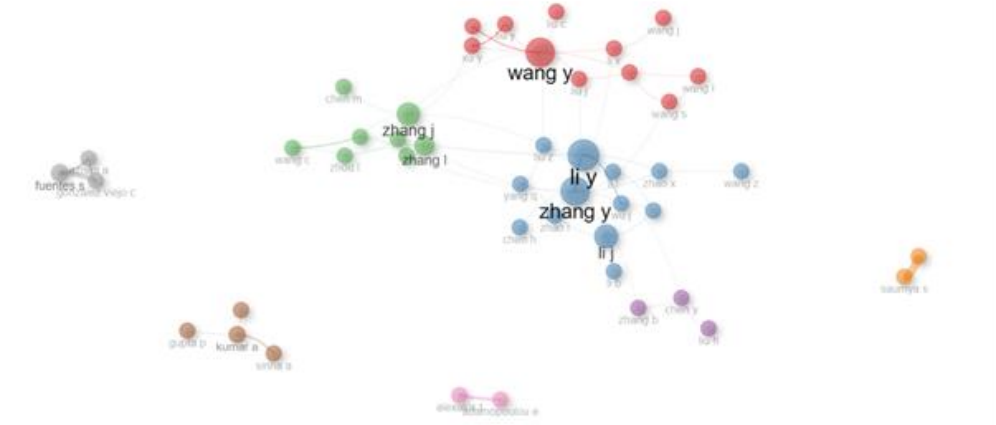

Fig. 6: Authors' network

Source: elaboration using bibliometric R-studio

The image shows several clusters of interconnected researchers, where each circle (node) represents an the most prominent collaboration groups are the large central cluster (mostly blue and light red/pink), which features highly connected authors like "li y," "zhang y," and "wang y," and the green cluster to its left, centered around "zhang l." Other, smaller, and more isolated clusters (like the grey, brown, and orange groups) represent less-connected research groups. Overall, the diagram visualizes the structure and key players in a research field, highlighting dominant groups and collaborative ties. The author, and the lines (edges) between them indicate a relationship, likely a co-authorship.

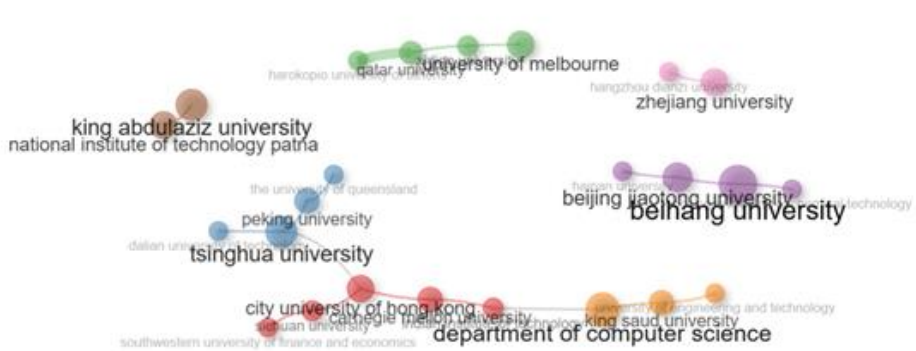

Fig. 7: Network by Institution

Source: Authors' elaboration using bibliometric R-studio

The visualization highlights several key collaborative communities: a major green cluster featuring the University of Melbourne and Qatar University; a central blue/red cluster dominated by Chinese institutions such as Tsinghua University, Peking University, and City University of Hong Kong; a separate, tightly-knit purple cluster including Beijing Jiaotong University and Beihang University; and smaller, more isolated groups like the brown cluster (e.g., King Abdulaziz University) and the pink cluster (Zhejiang University).

