

RESEARCH PROGRESS ON LEVERAGING BIG DATA ANALYTICS FOR DECISION-MAKING: A BIBLIOMETRIC ANALYSIS

Nazliah Chikon ^{a*}, Shuzlina Abdul-Rahman^a, Syaripah Ruzaini Syed Aris^a

^a *College of Computing, Informatics and Mathematics, Universiti Teknologi MARA,
Shah Alam, Selangor, Malaysia*

*Corresponding author's email: 2023431044@isiswa.uitm.edu.my

ABSTRACT

This bibliometric analysis explores the research landscape of leveraging Big Data Analytics (BDA) for decision-making, covering publications from 2019 to 2024. The study systematically reviews 1,013 articles retrieved from the Scopus database to identify key research trends, influential contributions, and the geographical distribution of research output. The findings reveal a significant increase in BDA research post-2020, driven by advancements in the Internet of Things (IoT), machine learning, and the heightened need for data-driven decision-making during the COVID-19 pandemic. India, the United States, and China are identified as leading contributors, with substantial international collaborations enriching research quality and impact. The analysis highlights the predominance of computer science, engineering, and decision sciences in advancing BDA capabilities. High citation counts of key authors underscore their pivotal roles in shaping the field. This study underscores BDA's critical role in enhancing operational efficiency and strategic decision-making, providing a robust framework for navigating complex environments. Future research should focus on addressing data quality challenges, enhancing governance structures, and integrating emerging technologies to maximize BDA's potential.

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Keywords: *big data analytics; BDA; decision making; data quality; Bibliometric Analysis*

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1. INTRODUCTION

Big data analytics (BDA) has emerged as a transformative force, enabling organizations across various sectors to enhance their operational efficiency and decision-making processes (Chen et al., 2021; Koot et al., 2021). It involves processing and analysing large, complex datasets that traditional databases cannot handle efficiently, enabling insights from sources like social media, sensors and the Internet of Things (Yarlagadda, 2022). The exponential growth of data, driven by

advancements in digital technologies, has necessitated the development of computational techniques to extract actionable insights from voluminous data sets, aiding decision-making across industries (Islam & Khan, 2024). These capabilities allow organizations to optimize processes, reduce costs, and improve responsiveness to dynamic market conditions (Jha et al., 2020).

In recent years, numerous studies have explored the multifaceted benefits of BDA for decision-making across different domains. For instance, in supply chain management, BDA facilitates the optimization of inventory management and logistics, thereby increasing profitability (Hrouga & Sbihi, 2023) and enhancing operational efficiency. In the healthcare sector, BDA improves clinical decision-making by providing comprehensive insights into patient data, leading to better patient outcomes and more efficient resource management (Hussain et al., 2023; Sousa et al., 2019). Additionally, BDA supports strategic decision-making at the organizational level by enabling accurate forecasting, strategic alignment, and adaptability to external disruptions (Li et al., 2022; Ragazou et al., 2023). This bibliometric analysis aims to systematically review the existing literature on leveraging BDA for decision-making, identify key research trends, and highlight influential contributions within this field. By mapping the scholarly landscape, this analysis provides a comprehensive understanding of how BDA capabilities are being utilized to drive decision-making and operational efficiency across various sectors.

2. LITERATURE REVIEW

Big data analytics (BDA) has transformed decision-making processes across various sectors by providing actionable insights from vast datasets. Various studies explore big data analytical capabilities in organizations. Big data analytics (BDA) capabilities significantly enhance operational efficiency by enabling organizations to process and analyse vast amounts of data in real time. Chen et al. (2021) stated that BDA optimizes supply chain operations by providing actionable insights that improve inventory management, reduce costs, and enhance responsiveness to market changes. This is supported by Koot et al. (2021), who emphasize the integration of the Internet of Things (IoT) with BDA to offer real-time data from physical operations, thus improving decision-making indirectly through enhanced data visibility and processing capabilities. Alhameli et al. (2021) further extend this discussion by proposing novel clustering methods to tackle the complexity of multiscale decision problems, demonstrating that methodological advancements are crucial for maximizing BDA's benefits in operational contexts. Additionally, Yildizbasi & Arioz (2022) highlight how BDA can facilitate environmentally conscious decisions in supply chain management, aligning operational efficiency with sustainability goals and expanding the scope of BDA's benefits beyond immediate operational improvements.

