

Bibliometric Analysis of the Impact of Big Data Technology on Business and Management

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ABSTRACT Businesses are established with the aim of generating more profit and remaining in operation for longer periods of time. Various practices contribute to ensuring the sustainability of businesses. One of these practices is big data technology. The application of big data technology, which has taken the whole world by storm and affected all sectors, is based on digital transformation. As a technology-based development, Industry 4.0 applications interact with many scientific fields such as sociology, economics, biological systems, and computer systems. Industry 4.0 applications bring about strategic transformations and paradigm shifts in all scientific fields and sectors. A bibliometric study is being conducted to observe and analyze the development of Industry 4.0 applications in the field of business, which enables important developments. The data for studies related to big data technology in the field of business and management was obtained from the Web of Science database, consisting of 2011 studies. The data obtained was analyzed using the Bibliometrix software in the R Studio program via the Biblioshiny database. The results show that 5,568 authors conducted research between 2020 and 2025. Additionally, it was found that the most frequently used keywords are "big data," "big data analysis," "digital transformation," and "artificial intelligence." Another important finding is that Bag and Papa are the authors who have conducted the most research in this field. Big data technology will make significant contributions to business and management, especially in 2024. The journal Technological Forecasting and Social Change contains the most studies related to this research topic. This research output serves as a guide for researchers interested in this field.

KEYWORDS

Big data
Sustainability
Innovation
Supply chain
Digital transformation

INTRODUCTION

With the acceleration of digitalization, the concept of big data has emerged and become one of the most valuable organizational resources of today. Today, data production is rapidly increasing in many areas, from manufacturing to finance, health to education, and this data plays an important role in strategic decision-making processes (Franke and Hiebl 2023; Abdelhalim 2024). Big data refers not only to the sheer volume of data but also to the high speed at which it is produced, its diverse sources, and its complex structure, making it impossible to process using traditional methods (Sardi *et al.* 2023).

Big data refers to large volumes of data produced in structured, semi-structured, and unstructured formats that are difficult to process using traditional methods (Baig *et al.* 2020). This data is obtained from various sources such as social media posts, learning management systems (LMS), sensor data, and log files (Michalik *et al.* 2014). The '5V' framework (volume, variety, velocity, veracity, value) frequently used to define big data reflects both technical and operational challenges (Luan *et al.* 2020). These are: **Volume**: The size of the data (terabytes/petabytes), **Variety**: The presence of different types of data (text, visual, audio, unstructured content),

Velocity: The speed at which data is produced and processed, **Veracity**: The reliability of the data, **Value**: The contribution of the information obtained to decision-making processes (Gärtner and Hiebl 2018). These data sets require new-generation analysis techniques and information technologies because they cannot be processed using traditional data processing systems (Ward and Barker 2013; Sardi *et al.* 2023). In this context, big data has become an important source of information and a decision support tool for organizations.

Big data is used in a wide variety of sectors. It has an impact in many areas, from disease prediction to resource management in the healthcare sector and quality control and supply chain optimization in the manufacturing sector (Fanelli *et al.* 2023). It is also used to support decision-making processes in areas such as public administration, marketing, education, and environmental sustainability (Nisar *et al.* 2021; Abdelhalim 2024). The opportunities offered by big data are particularly prominent in the digital transformation of public services such as healthcare and education. The main benefits of big data include more accurate and faster decision-making, cost reduction, increased customer satisfaction, and competitive advantage (Franke and Hiebl 2023).

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Furthermore, big data enables organizations to perform real-time analysis and significantly increase their operational efficiency (Sardi *et al.* 2023; Abdelhalim 2024). A knowledge-based decision-making culture paves the way for strategic transformations, particularly in areas such as accounting and finance. Big data is not merely a technological advancement but also a tool for organizational change and strategic management. A company's ability to remain competitive is directly linked to its capacity to make data-driven decisions. In this context, investing in big data is the key to sustainable growth for both the private sector and public institutions.

