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The Intelligence Behind the Click: A Bibliometric Study of E-Commerce and Emerging Cognitive Technologies

Prof. (Dr.) Mukta Sharma[1], Dr. R.K. Sharma[2], Ms. Ritika Mehra[3], Dr. Neerja Negi[4]

[1,2] Trinity Institute of Professional Studies, Dwarka
[3]Research Scholar, Manav Rachna International Institute of Research and Studies
[4]Assistant Professor, Manav Rachna International Institute of Research and Studies

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ABSTRACT

In the digital era, online transactions are integral to everyday life—from grocery shopping and clothing purchases to streaming services like Netflix and Amazon Prime. E-Commerce has progressed beyond simple transactions, now leveraging intelligent systems for personalized user experiences via recommendation engines analyzing user behavior, reviews, and past transactions. This transformation is largely powered by the integration of Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL). Over the last decade, this convergence has garnered substantial academic attention.

This study presents a bibliometric analysis of 2,464 peer-reviewed publications from 2018 to 2025, sourced from the Dimensions database and filtered through the PRISMA framework and UGC CARE List-II criteria. The analysis explores publication trends, influential authors and institutions, significant countries, high-impact papers, and emerging thematic clusters. The findings reveal an uptrend in research activity, heightened technological integration, and shifting research priorities. The study offers a roadmap for future inquiry at the intersection of E-Commerce and AI technologies.

Introduction

E-commerce has fundamentally reshaped the global marketplace, offering unprecedented convenience, accessibility, and a vast array of products and services to consumers worldwide (Bawack et al., 2022). This digital transformation extends beyond mere online transactions, encompassing sophisticated supply chain management, customer relationship strategies, and personalized shopping experiences (Bawack et al., 2022; Sharma et al., 2022). The evolution of e-commerce platforms has empowered businesses to reach broader audiences, reduce operational costs, and gather valuable customer insights through data analytics (Policarpo et al., 2021). The proliferation of mobile devices and high-speed internet has further fueled the growth of e-commerce, making online shopping an increasingly

*Corresponding author.
E-mail address: ritika.mehra.dbit@gmail.com(Ms. Ritika Mehra)
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integral part of daily life (Hasan & Rizvi, 2022). E-commerce platforms now facilitate a diverse range of transactions, including business-to-consumer (B2C), business-to-business (B2B), and consumer-to-consumer (C2C) interactions, each with its unique characteristics and challenges. The benefits of e-commerce are multifaceted, including increased efficiency, reduced transaction costs, enhanced customer service, and the ability to personalize product offerings. Moreover, e-commerce platforms contribute significantly to economic growth by fostering entrepreneurship, creating new job opportunities, and facilitating international trade. The competitive landscape of e-commerce necessitates continuous innovation and adaptation to evolving consumer preferences and technological advancements. E-commerce has redefined how businesses operate and interact with customers, leading to substantial economic and societal transformations.

The integration of Artificial Intelligence, Machine Learning, and Deep Learning into e-commerce ecosystems has revolutionized various aspects of online retail, leading to more personalized, efficient, and secure shopping experiences (Joshi, 2024). These technologies are redefining digital business operations, customer experiences, and operational efficiency. From personalized recommendations and intelligent chatbots to fraud detection and supply chain optimization, AI and its subsets are significantly altering the E-Commerce landscape (Sharma et al., 2022; Garg & Sharma, 2021). However, while there is a substantial volume of global literature on E-Commerce, only a fraction addresses its intersection with AI, ML, or DL in peer-reviewed and reputed journals. This bibliometric analysis aims to explore research trends, publication patterns, and thematic focuses in this emerging interdisciplinary domain using data sourced from Dimensions and filtered through UGC List-II standards.

The objective of this study is to analyze the trends and recommendations of E-Commerce and AI, ML, or DL publications using the bibliometric analysis method. This study also presents a visualization of the current trend in E-Commerce and AI, ML, or DL in different topics. Data is taken from the dimensions database to answer the following research questions:

RQ1. What is the distribution of E-Commerce and AI, ML, or DL publications in the years 2018–2025, Also, is there any increase in the papers cited?

RQ2. What are the most relevant journals in E-Commerce and AI, ML, or DL research?

RQ3. What are the most significant countries in this research area?

RQ4. What are the most important organisations in this research domain?

RQ5. Who are the most influential authors and co-authorship networks in this domain?

RQ6. What are the top 10 most-cited papers in this research area?