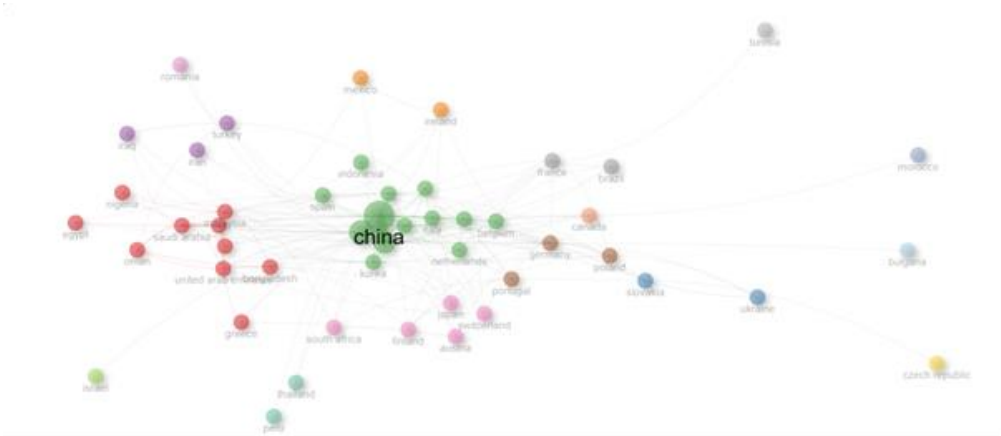

Fig. 8: Network by Countries

Source: Authors' elaboration using bibliometric R-studio

Figure 8 The network shows China as the dominant hub, collaborating extensively with countries across several clusters, including the large green cluster (e.g., Italy, Indonesia, Spain, Korea) and the red/pink cluster. There are other clusters, such as the purple cluster (Iran, Turkey, Iraq) and the more isolated groups (e.g., Canada, Brazil, France in grey), suggesting multiple regional or thematic collaboration communities. Overall, the visualization maps the structure of global research partnerships, highlighting China's central role and the diverse clusters of its international research partners.

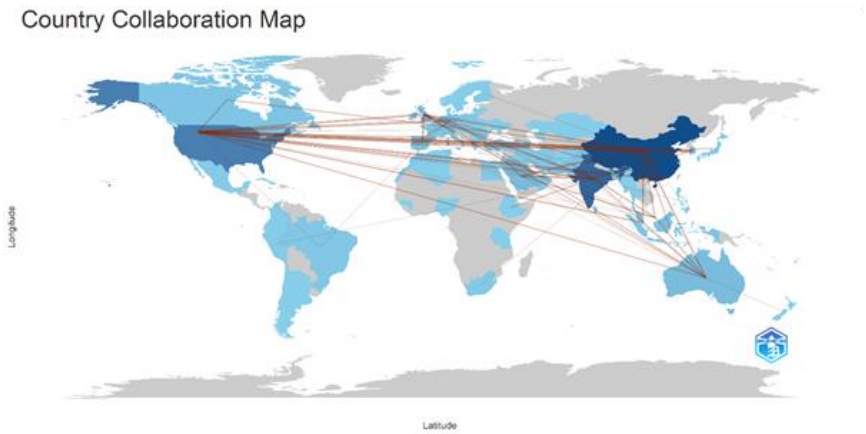

Fig. 9: Country's Collaboration Map

Source: Authors' elaboration using bibliometric R-studio

This image is a Country Collaboration Map that visualizes the global network of research partnerships, likely based on co-authored academic publications. The shades of blue on the map indicate the level of a country's involvement or productivity in the network, with darker shades highlighting the major players like the United States, China, and India. The brown lines crisscrossing the map represent the collaborative links or connections between these countries. The high density of lines clearly shows that a strong and centralized network of collaboration exists, heavily connecting major research hubs, particularly between North America (the US) and Asia (China and India), with Australia also featuring as a key partner.