The importance of big data is directly related to the transformation it brings to business decision-making processes. Information that could take days to obtain using traditional data analysis methods can now be obtained in real time thanks to big data analytics (BDA). This enables businesses to not only analyze the past but also predict the future and develop proactive strategies (Ajah and Nweke 2019). In particular, predictive and prescriptive analysis techniques make it possible to model customer behavior, optimize the supply chain, predict risks, and increase operational efficiency.

Big data technologies also contribute to the restructuring of business processes. Fosso Wamba and Mishra (2017) reveal a strong integration between big data analytics and business process management (BPM), business process reengineering (BPR), and business process innovation (BPI). This integration enables businesses to improve process performance, optimize resource utilization, and gain a competitive advantage. Furthermore, big data analytics enriches decision support systems, thereby improving the quality of managerial processes. In particular, big data-driven decisions yield higher success rates in areas such as customer relationship management, pricing strategies, product/service development, and marketing campaign effectiveness (Pizlo *et al.* 2023). For example, Wal-Mart uses big data analytics to develop product recommendation systems, while American Express conducts successful analyses to predict customer churn (Ajah and Nweke 2019). However, big data management requires not only technological but also organizational transformation. Successful big data projects require accurate problem definition, access to data, collaboration among multidisciplinary teams, and integration of analysis results into systems (Pizlo *et al.* 2023). Additionally, issues such as security, privacy, and ethics must also be considered.

Kalantari *et al.* (2017) evaluates publications on big data technology. A comprehensive analysis of publication trends is presented, including document type and language, year of publication, country contributions, journal analysis, research area analysis, Web of Science category analysis, author analysis, author keywords, and keyword plus analysis. Additionally, the innovative aspect of this study is that it presents a formula derived from multiple regression analysis for citation analysis based on the number of authors, number of pages, and number of references.

Liu *et al.* (2020) includes a bibliometric study on big data technology. In recent years, the rapid growth of big data has offered tremendous potential for business applications and has also attracted considerable attention in academia. In response to this emerging phenomenon, this article aims to provide a comprehensive literature review on big data. The number of studies on big data is increasing, and it is considered an intensively researched field worldwide. Chawla and Goyal (2022) conducted a bibliometric study on digital transformation. This study reveals a general upward trend in terms of annual publications, author performance, publishing journals, affiliated institutions, and countries driving the research, along with important insights obtained

from co-citation network analysis. Additionally, the study evaluates four research areas (institutional impacts, applied applications and insights, operational processes, and social aspects) comprising eighteen research streams that comprehensively address research in the DT field.

The research question is: What are the implications of big data technology applications in the field of business and management? The research is conducted based on this question, and big data provides many contributions in the application field.

On the other hand, in order to reveal the reflections of big data in the field of business and management, the interaction in the literature is revealed by using the document analysis technique. The study uses the document review technique from the qualitative research method. The study will examine the implications of big data technology in the fields of business and management between 2020 and 2025 using the Web of Science database. The research is conducted based on five main questions. The research questions to be answered in this study are as follows:

1. What is the distribution of articles according to the years they were published?
2. What is the distribution of articles according to the journals in which they were published?
3. What are the most frequently used keywords by authors?
4. Who are the most prolific authors?
5. What are the most trending topics?

The most important outcome of this study is that it offers recommendations to authors who will conduct research in this field. Indeed, it identifies the latest developments in the literature. By identifying gaps in the literature related to this topic, it guides new studies.

MATERIALS AND METHODS

The research was conducted by evaluating scientific studies on big data technology in the fields of management and business based on specific parameters. In the research, the document review technique was used as a qualitative research method. The data was collected between May 20, 2025, and June 20, 2025. The Web of Science database was used to collect the data. The search criteria focused on the keywords "big data" and "management." Studies from the last five years were targeted, and the period between 2020 and 2025 was selected. The field of study was business and management. Only articles were selected as the data type. The search yielded 2011 documents. The documents were filtered to include only those published between 2020 and 2025 and related to the fields of business and management. The 2011 documents were analyzed using the IR Studio program and Biblioshiny.

