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Current Trends and Future Directions of Big Data in Commerce: A Bibliometric Analysis Based on Scopus

Ahmad Bilal Almagribi*[*1], Bambang Purnomosidi Dwi Putranto[2]
[*1,2]*Department of Information Technology, Universitas Teknologi Digital Indonesia*
abalmagribi@gmail.com

ABSTRACT

Big data provides significant benefits across various sectors, including commerce. However, there remained a gap in bibliometric studies examining big data within the context of commerce, leaving research development in this field unclear. This study aimed to address this gap by conducting a bibliometric investigation into researchers' contributions to big data in commerce, including their affiliations and countries of origin. Additionally, the study sought to identify the most productive journals and highlight relevant and under-researched topics within this field. A bibliometric analysis approach was employed, analyzing 396 Scopus-indexed documents and using VOSviewer visualization to identify major recurring issues in the literature. The findings revealed that in 2021, the number of publications on big data in commerce peaked at 97 documents. Maalla, A., from Guangzhou College of Technology and Business, China, emerged as the most prolific author, while China led in publication output with 308 documents. The Journal of Physics Conference Series was identified as the most productive source. Computer Science was the most explored discipline, indicating a strong integration of technology with commerce. Keyword analysis divided research focus into four main clusters: analytical technology, platform optimization, supply chain management, and marketing strategy optimization. These findings provide a foundation for future research to explore areas such as Customer Experience Management, Blockchain Technology, Cloud Computing, Predictive Analytics, and Customer Segmentation, thereby enriching the academic literature and offering practical contributions to data-driven commerce.

Keywords: Big Data, Commerce, Bibliometric Analysis, Scopus, VOSviewer

INTRODUCTION

Big Data played a crucial role in supporting the development of various sectors, including commerce. Yim *et al.* (2022) found that Big Data influenced price dynamics and inflation within e-commerce in Korea. Ge *et al.* (2023) revealed the impact of live e-commerce streaming on consumer happiness through Big Data analysis. Similarly, Zhang & Huang (2022) developed a precision marketing strategy based on consumer behavior analysis on e-

commerce platforms in the Big Data era. Byrapu Reddy *et al.* (2024) demonstrated that effective fraud detection in e-commerce could be enhanced through the application of machine learning and Big Data analytics.

Additionally, studies by Ramkumar *et al.* (2023) and Sharma *et al.* (2023) explored the use of Big Data analytics in various e-commerce applications, while Roy *et al.* (2022) and Ran *et al.* (2024) highlighted the role of Big Data and IoT in improving logistics and supply chain management within e-commerce. Chen & Sapna Kumari (2024) and Mahajan *et al.* (2024) focused on cost management and the identification of customer needs within e-commerce based on large-scale data processing platforms. Pande & Sengupta (2024) and Munshi *et al.* (2023) presented reviews and architectures for analyzing Big Data applications in e-commerce and the tourism industry.

Several bibliometric analyses on the use of Big Data were conducted to understand the dynamics and research developments across various fields. Ellili *et al.* (2023) investigated Big Data applications in the insurance industry, while Fauzi *et al.* (2023) conducted a bibliometric review on human resource management and Big Data analytics. Pandey *et al.* (2023) presented a comprehensive bibliometric review on artificial intelligence, machine learning, and Big Data in natural resource management. In the field of manufacturing, Sahoo (2022) examined research on Big Data analytics through a bibliometric analysis in business management. Samsul *et al.* (2023) explored Big Data education and learning analytics, whereas Tamasiga *et al.* (2023) reviewed the role of AI and Big Data in predicting disruptions in the global food value chain to address food insecurity. Finally, Thayyib *et al.* (2023) provided a bibliometric summary of artificial intelligence and Big Data analytics across five different domains.