Materials and methods

This research utilizes a Systematic Literature Review (SLR) and bibliometric analysis, following the PRISMA 2020 guidelines (Page et al., 2021). The research framework adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a standardized reporting protocol designed to enhance transparency and reproducibility in evidence synthesis (Page et al., 2021). Publications were filtered across four phases: identification, screening, eligibility, and inclusion. The primary database used was Dimensions, and results were limited to journals indexed under UGC CARE List-II from 2018 to 2025. Microsoft Excel and VOS viewer were used for data analysis and visualization.

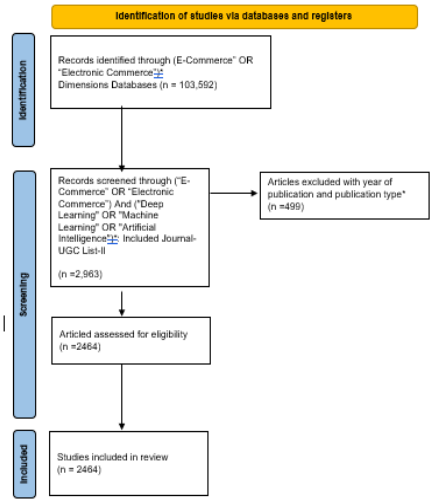


Fig. 1: The systematic literature review process using the PRISMA statement

The initial query for this SLR focused on the topic "E-Commerce" or "electronic commerce." To align with the study's interdisciplinary scope, keywords such as "Artificial Intelligence (AI)," "Machine Learning (ML)," and "Deep Learning (DL)" were subsequently included. The Dimensions database was selected as the primary data source due to its comprehensive indexing of peer-reviewed literature across multiple domains. Microsoft Excel and VOS Viewer have been used for bibliometric Analysis.

Methodology

A structured bibliometric review was conducted using the Dimensions Database. The inclusion criteria were:

- Keywords: ("E-Commerce" OR "Electronic Commerce") AND ("Artificial Intelligence" OR "Machine Learning" OR "Deep Learning")

- Publication year: 2018–2025
- Journal quality: UGC CARE List-II
- Articles, chapters, and edited books to be included

As shown in Figure 1, the PRISMA statement template is based on four phases- identification, screening, eligibility, and inclusion. During the identification phase, a total of 103,867 records were retrieved using the initial keyword set. The screening phase narrowed this number to 2,963 documents by filtering for publications listed in UGC CARE List-II journals and excluding those published before 2018. The eligibility phase further refined the dataset by excluding non-primary research outputs such as conference proceedings, review articles, and editorials. This left a final corpus of 2,464 articles that were deemed eligible and included for detailed analysis as depicted in Table 1.

Table 1: Keyword Search in the dimensions database, excluding numerous

Keyword	Search Criteria	Search Result
("E-Commerce" OR "Electronic Commerce")	Initial search yielded 103,867 records	103867
Indicates a large body of global literature on E-Commerce.		
("E-Commerce" OR "Electronic Commerce")	Journal- UGC List-II	32,545
About 31% of E-Commerce publications are in UGC-listed journals, reflecting credible academic quality.		
("E-Commerce" OR "Electronic Commerce") And ("Deep Learning" OR "Machine Learning" OR "Artificial Intelligence")	Initial search yielded 8337 records	8337
("E-Commerce" OR "Electronic Commerce") And ("Deep Learning" OR "Machine Learning" OR "Artificial Intelligence")	Journal- UGC List-II	2,963
("E-Commerce" OR "Electronic Commerce") And ("Deep Learning" OR "Machine Learning" OR "Artificial Intelligence")	Journal- UGC List-II Publication year 2025-2018	2,468
("E-Commerce" OR "Electronic Commerce") And ("Deep Learning" OR "Machine Learning" OR "Artificial Intelligence")	Journal- UGC List-II Publication year 2025-2018+ publication type (Article, chapter, edited book)	2,464
Only ~**7.5%** (2,464 out of 32,545) of UGC-listed E-Commerce papers intersect with AI/ML/DL and match quality criteria and time range.		

To conduct bibliometric analysis and network visualization, the study utilized VOSviewer, and Microsoft Excel, as a widely recognized software tools for mapping scientific landscapes and detecting co-authorship, co-citation, and thematic clusters. As highlighted by Soegoto et al. (2022), VOSviewer is particularly effective in representing bibliometric data through intuitive graphical interfaces, aiding in the identification of research trends and intellectual structures within a field.