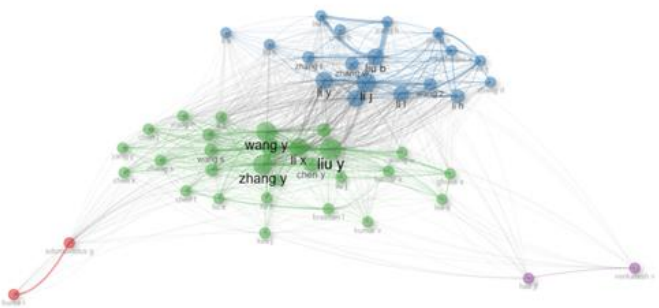

Fig. 10: Co-citation analysis

Source: Authors' elaboration using bibliometric R-studio

Figure 10 illustrates that network visualization that maps the relationships between various entities, most likely authors or research topics, within a specific academic field. The network is characterized by distinct clusters, visualized by color (primarily green and blue), where nodes (circles) represent the entities and lines (edges) indicate a strong connection, such as co-authorship or co-occurrence. The thickness of the lines denotes the strength of the connection. A key feature is the strong interconnectedness of the large green and blue clusters, with central nodes like li x and Liu Y acting as important bridges, suggesting these researchers or topics are highly influential and link together two major, active sub-areas of research within the broader community.

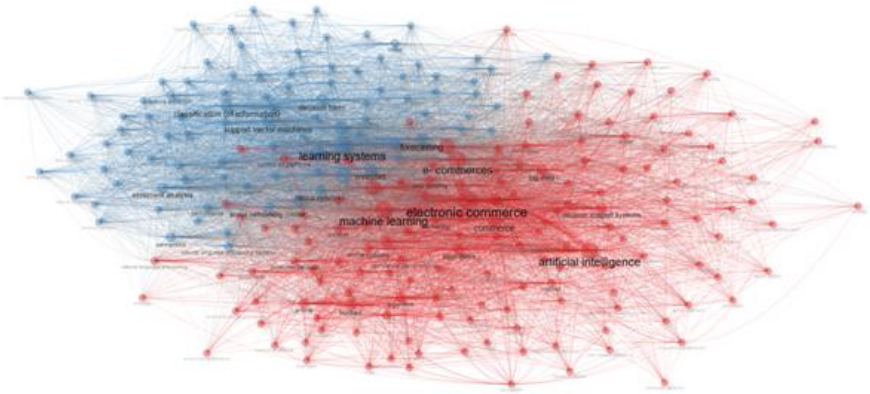

Fig. 11: Thematic Mapping

Source: Authors' elaboration using bibliometric R-studio

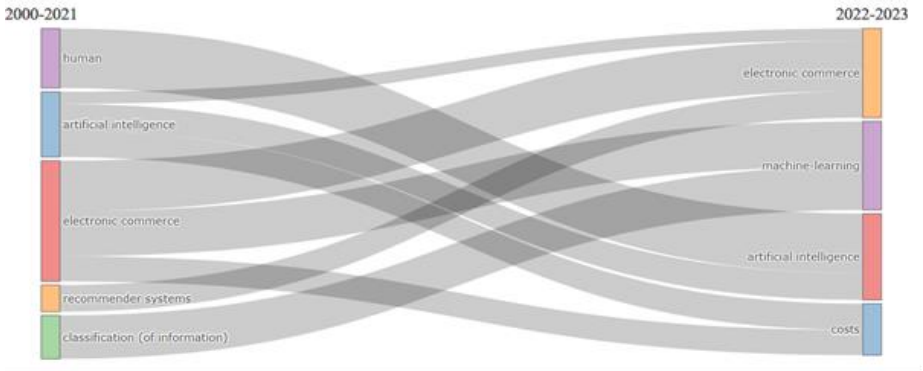

Fig. 12: Evolution of artificial intelligence in e-retailing between 2000-2023.
Source: Authors' elaboration using the bibliometric R-studio.