Although numerous publications have explored the use of big data across various sectors, including commerce, there is no Scopus-indexed paper that specifically conducts a bibliometric analysis of big data within the context of commerce. Consequently, information on the research landscape of big data in the commerce sector remains unclear, including the identification of the most productive and impactful authors, affiliations, countries, and journals on this topic. Furthermore, the frequently researched and under-researched topics within this context have yet to be clearly mapped. The purpose of this paper is to address this research gap by identifying the most productive and impactful authors, affiliations, countries, and journals, as well as by mapping relevant topics and uncovering under-researched areas that could be recommended for future research innovation.

METHODS

This study is a literature review utilizing bibliometric analysis to examine 396 documents indexed in Scopus as of October 30, 2024. Document selection was based on keyword searches in titles using the search formula *(TITLE (bigdata) OR TITLE (big AND data) AND TITLE (commerce))*. In this study, the authors did not exclude any documents; all documents meeting the keyword criteria were collected and analyzed.

The analysis methods used in this study are divided into three main types. First, descriptive analysis aimed to measure research productivity, including the count of publications, annual growth, identification of prominent authors, affiliations or institutions, countries, journals, document types, and subject areas most engaged in the topic of big data in commerce. Second, citation analysis was conducted to assess the research impact by examining the most cited papers, frequently cited authors, publication years, and major sources. Third, keyword analysis was employed to identify the most frequently used keywords related to the topic, indicating research trends and dominant focus areas.

For data visualization, this study utilized VOSviewer software. This software enabled the visualization of keyword networks, author co-citation, and institutional collaboration, assisting in mapping relationships and major trends within the selected literature.

RESULTS AND DISCUSSION

Descriptive Analysis

Among the earliest documents published on this topic was research by Zhang & Chen (2014), which discussed the application of big data technology in managing unstructured data for railway e-commerce. Meanwhile, Xiong *et al.* (2014) conducted a study on the operational mechanisms of e-commerce platforms in a big data environment. Yesudas *et al.* (2014) explored the use of intelligent operational dashboards for smarter commerce using big data.

Peng & Huang (2014) and Sun *et al.* (2014) also presented studies related to IoT-based e-commerce intelligence and big data, as well as a big data-based retail recommendation system for non-e-commerce applications. Philippov *et al.* (2015) discussed big data organization on global e-commerce platforms. Dong (2015) conducted research on a big data e-commerce model within cloud networks based on consumer behavior. Fang *et al.* (2015)

developed a new framework for identifying commodity entities in big data e-commerce. Finally, Zhao *et al.* (2015) examined the interactions between commercial banks and big data-based e-commerce financial institutions in China through an evolutionary game study.