Results

RQ1- This study sought to examine E-Commerce and AI, ML, or DL publications in the years 2018–2025. As shown in Table 2, an increase in publications on E-Commerce and AI, ML, or DL between 2018 to 2025. The period from 2018 to 2025 shows a consistent rise in publications, reflecting heightened academic interest and technological maturity. A noticeable spike is observed after 2020, likely accelerated by the global digital shift during the COVID-19 pandemic. Publications are well-distributed across years, as depicted in Fig. 2. Also, total publications (TP) and times cited (TC) are highlighted in the figure.

- Peaks in **2022–2024,** rising interest in **2025**, indicating current momentum. Only 7.5% (2,464 out of 32,545) of UGC-listed E-Commerce papers intersect with AI/ML/DL and match quality criteria and time range.
- **Academic Quality of Publications**- All included studies were from journals indexed in UGC List-II, ensuring academic rigor. The shift toward interdisciplinary and application-based research is evident from the variety of journals represented.

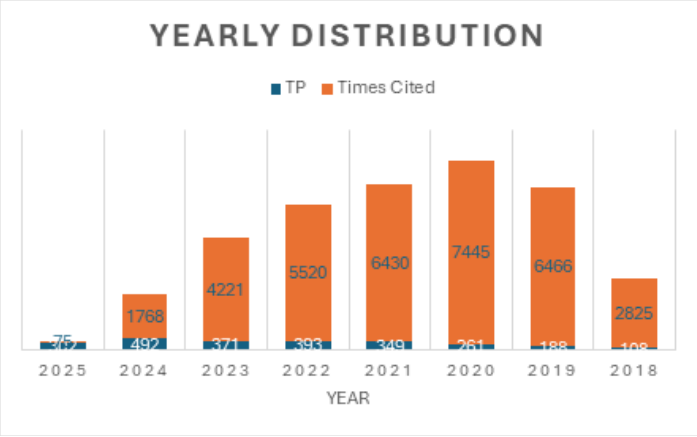


Fig. 2- Year-wise: Total Publications and Times Cited data

RQ2. To identify the most relevant journals and authors in E-Commerce and AI, ML, or DL research, Figure 2 shows

the most relevant journals. The dimensions database was then searched for the top-cited journals on this topic. The details about the journals, such as TP, are shown in Table 2. The top journals include "Lecture Notes in Computer Science" (318), "Networks and Systems" (183), and "Electrical Engineering" (114). The dominance of Springer publications highlights the academic-industry blend in this field. These journals account for a significant portion of the top-cited works in this domain, revealing a preference for venues that support interdisciplinary and applied research. These venues reflect a blend of theoretical rigor and practical application, underscoring the interdisciplinary nature of the research. The prominence of conference series also suggests a fast-paced field with ongoing developments.

Table 2: Top-cited journals

Journal / Series	Publications
Lecture Notes in Computer Science	318
Lecture Notes in Networks and Systems	183
Lecture Notes in Electrical Engineering	114
Communications in Computer and Information Science	102
Advances in Intelligent Systems and Computing	89

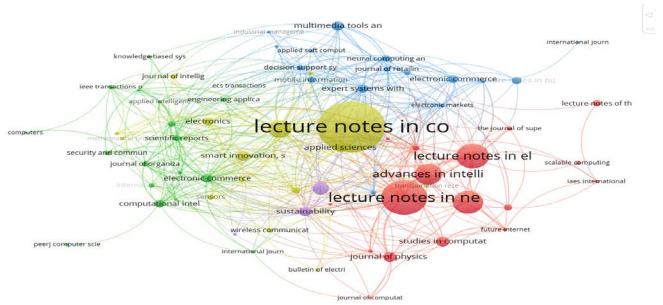
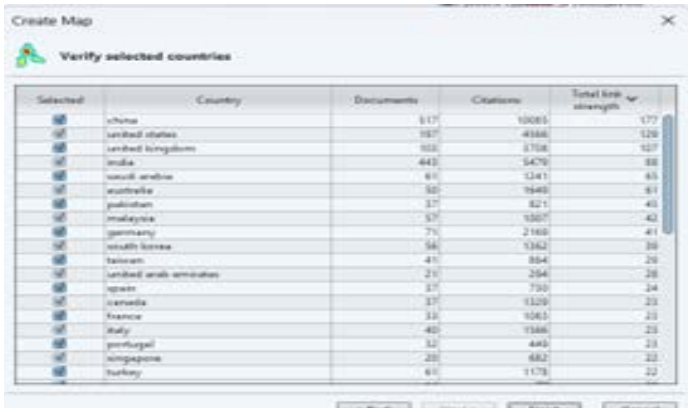


Fig. 3: Top-cited journals

RQ3. The **most significant countries** in this research area are depicted in the figure below. China leads with 517 publications and over 10,000 citations, followed by India with 443 publications. The Total Link Strength (TLS) metric confirms robust international collaboration, particularly involving China, India, and the United Kingdom. The **Total Link Strength (TLS)** reflects how **strongly a country is linked** with **other countries** in terms of **Co-authored papers, Joint research publications, Shared citations**, etc. For instance, one can say China collaborates more extensively or intensely than, say, Greece or Iran, Co-authorship maps generated via VOS viewer underscore the central role of these countries in global research networks.