The figure illustrates the thematic evolution of research on artificial intelligence (AI) in e-retailing between two time periods: 2000–2021 and 2022–2023. It shows how earlier research themes have transitioned into newer areas of focus. During the 2000–2021 period, major themes included human interaction, artificial intelligence, electronic commerce, recommender systems, and classification of information. These topics reflected the early development of AI technologies aimed at improving product recommendation, data categorization, and automation within e-commerce. However, as research matured, the focus shifted during 2022–2023 toward more advanced and applied domains such as machine learning, electronic commerce, artificial intelligence, and cost optimization. This evolution suggests that AI research in e-retailing has moved from basic algorithmic and technical exploration to more consumer-oriented, data-driven, and efficiency-focused applications. The emergence of themes like machine learning and costs also highlights growing attention to using AI for predictive analytics, operational efficiency, and personalized shopping experiences. Overall, the diagram reflects a clear progression from foundational AI and recommendation models to sophisticated, performance-based, and commercial applications that directly enhance e-retail effectiveness and consumer engagement.

4. Results and Discussions

4.1 Results

The bibliometric analysis examined 1,186 peer-reviewed publications on artificial intelligence (AI) and consumer awareness in e-retailing from 2003 to 2023, sourced from 574 journals in the Scopus database. The dataset included 1,101 research articles, 81 reviews, and 3 short surveys, with 54,178 references and an annual growth rate of 21.76%, indicating a strong increase in scholarly attention to AI applications in online retail. Research activity expanded sharply after 2012, peaking in 2020 due to advances in machine learning, big data analytics, and the digital acceleration prompted by the COVID-19 pandemic. China and the United States were the leading contributors, with 5,673 and 4,072 publications, respectively, followed by India, Bangladesh, and the United Kingdom, reflecting Asia's emergence as a major hub of AI and e-commerce research. The most productive sources included IEEE Access, Sustainability (Switzerland), and Electronic Commerce Research and Applications, underscoring the multidisciplinary nature of the field. Keyword co-occurrence analysis revealed that terms such as artificial intelligence, e-commerce, machine learning, consumer behavior, and chatbots dominated the literature, clustering around four key themes: AI-driven personalization, sentiment and behavioral analysis, automation through chatbots, and ethical and privacy concerns. Co-authorship and institutional collaboration networks highlighted leading contributors such as Li Y., Zhang Y., Wang Y., and

Chen M., and institutions like Tsinghua University, Peking University, and the City University of Hong Kong, indicating dense collaborative activity centered in Asia with growing international partnerships involving the United States and Europe. Co-citation and thematic mapping identified core research foundations in AI personalization and predictive analytics, while emerging topics included algorithmic transparency, trust, and ethical AI adoption. The temporal evolution of themes showed that early research (2000–2015) focused mainly on algorithm development and recommendation systems, whereas recent studies (2020–2023) emphasize consumer trust, personalization, and responsible AI use. Overall, the results demonstrate that AI has become a transformative force in e-retailing, driving innovation, enhancing consumer awareness, and shaping global digital retail strategies through increasingly intelligent, ethical, and consumer-centric technologies.

4.2 Discussion

The findings of this bibliometric study reveal a significant increase in academic attention toward artificial intelligence (AI) and consumer awareness in e-retailing over the past two decades. The rise in publications from 2003 to 2023 reflects the growing integration of AI technologies—such as machine learning, deep learning, sentiment analysis, and chatbots—into the retail ecosystem. This growth is strongly associated with the global digital transformation and the expansion of e-commerce platforms.

China and the United States emerged as the most influential countries, accounting for the majority of publications and citations. This dominance reflects their robust technological infrastructure, government support for AI research, and collaboration between universities and private technology firms. Meanwhile, developing nations such as India and Bangladesh have shown rapid progress, indicating increasing interest and participation in AI-driven retail research in emerging markets.

Thematic mapping and co-citation analyses identified four primary clusters: AI in customer engagement, personalization and recommendation systems, sentiment analysis and predictive analytics, and chatbot-driven customer service. These themes collectively emphasize the transition from traditional e-commerce to intelligent, data-driven retail experiences. However, the study also uncovered notable research gaps particularly in areas related to consumer trust, data privacy, algorithmic transparency, and ethical AI use. Future research should therefore focus on developing frameworks that promote responsible and transparent AI deployment in retail contexts.