a) Annual Growth

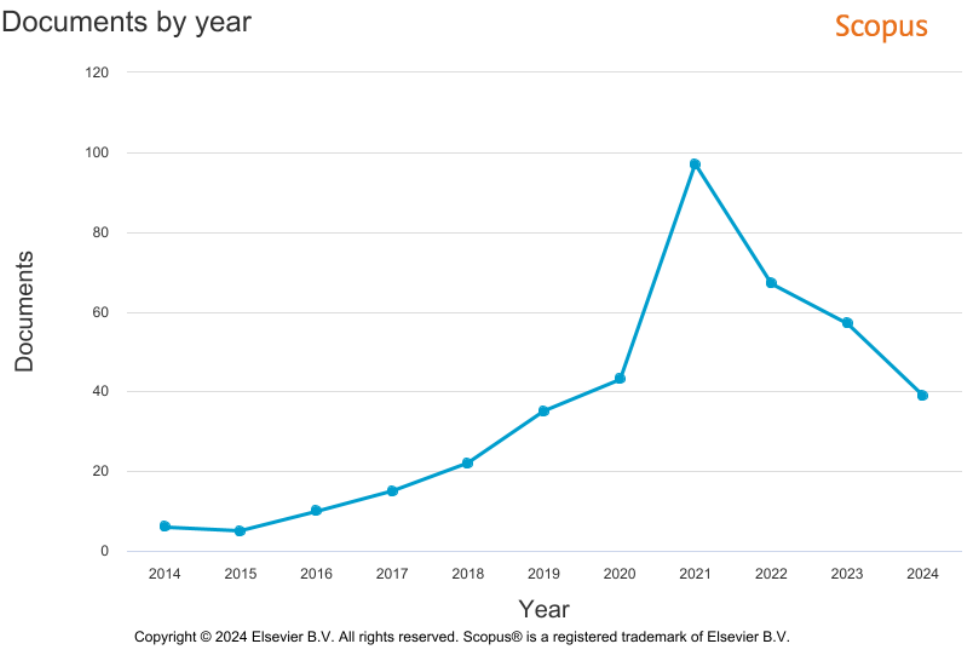

Fig. 1. Annual growth of papers published related to the field.

Figure 1 illustrates the growth in the number of documents indexed by Scopus concerning big data in commerce from 2014 to 2024. According to the data, a total of 396 documents were recorded. In 2014, there were only 6 publications, which then increased gradually each year. The most significant rise occurred between 2020 and 2021 when the number of publications surged from 43 to 97 documents. But thereafter, a decline ensued, falling to 67 documents in 2022, 57 in 2023, and only 39 documents in 2024. This decline may indicate a decreasing trend in research or a shift in focus to other topics within the fields of commerce and big data.

b) Top Authors

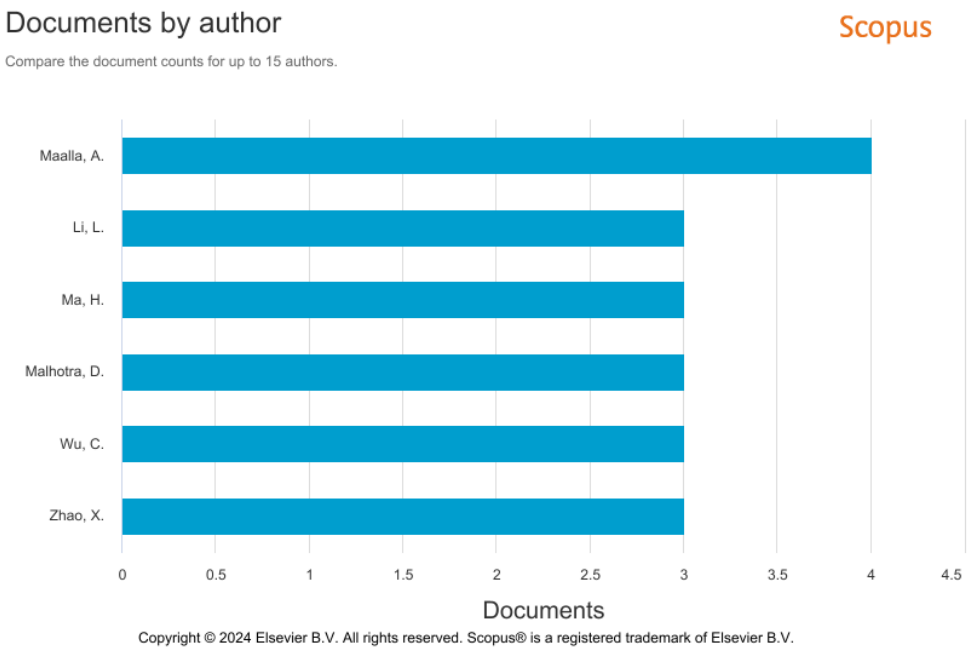

Fig. 2. The most productive authors related to the field.

Figure 2 displays the distribution of the number of documents published by authors on big data in commerce, according to the Scopus database up to 2024. Maalla, A. is the most productive author with a total of 4 publications. He is followed by Li, L., Ma, H., Malhotra, D., Wu, C., and Zhao, X., each of whom has 3 publications. This graph illustrates the significant contributions of these authors to the development of literature on the topic of big data in commerce, highlighting the importance of their contributions to the advancement in this field.