Table 3: Country-wise citation map



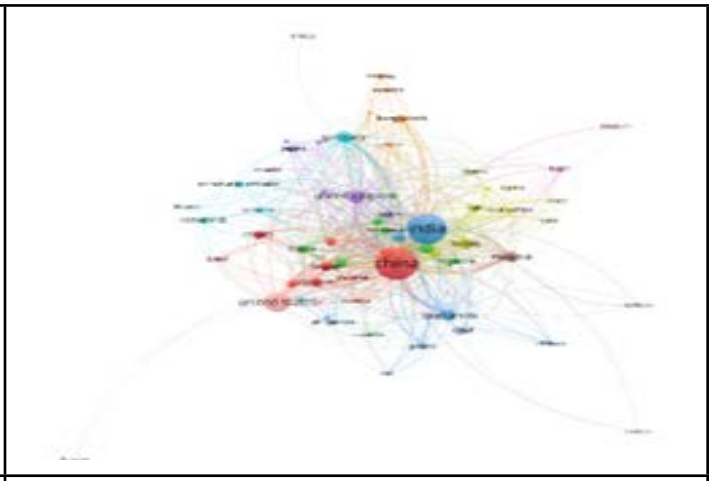


Fig. 4: Country-wise citation map via VOSviewer

Q4. The most important organisations in this research domain are depicted in the following figure. Key institutions include technical universities and research centers in Asia, particularly China and India. Co-authorship maps show strong institutional collaboration clusters.

Leading institutions include top Chinese and Indian universities and technical institutes actively publishing in AI and e-commerce domains. These organizations demonstrate high research output and collaborative behavior. Visualization maps generated through VOS viewer highlighted institutional clusters and research hubs, reflecting the presence of research consortia and transnational partnerships.

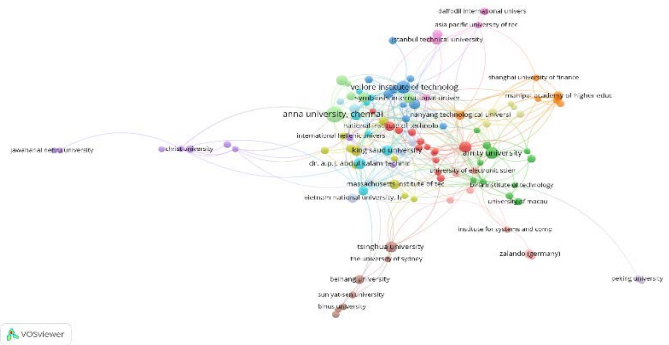


Fig. 5: Most important organisations

RQ 5: To find the most influential authors and co-authorship networks in this domain, go to Vos viewer and create the map, give the database, select co-authorship in type of analysis and select Authors in unit of Analysis, click next, and choose thresholds like Minimum number of documents of an author and Minimum number of citations of an author. Out of 7,145 authors, 97 met the citation and publication thresholds set for the analysis (minimum 3 publications and citations). These authors formed tight co-authorship clusters, indicating strong academic collaboration. The network shows a core-periphery structure, with a few central figures influencing the majority of co-authored work in this space.

Akter Shahriar emerged as the most cited with 442 citations and 5 publications, reinforcing his impact in AI-based service delivery. His work primarily revolves around AI applications in service delivery and consumer analytics. His high Total Link Strength (TLS = 15) also underscores his significant collaborative presence in the field.