RESULTS AND DISCUSSION

After analyzing the study, various findings were obtained. Table 1 presents the general information of the study.

■ **Table 1** General Information Summary

Main Information About Data	
Timespan	2020–2025
Sources (Journals, Books, etc.)	400
Documents	2011
Annual Growth Rate (%)	214.77
Document Average Age	1.88
Average Citations per Document	17.84
References	115170
Document Contents	
Keywords Plus (ID)	2722
Author's Keywords (DE)	5963
Authors	
Total Authors	5568
Authors of Single-Authored Docs	156
Authors Collaboration	
Single-Authored Documents	168
Co-Authors per Document	3.61
International Co-authorships (%)	43.06
Document Types	
Article	1780
Article; Book Chapter	20
Article; Early Access	205
Article; Proceedings Paper	2
Article; Retracted Publication	4

According to Table 1, all of the 2011 documents retrieved from the Web of Science database were categorized as articles. The data covers the period between 2020 and 2025. These studies were produced using 115,700 references, and a total of 5,568 authors contributed to the topic of big data. Additionally, 5,963 keywords were used by the authors. The proportion of studies utilizing big data technology in the fields of management and business is reported as 214%. The first research question is: *What is the distribution of articles according to the years they were published?* The findings addressing this question are presented in Table 2.

■ **Table 2** Distribution of Articles by Publication Year

Year	Number of Articles
2020	245
2021	319
2022	408
2023	467
2024	572

According to Table 2, the highest number of studies was conducted in 2024 with 572 studies, and when looking at the distribution over the last five years, it can be seen that the number of studies has increased year by year. The increasing interest in this field can be understood from the number of documents. The second research question is:

What is the distribution of articles according to the journals in which they were published? The findings of this research question are presented in Table 3 below:

■ **Table 3** Most Relevant Journals in the Field of Management and Big Data (2020–2025)

Source	No. of Documents
Technological Forecasting and Social Change	133
IEEE Transactions on Engineering Management	84
Journal of Business Research	81
Benchmarking – An International Journal	50
Business Strategy and the Environment	45
Journal of Enterprise Information Management	38
Business Process Mgmt Journal	32
European Journal of Innovation Management	31
TQM Journal	30
Cogent Business & Mgmt	28

According to Table 3, most studies were published in *Technological Forecasting and Social Change*. *IEEE Transactions on Engineering Management* ranked second, and *Journal of Business Research* ranked third.

The third question of the study was: *What are the most frequently used keywords by authors?* The findings of this study are presented in Figure 1.



Figure 1 Most frequently used keywords by authors

Figure 1 shows the most frequently used keywords. Words such as *big data*, *big data analytics*, *digital transformation*, *artificial intelligence*, and *sustainability*, which are expressed in large font, are frequently used. The fourth question of the research is: *Who are the authors who produce the most work?* The findings of this research question are presented in Table 4.

■ **Table 4** Most Frequently Cited Authors (Local Citations)

Author	Local Citations
BAG S	83
PAPA A	78
CIAMPI F	76
DEMI S	76
GIACOMO G	76
MAGRINI A	76
MARZI	76
KUMAR A	51
DHAMIJA P	45
LUTHRA S	45

According to Table 4, Bag is the author who produced the most studies with 83 studies, followed by Papa with 78 studies. Ciampi and Demi come next with 76 studies. The fifth question of the study is: *What are the most trending topics?* The answer to this question is presented below:

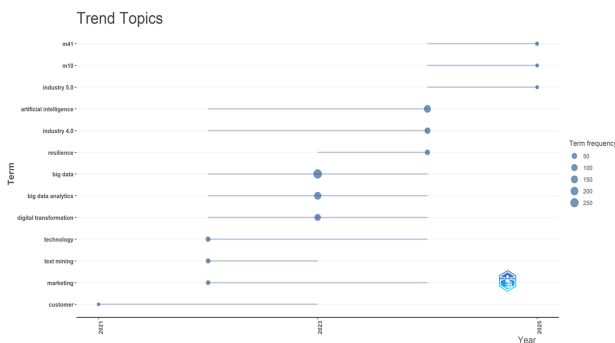


Figure 2 Trend Topics Identified Between 2021 and 2025

As seen in Figure 2, *big data*, *big data analytics*, *digital transformation*, *artificial intelligence*, and *Industry 4.0* are considered to be the most trending topics. They are frequently mentioned in connection with big data.

CONCLUSION

This study was conducted using bibliometric analysis techniques to reveal the general trends in the literature and the structural map of knowledge accumulation. The findings were comprehensively evaluated in terms of citation data, keyword usage, author impact, and source journal density at both global and local levels. Firstly, concepts such as 'big data,' 'big data analytics,' 'artificial intelligence,' and 'digital transformation' stand out among the most frequently recurring keywords. This shows how management and organization studies are integrated with current technological trends and that data-driven decision-making processes are at the forefront. In addition, concepts such as 'sustainability,' 'innovation,' 'performance,' and 'supply chain' reveal that strategic governance and operational efficiency dimensions are also intensively discussed in the studies. In author-based analyses, authors with both high local and global impact levels were identified. In particular, Bag S. has established a leading position in the literature, ranking

among the authors with the most local citations and the most publications. He is followed by Ciampi F. and Papa A. The contributions of these authors are related to the themes of digital transformation, sustainability, and innovation.

In journal-based analyses, the *Journal of Business Research* and *Technological Forecasting and Social Change* journals form the main axis of the literature in terms of both citations and publication volume. This highlights the interdisciplinary nature of the study and its strong links with both social sciences and engineering-based literature.

The co-citation network has enabled us to understand the theoretical foundation of the knowledge structure. Blue clusters, where classic strategy authors such as Porter, Teece, Barney, and Wernerfelt are concentrated, show that the resource-based view (RBV) and dynamic capabilities theory are still central reference points. On the other hand, the works of contemporary authors such as Bag, Belhadi, and Mikalef on artificial intelligence, digitalization, and sustainability indicate current research trends. The list of most cited documents includes publications such as Mikalef *et al.* (2021); Belhadi *et al.* (2021), which have received over 500 citations. These publications are thought to be related to themes such as digital transformation, data analytics, and green supply chain management. In addition, studies such as Ciampi *et al.* (2021); Usai *et al.* (2021) have become reference texts in the field, particularly through their publication in the *Journal of Business Research*.

In light of all these analyses, it has been observed that there has been a significant paradigm shift in the literature in the areas of strategic management, digitalization, and sustainability. Traditional resource-based strategy approaches are being reinterpreted in light of concepts such as big data, artificial intelligence, and digital transformation. In this context, the literature is increasingly taking on an interdisciplinary structure, and new research opportunities are emerging at the intersection of management science, information technology, and environmental sustainability. This study not only provides researchers with a map of the current state of the literature but also identifies potential gaps and trends that may guide future work. As a recommendation, it is suggested that future research should focus on restructuring conceptual frameworks around key themes identified through bibliometric analysis and integrating theoretical approaches with the requirements of the digital age.

Ethical standard

The author has no relevant financial or non-financial interests to disclose.

Availability of data and material

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of interest

The author declares that there is no conflict of interest regarding the publication of this paper.

LITERATURE CITED

- Abdelhalim, A. M., 2024 How management accounting practices integrate with big data analytics and its impact on corporate sustainability. *Journal of Financial Reporting and Accounting* **22**: 416–432.
- Ajah, I. A. and H. F. Nweke, 2019 Big data and business analytics: Trends, platforms, success factors and applications. *Big Data and Cognitive Computing* **3**: 32.