c) **Top Affiliations**

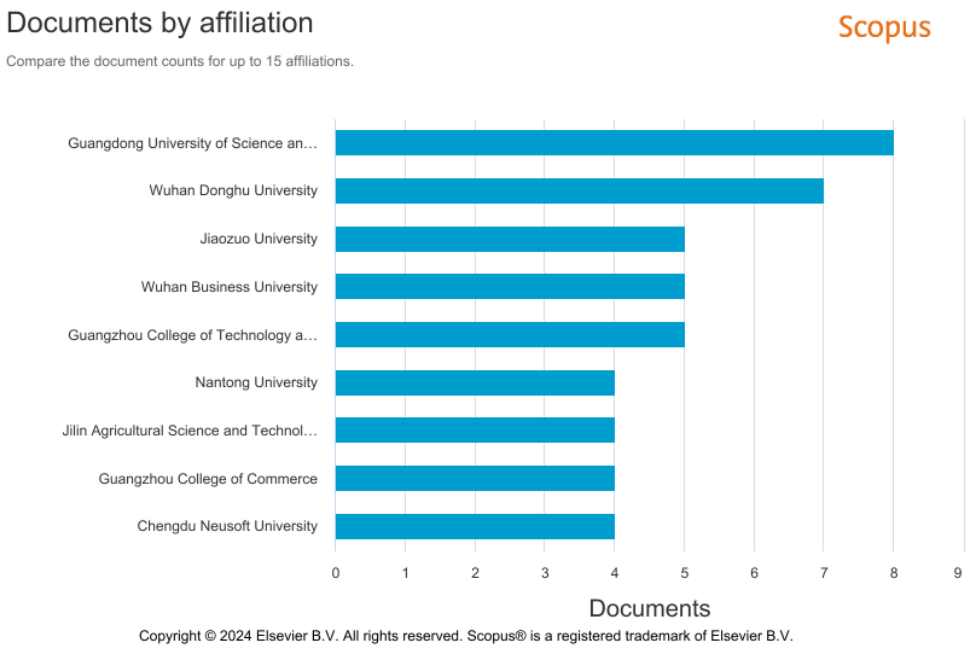

Fig. 3. Top affiliations published related to the field.

Figure 3 shows that several institutions have been prominent in publishing documents on big data in commerce. Guangdong University of Science and Technology leads with 8 publications, followed by Wuhan Donghu University with 7 publications. Jiaozuo University, Wuhan Business University, and Guangzhou College of Technology and Business have each published 5 documents. This data illustrates the active engagement of these institutions in research related to the utilization of big data to enhance processes and strategies in the commerce sector.