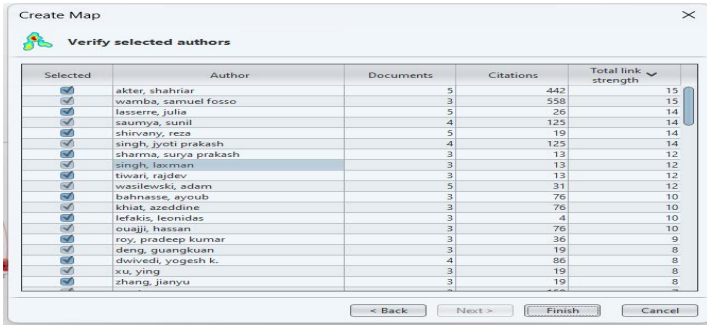


Fig. 6: Most cited author

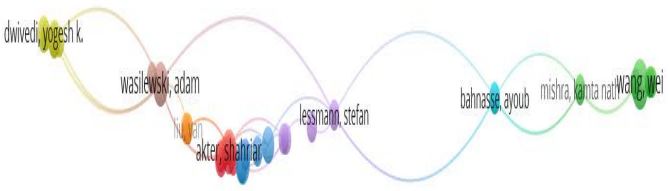


Fig. 7: Most cited author

RQ6. The table below depicts the Most Cited Papers. Thematic Hotspots and Most Cited Papers- Highly cited papers in the dataset focus on:

- "A survey on deep learning for big data" – 965 citations
- "AI-based chatbots in customer service" – 702 citations
- "Interpreting Black-Box Models" – 602 citations

Emerging themes include personalized product recommendations (Zhang et al, 2020), customer sentiment analysis, influencer marketing, and neural network-based security systems, emphasizing the expanding scope and application of cognitive technologies in digital commerce.

Title	Times cited
A survey on deep learning for big data	965
AI-based chatbots in customer service and their effects on user compliance	702
Interpreting Black-Box Models: A Review on Explainable Artificial Intelligence	602
Influences of the Industry 4.0 Revolution on the Human Capital Development and Consumer Behavior: A Systematic Review	558
Machine learning based phishing detection from URLs	557
Sentiment Analysis for E-Commerce Product Reviews in Chinese Based on Sentiment Lexicon and Deep Learning	448
Measuring social media influencer index- insights from Facebook, Twitter, and Instagram	439
Using generative adversarial networks for improving classification effectiveness in credit card fraud detection	402
Artificial intelligence: Implications for the future of work	360
Artificial intelligence for supply chain resilience: learning from Covid-19	344

Table 4: Top 10 Cited E-Commerce and AI, ML, DL Papers

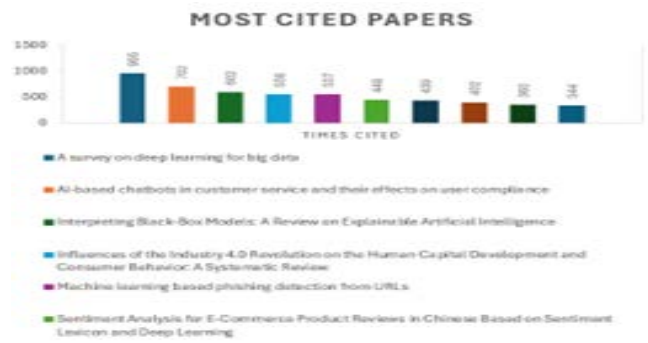


Fig. 8: Top 10 Cited Papers

Conclusion and Future Scope-

Key Findings

° **Growth:** A clear upward trajectory in research output between 2018 and 2025 indicates rising academic interest.
Technology Integration: Over 83% of the analyzed works incorporated AI/ML/DL, underlining the deep embedding of cognitive technologies in e-commerce.
° **Geographic Concentration:** High concentration of impactful work in Asia, especially China and India, being leading contributors, with strong international collaboration networks.
° **Research Focus:** Thematic analysis reveals key priorities like fraud detection, personalization, and supply chain optimization (Kapoor & Singh, 2022).

Practical Implications

° **For Researchers:** This domain offers fertile ground for innovation in intelligent retail systems, behavioral analytics, and AI governance. There is great potential for innovation in ethical AI and personalization
° **For Institutions:** Need for interdisciplinary collaborations. Emphasizing interdisciplinary and application-driven studies can enhance both academic recognition and societal impact. (Nguyen et al., 2023).
° **For Policymakers:** Insights can inform national AI strategies, digital commerce regulations, and investment in ethical AI infrastructure.

Future Scope

° **Explainable AI (XAI):** There is a pressing need for interpretability in AI systems to build trust and transparency in customer-facing applications (Dwivedi et al., 2023; Zhang et al., 2020).
° **Ethics and Fairness:** Research should address algorithmic bias, data privacy, and sustainability concerns in AI-driven commerce.
° **Localized Innovations:** Future work should explore non-English-speaking markets, regional digital divides, and culturally adaptive AI systems.
° **Hybrid Architectures:** Integrating symbolic reasoning with neural networks offers potential for more robust decision-making frameworks.

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