In terms of decision-making, BDA capabilities provide significant advantages by improving the accuracy, speed, and quality of decisions across various sectors. Hussain et al. (2023) illustrate that advancements in data quality and analytical techniques enable more precise and timely clinical decisions in healthcare, leading to better patient outcomes and resource management. Meanwhile, Sousa et al. (2019) emphasize that BDA supports decision-making in healthcare management by enhancing processes related to human resources and organizational efficiency. On a strategic level, Ragazou et al. (2023) demonstrate that BDA drives operational efficiencies and supports strategic decisions through comprehensive analysis,

allowing organizations to adapt to dynamic market conditions and unforeseen events. Chen et al. (2022) further debate that BDA's impact is contingent on external variables such as event criticality, which can either enhance or diminish its effectiveness. This is contrasted by Ahmed et al. (2022) and Kinra et al. (2020), who show that BDA significantly enhances project success and public policy decisions by providing deeper insights and improving decision-making processes. Collectively, these studies suggest that BDA is a critical enabler of strategic decision-making, providing a robust framework for navigating complex and dynamic environments, thus driving organizational success and innovation.

In summary, the literature highlights the critical role of BDA in supporting decision-making in various domains. Leveraging BDA in each domain reveals unique challenges and opportunities, suggesting that successful BDA integration requires a nuanced understanding of sector-specific contexts, technological readiness, and governance structures. The interplay between technological advancements, organizational strategies, and external contingencies emerges as a key determinant of BDA's effectiveness in decision-making.

3. RESEARCH QUESTION

This study is conducted by addressing the following research questions (RQs):

- RQ1: What are the research trends in leveraging big data analytics for decision-making according to the year of publication?
- RQ2: What are the types of documents by subject of research?
- RQ3: Who writes the most-cited articles?
- RQ4: How are the collaborations of co-authorship countries?
- RQ5: How about network mapping based on co-citation by authorship?

4. METHODOLOGY

Bibliometric analysis is a popular and rigorous method for exploring and analyzing large volumes of scientific data. It enables us to unpack the evolutionary nuances of a specific field while shedding light on the emerging areas in that field (Donthu et al., 2021). It includes advanced methods such as document co-citation analysis, along with standard descriptive data like publishing journals, publication year, and major author categorization. To provide a comprehensive bibliography and reliable results, a successful literature review requires an iterative process involving the identification of appropriate keywords, literature search, and meticulous analysis (Van Eck & Waltman, 2007). Given this, the study focused on high-indexed publications, as they offer valuable insights into the theoretical perspectives influencing the field's development. The Scopus database was used for data gathering to ensure data reliability (Elnadi & Abdallah, 2024). Additionally, only papers published in rigorously peer-reviewed academic journals were considered, while books and lecture notes were intentionally excluded to ensure the inclusion of high-quality publications. Specifically, Elsevier's Scopus, known for its extensive coverage, facilitated the collection of publications from 2019 to May 2024 for further examination.

4.1 Data search strategy

The search terms for article retrieval were determined by the study using a screening sequence. The study was started by putting together 13,962 articles online and querying the Scopus database. Later, the query string was changed to concentrate on

leveraging big data analytics for decision-making by using the search phrases "big data analytics" AND "decision making." 1,013 articles from the final search string in Table 1 refinement were used for bibliometric analysis. All publications pertaining to big data analytics with a focus on decision-making that was found in the Scopus database as of May 2024 were included in the research.

Table 1: The search string

Scopus	TITLE-ABS-KEY (("big data analytic*" OR "BDA") AND "decision making*") AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp"))
	Accessed: 15 May 2024 Result: 1013

Table 2: The selection criterion in searching

Criterion	Inclusion	Exclusion
Timeline	2019-2024	<2019
Language	English	Non-English
Document Type	Article, Conference paper	Non-article, non-conference
Source type	Journal and Proceeding	Book, Review, survey

4.2 Data analysis

VOSviewer is a widely used software tool in the field of bibliometrics and scientometrics for visualizing and analyzing bibliographic data. It is developed by Nees Jan van Eck and Ludo Waltman at Leiden University in the Netherlands. It allows researchers to create visual representations of bibliometric networks, such as co-authorship, co-citation, and keyword co-occurrence networks, allowing them to identify patterns, trends, and relationships within extensive sets of scholarly literature (van Eck & Waltman, 2010). The software employs various algorithms to cluster and map data points, providing insights into the structure and dynamics of scientific fields, research collaborations, and knowledge domains (Haryandi et al., 2021). One of its outstanding features is its ability to convert complex bibliometric datasets into easily interpretable visual maps and charts. Specializing in network visualization, the software excels at clustering related items, analyzing keyword co-occurrence patterns, and creating density maps. Researchers benefit from its user-friendly interface, which allows both novice and experienced users to efficiently explore research landscapes.