d) **Top Countries**

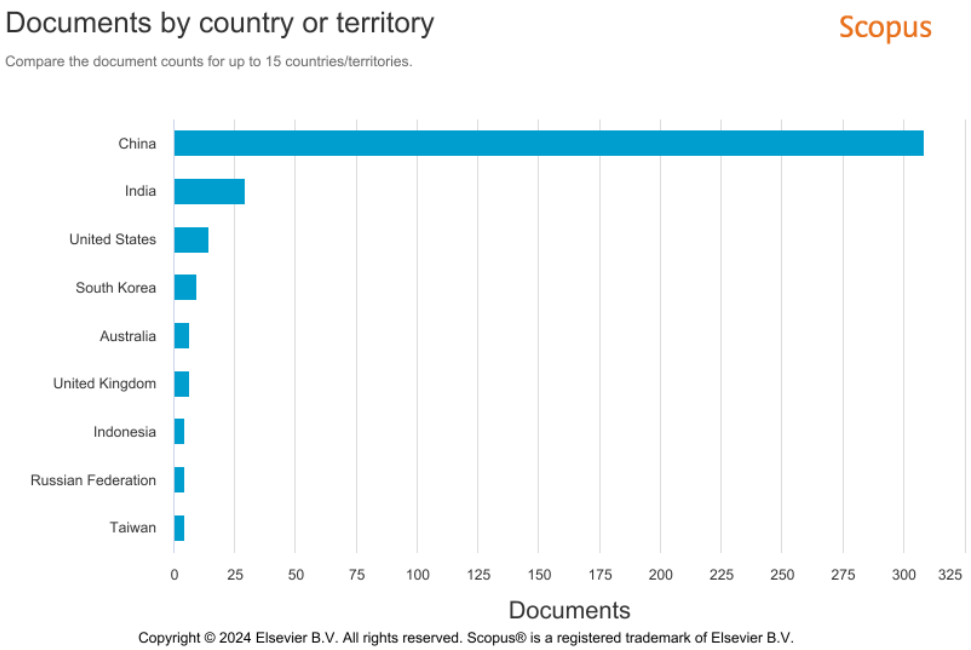

Fig. 4. The most productive countries published related to the field.

Figure 4 illustrates the contributions of countries regarding the use of big data in commerce. China is dominant, with a substantial total of 308 documents, indicating its significant role and leadership in big data-related commerce research. India follows distantly with 29 documents, while the United States has 14 documents. South Korea, Australia, and the United Kingdom each have fewer than 10 publications. Indonesia, the Russian Federation, and Taiwan each contributed 4 documents. This data highlights the considerable disparity in research output between China and other countries in the context of big data in commerce.

e) Top Sources

Table 1. the most productive sources in the field

Source	Documents
Journal Of Physics Conference Series	34
ACM International Conference Proceeding Series	28
Advances In Intelligent Systems And Computing	16
Applied Mathematics And Nonlinear Sciences	11
Mobile Information Systems	11

Table I shows that several journals and conference proceedings have emerged as principal sources of publication. The 'Journal of Physics Conference Series' leads with the highest number of publications, totaling 34 documents, followed by the 'ACM International Conference Proceeding Series' with 28 documents. Additionally, 'Advances in Intelligent Systems and Computing' has published 16 documents. Other active sources include 'Applied Mathematics and Nonlinear Sciences' and 'Mobile Information Systems,' each with 11 documents.

f) Document Types

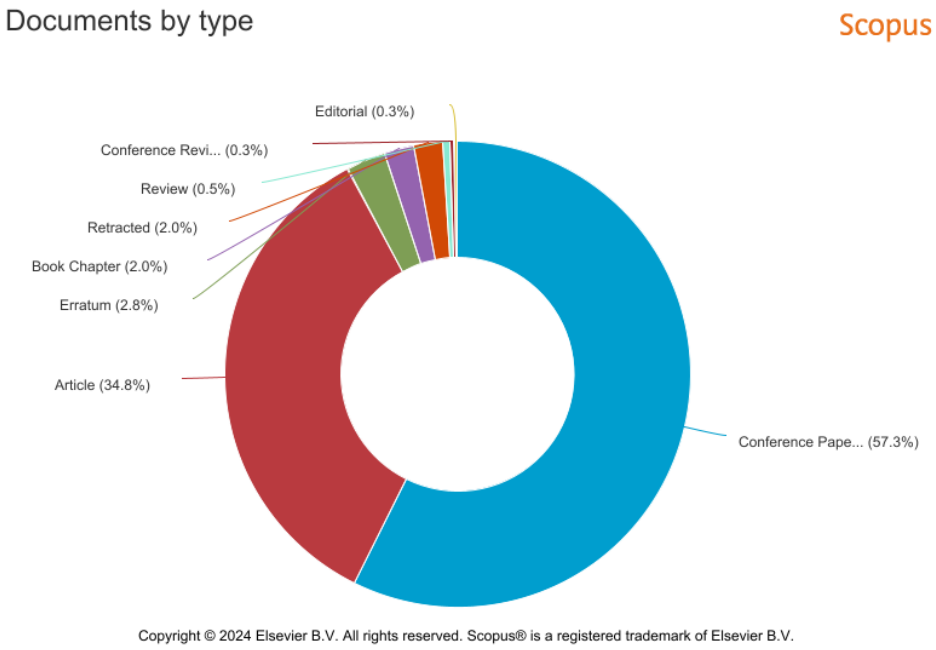

Fig. 5. Document Types published related to the field.