From a theoretical perspective, the results contribute to the evolving literature on technology adoption and consumer behavior by highlighting how AI technologies enhance awareness, trust, and engagement. Practically, the findings underscore that retailers who adopt AI-based personalization and predictive analytics can improve customer satisfaction and loyalty, provided they maintain ethical standards and transparency.

5. Conclusions

This bibliometric review provides a comprehensive overview of the evolution, structure, and trends of research on consumer awareness of AI in e-retailing from 2003 to 2023. By analyzing 1,186 publications using citation, co-citation, keyword, and network analyses, the study identified key contributors, influential journals, dominant themes, and emerging areas of inquiry.

The results demonstrate that AI has become a central driver of innovation in e-retailing, transforming consumer experiences through intelligent recommendation systems, real-time analytics, and personalized interactions. The strong scholarly output from Asian and Western countries highlights the global relevance of this field, yet the uneven research distribution suggests opportunities for cross-regional collaboration and knowledge exchange.

In conclusion, this study enriches the academic understanding of AI's role in shaping consumer awareness and behavior in digital retailing. It offers valuable insights for scholars, practitioners, and policymakers seeking to foster ethical and customer-centric AI adoption. Future research should emphasize interdisciplinary approaches that integrate marketing, information systems, and behavioral sciences to ensure that AI's benefits are realized responsibly and inclusively across global retail markets.

6. Further Scope

It outlines potential future research on data privacy, algorithm transparency, cross-regional consumer studies, and interdisciplinary collaboration in AI retail applications.

7. Practical Implications

The European Union's General Data Protection Regulation (GDPR) remains the most influential benchmark for consumer data protection. It establishes principles of consent, data minimization, and the right to explanation, which directly apply to AI-driven personalization and automated decision-making in e-retailing. Similarly, the OECD AI Principles (2019) emphasize human-centered values, transparency, robustness, and accountability in AI systems. These principles are widely endorsed and provide an international reference point for responsible AI governance. In the Indian context, the recently passed Digital Personal Data Protection Act (DPDP, 2023) introduces stronger obligations for data fiduciaries, stricter rules on consent, and new mechanisms for consumer grievance redressal. Given India's growing e-retail sector, this legislation will play a decisive role in shaping consumer trust in AI-mediated commerce.

From a policy perspective, this study's results suggest three key implications:

1. Strengthening AI ethics in retail ecosystems: Policymakers should promote the adoption of ethical AI guidelines that align with global standards (e.g., GDPR, OECD Principles) but adapt to local contexts. E-retailers must be encouraged—or mandated—to integrate fairness, accountability, and explainability into their AI models.
2. Enhancing algorithmic transparency: Current consumer awareness is limited regarding how recommendation systems, chatbots, and predictive analytics operate. Regulators should require disclosure of when and how AI systems influence consumer decisions, for example, through "explainability labels" or mandated transparency reports. This can reduce information asymmetry and empower consumers.
3. Protecting consumer rights and privacy: The growth of e-retailing magnifies the risks of data misuse. Laws such as India's DPDP Act and the GDPR should be complemented with sector-specific guidelines for AI in retail. These could include mandatory privacy audits, limits on behavioral profiling, and clear remedies for consumers in cases of algorithmic harm.

4. Encouraging cross-sector collaboration: Effective governance of AI in e-retailing requires collaboration between governments, technology firms, consumer protection bodies, and academia. Shared initiatives such as regulatory sandboxes or public–private data ethics boards could foster innovation while safeguarding consumer interests.

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Conflict of Interest

The authors declare no conflict of interest regarding the publication of this research paper.

Author Contributions

Menaka. S: Conceptualization, literature review, data collection, bibliometric analysis, manuscript drafting.
Dr. V. Selvam: Supervision, methodology design, critical review, interpretation of results, and final editing of the manuscript.
Both authors read and approved the final version of the paper.

Ethics Approval

This study did not involve human participants, animals, or sensitive personal data. Therefore, no ethics approval was required.

Data Availability

The bibliometric data analyzed in this study were retrieved from Scopus. Processed data and analysis outputs are available from the corresponding author upon reasonable request.

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