- Baig, M. I., L. Shuib, and E. Yadegaridehkordi, 2020 Big data in education: a state of the art, limitations, and future research directions. *International Journal of Educational Technology in Higher Education* **17**: 1–23.
- Belhadi, A., S. S. Kamble, C. J. C. Jabbour, A. Gunasekaran, N. O. Ndubisi, *et al.*, 2021 Manufacturing and service supply chain resilience to the covid-19 outbreak: Lessons learned from the automobile and airline industries. *Technological Forecasting and Social Change* **163**: 120447.
- Chawla, R. N. and P. Goyal, 2022 Emerging trends in digital transformation: a bibliometric analysis. *Benchmarking: An International Journal* **29**: 1069–1112.
- Ciampi, F., S. Demi, A. Magrini, G. Marzi, and A. Papa, 2021 Exploring the impact of big data analytics capabilities on business model innovation: The mediating role of dynamic capabilities. *Technological Forecasting and Social Change* **164**: 120531.
- Fanelli, S., L. Pratici, F. P. Salvatore, C. C. Donelli, and A. Zangrandi, 2023 Big data analysis for decision-making processes: Challenges and opportunities for the management of healthcare organizations. *Management Research Review* **46**: 369–389.
- Fosso Wamba, S. and D. Mishra, 2017 Big data integration with business processes: a literature review. *Business Process Management Journal* **23**: 477–492.
- Franke, F. and M. R. W. Hiebl, 2023 Big data and decision quality: The role of management accountants' data analytics skills. *International Journal of Accounting & Information Management* **31**: 93–127.
- Gärtner, B. and M. R. W. Hiebl, 2018 Issues with big data. In *The Routledge Companion to Accounting Information Systems*, edited by M. Quinn and E. Strauss, pp. 161–172, Routledge.
- Kalantari, A., A. Kamsin, H. S. Kamaruddin, N. Ale Ebrahim, A. Gani, *et al.*, 2017 A bibliometric approach to tracking big data research trends. *Journal of big data* **4**: 30.
- Liu, X., R. Sun, S. Wang, and Y. J. Wu, 2020 The research landscape of big data: a bibliometric analysis. *Library Hi Tech* **38**: 367–384.
- Luan, H., P. Geczy, H. Lai, J. Gobert, and *et al.*, 2020 Challenges and future directions of big data and artificial intelligence in education. *Frontiers in Psychology* **11**: 580820.
- Michalik, P., I. Zolotová, and V. Bures, 2014 Big data analytics for process improvement in manufacturing environments. *IFAC Proceedings Volumes* **47**: 7983–7988.
- Mikalef, P., J. Krogstie, I. O. Pappas, and P. A. Pavlou, 2021 Investigating the effects of big data analytics capabilities on firm performance: The mediating role of dynamic capabilities. *Information & Management* **58**: 103508.
- Nisar, Q. A., N. Nasir, S. Jamshed, S. Naz, M. Ali, *et al.*, 2021 Big data management and environmental performance: Role of big data decision-making capabilities and decision-making quality. *Journal of Enterprise Information Management* **34**: 1061–1096.
- Pizło, W., O. Kulykovets, D. Prokopowicz, A. Mazurkiewicz-Pizło, A. Kałowski, *et al.*, 2023 The importance of big data analytics technology in business management. *Cybersecurity and Law* **2**: 271–276.
- Sardi, A., E. Sorano, V. Cantino, and P. Garengo, 2023 Big data and performance measurement research: Trends, evolution and future opportunities. *Measuring Business Excellence* **27**: 531–548.
- Usai, A., V. Scuotto, A. Murray, A. Stephan, and A. Ferraris, 2021 Do entrepreneurial knowledge and innovative attitude overcome “imperfections” in the innovation process? the role of social media and open innovation. *Journal of Business Research* **128**: 342–361.
- Ward, J. S. and A. Barker, 2013 Undefined by data: a survey of big data definitions. arXiv preprint arXiv:1309.5821 .

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