Figure 5 shows that the dominant document type is 'Conference Paper,' accounting for 57.3% of total publications. This indicates that conferences play a crucial role as a primary platform for disseminating current research in this field. Additionally, 'Article' also constitutes a significant proportion at 34.8%, demonstrating the acceptance and validation of this research in peer-reviewed scientific journals. This illustrates that although there was variety in publication types, conferences and journal articles are the main mediums for scholarly discussion related to big data in commerce.

g) Subject Areas

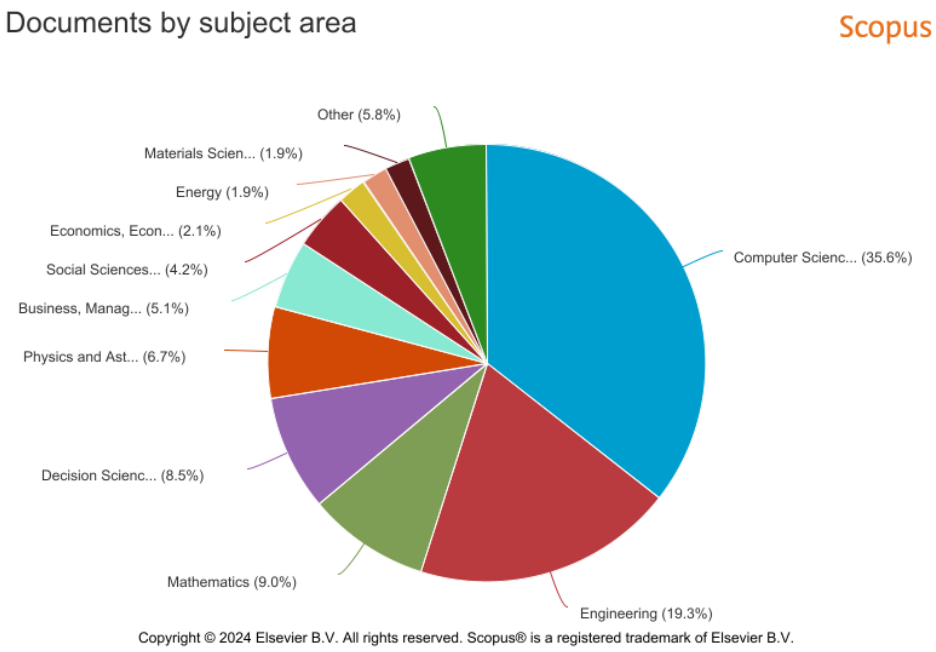

Fig. 6. Top documents by subject areas.

Figure 6 indicates that Computer Science is the most dominant field of study, contributing 35.6% of the total documents. This suggests that most big data research in commerce involves information technology and computing. Engineering is also significant, accounting for 19.3%, indicating the integration of big data in a wide range of technical applications in commerce. Mathematics, which includes data analysis and mathematical modeling, contributes 9.0%. Decision Sciences account for 8.5% of the total, reflecting the growing need for data-driven decision analysis in commerce. Other categories encompass various disciplines, indicating the extensive dissemination of big data research across various scientific and practical aspects.

Citation Analysis

Table 2. The Most Cited Papers In The Field

No.	Article Details	Cited
1.	S. Akter and S. F. Wamba, 2016, *"Big data analytics in E-commerce: a systematic review and agenda for future research,"* Electron. Mark. (Akter & Wamba, 2016)	472

2.	M. S. Eastin, N. H. Brinson, A. Doorey, and G. Wilcox, 2016, *"Living in a big data world: Predicting mobile commerce activity through privacy concerns,"* Comput. Hum. Behav. (Eastin et al., 2016)	107
3.	B. Zhang, Z. Du, B. Wang, and Z. Wang, 2019, *"Motivation and challenges for e-commerce in e-waste recycling under 'Big data' context: A perspective from household willingness in China,"* Technol. Forecast. Soc. Change. (B. Zhang et al., 2019)	84
4.	K. Zheng, Z. Zhang, and B. Song, 2020, *"E-commerce logistics distribution mode in big-data context: A case analysis of JD.COM,"* Ind. Mark. Manag. (Zheng et al., 2020)	82
5.	P.-J. Wu and K.-C. Lin, 2018, *"Unstructured big data analytics for retrieving e-commerce logistics knowledge,"* Telemat. Inform. (Wu & Lin, 2018)	81
6.	L. Li, T. Chi, T. Hao, and T. Yu, 2018, *"Customer demand analysis of the electronic commerce supply chain using Big Data,"* Ann. Oper. Res. (Li et al., 2018)	78
7.	A. Behl, P. Dutta, S. Lessmann, Y. K. Dwivedi, and S. Kar, 2019, *"A conceptual framework for the adoption of big data analytics by e-commerce startups: a case-based approach,"* Inf. Syst. E-Bus. Manag. (Behl et al., 2019)	60
8.	T. M. Le and S.-Y. Liaw, 2017, *"Effects of pros and cons of applying big data analytics to consumers' responses in an e-commerce context,"* Sustain. Switz. (Le & Liaw, 2017)	54
9.	A. A. Alsmadi, A. Shuhaiber, M. Al-Okaily, A. Al-Gasaymeh, and N. Alrawashdeh, 2023, *"Big data analytics and innovation in e-commerce: current insights and future directions,"* J. Financ. Serv. Mark. (Alsmadi et al., 2023)	51
10.	S. S. Alrumiah and M. Hadwan, 2021, *"Implementing big data analytics in e-commerce: Vendor and customer view,"* IEEE Access. (Alrumiah & Hadwan, 2021)	42

Table II displayed the analysis of the 10 most cited documents in the context of big data in commerce, it can be concluded that there are no authors or sources from journals or conference proceedings that are the most influential, as none are mentioned more than once.

Keywords Analysis

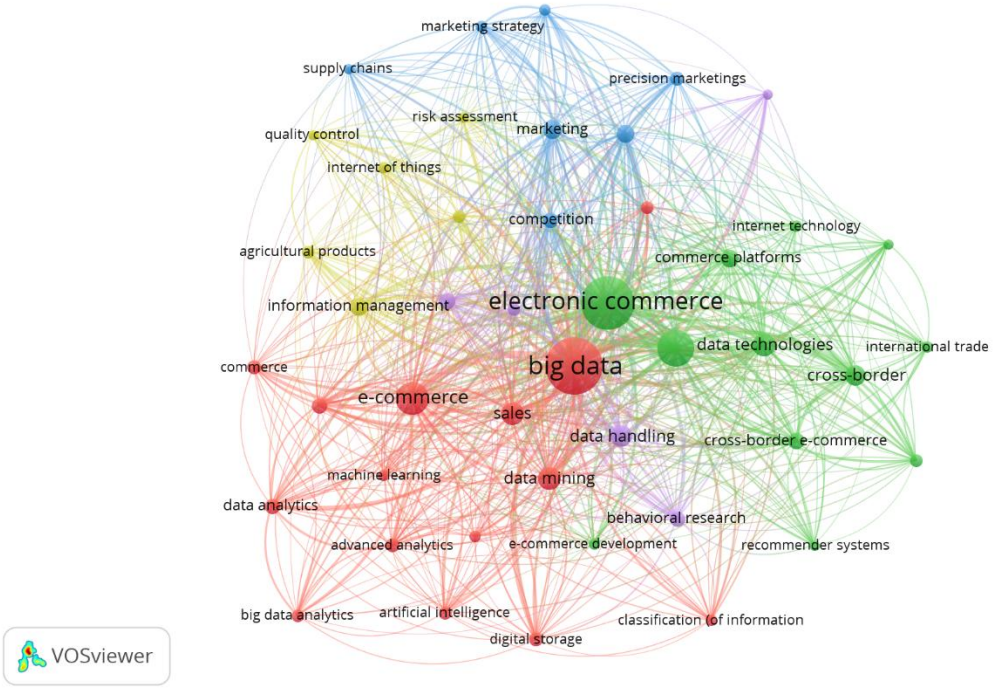

Fig. 7. Visualization of most frequently occurring keywords.

From the total of 396 documents on big data in commerce indexed by Scopus, there are 2,582 keywords. Analysis using the VOSviewer application established that only keywords appearing a minimum of 13 times were eligible for visualization, resulting in 45 frequently occurring keywords. This visualization in Figure 7 divides these keywords into five color-coded groups, each representing a different thematic cluster.

- **The Red Cluster** focuses on advanced technology and analytics, including 'advanced analytics', 'artificial intelligence', 'big data', 'big data analytics', and 'machine learning'. This group reflects the intensive use of smart technology in the processing and analysis of big data within commerce.

- **The Green Cluster** consists of keywords related to electronic commerce platforms and cross-border trade, such as 'commerce platforms', 'cross-border', 'cross-border e-commerce', 'e-commerce development', and 'international trade'. This group highlights the application of big data in expanding and optimizing global trade and e-commerce.
- **The Yellow Cluster** encompasses keywords associated with management and quality control, such as 'agricultural products', 'quality control', 'risk assessment', and 'supply chain management'. This cluster indicates the application of big data to enhance efficiency and security in supply chain management.
- **The Blue Cluster** identifies marketing strategies and market competition with keywords such as 'competition', 'marketing', 'marketing strategy', 'precision marketing', and 'strategic planning'. It emphasizes data-driven strategies to enhance competitive positioning and market adaptation.
- **The Purple Cluster** contains keywords related to behavioral research and data analysis such as 'behavioral research', 'big data analysis', 'data handling', and 'forecasting'. The focus of this cluster is on a deep understanding of consumer behavior and forecasting trends that affect commerce.

Overall, the visualization reveals how various aspects of big data are extensively used to advance knowledge and practice in commerce, providing a clear overview of the main topics and potential directions for future research.

FUTURE RESEARCH

Based on the previous part, we provide some recommendations for under-researched keywords that can be linked to the main topics of big data in commerce, presenting opportunities for novel research in the future:

- **Customer Experience Management** - Utilizing big data to enhance customer satisfaction and retention.

- **Blockchain Technology** - Enhancing e-commerce security and transparency through blockchain integration.
- **Cloud Computing** - Leveraging cloud computing for scalable, efficient big data processing in e-commerce.
- **Predictive Analytics** - Employing big data for predictive analytics to anticipate market trends and consumer behavior.
- **Customer Segmentation** - Implementing big data-driven segmentation for targeted marketing.
- **Social Media Analytics** - Gleaning consumer insights from social media big data.
- **Omnichannel Marketing** - Integrating big data into omnichannel strategies to unify the shopping experience.
- **Logistics Optimization** - Using big data to streamline logistics for better delivery and inventory management.
- **Fraud Detection** - Advancing fraud detection in e-commerce with big data technologies.
- **Regulatory Compliance** - Using big data to ensure precise compliance reporting and analysis.

CONCLUSION

This study highlights key trends and findings in big data in commerce, peaking in 2021 with 97 Scopus-indexed documents. Maalla, A. from Guangzhou College of Technology and Business was the most prolific author, contributing four documents, with China leading publication efforts with 308 documents.

The Journal of Physics Conference Series emerged as the most productive source, reflecting the prominence of conference papers, which constitute 57.3% of publications. Computer Science was the dominant field, accounting for 35.6% of the research, underscoring the integration of computer technology in commerce.

VOSviewer keyword analysis identified four primary research clusters: analytic technology, platform optimization, supply chain management, and marketing strategy optimization, demonstrating the sector's research diversity and depth.

Future studies may expand to include areas such as Customer Experience Management, Blockchain Technology, Cloud Computing, Predictive Analytics, Customer Segmentation, Social Media Analytics, Omnichannel Marketing, Logistics Optimization, Fraud Detection, and Regulatory Compliance, adapting to the evolving demands of modern commerce.

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