Datasets comprising information on the publication year, title, author name, journal, citation, and keywords in plain text format were procured from the Scopus database, spanning the period from 2019 to May 2024. These datasets were then analyzed using VOSviewer software version 1.6.19. Through the application of VOS clustering and mapping techniques, this software facilitated the examination and generation of maps.

5. RESULT AND FINDING

This section presents the results and findings from the data analysis based on the research questions.

RQ1: What are the research trends in leveraging big data analytics for decision-making according to the year 2019 until 2024?

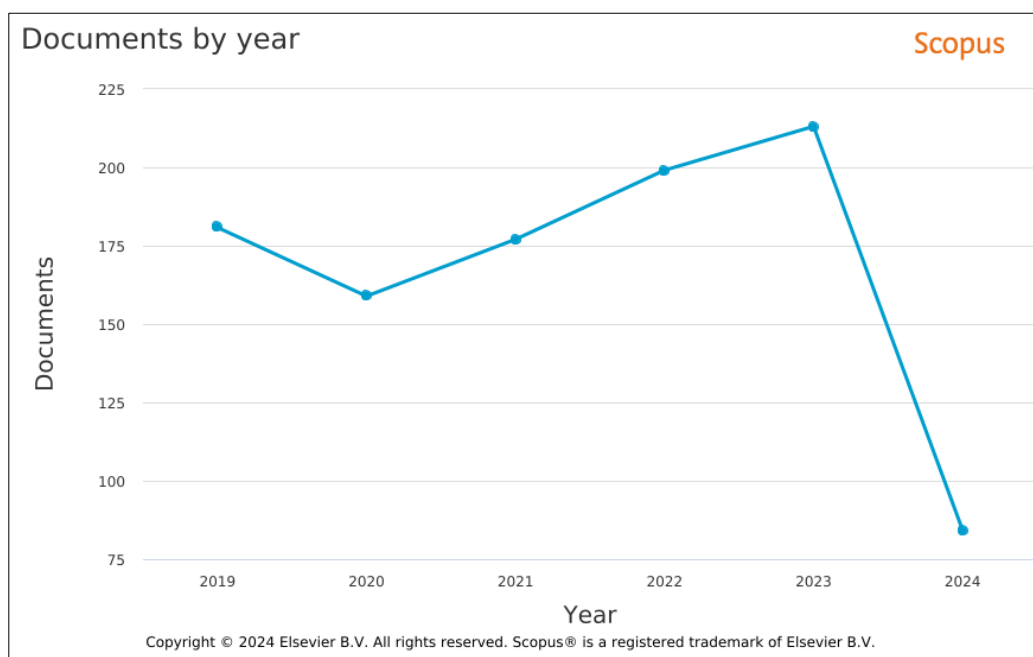


Figure 1: Research publications from 2019 until 2024

The bibliometric analysis of publications by year provides a clear view of the temporal trends in scholarly output over recent years. The data spans from 2019 to 2024, showing fluctuations in the number of publications each year and indicating potential factors influencing research productivity and publication rates.

The bibliometric analysis of publications on Big Data Analytics for decision-making yields significant insights into the patterns and changes in the field. The data demonstrates a significant amount of research output, with a noticeable focus in recent years. In 2019, the publication count started at a moderate level, with 181 publications making up 17.87% of the total. This year serves as a pre-pandemic baseline, reflecting typical research productivity levels before the global disruptions. The relatively high number of publications indicates a healthy and active research environment prior to the onset of the pandemic.

It then experienced a slight dip in 2020, with 159 publications, accounting for 15.70% of the total. This year marks the beginning of the COVID-19 pandemic, which had a significant impact on research activities worldwide. The slightly reduced number of publications could be a result of the disruptions caused by lockdowns, lab closures, and the shift to remote work, which affected many researchers' ability to conduct and publish their work. However, the publication count rebounds in the following year. The year 2021 saw 177 publications, representing 17.47% of the total. While slightly increased than the previous year, this figure likely reflects the continued adaptation to the challenges posed by the pandemic, with many researchers possibly finalizing and publishing work that had been in progress.

The publications continued to increase in 2022, with 199 documents published, making up 19.64% of the total. This high number reflects sustained research activity, possibly driven by the resumption of normal research operations following the disruptions of previous years. The substantial output indicates that researchers were

highly engaged in publishing their findings during this period. Remarkably, there was a significant jump in 2023, with the number of publications reaching a peak of 213, which is 21.03% of the total. This upward trend could be attributed to factors such as increased research funding or heightened collaborative efforts as the global academic community adapts to new norms post-pandemic or a renewed focus on specific research areas.

Notably, the graph shows a sharp decline in the publication count after 2023. In 2024, the number of publications drops significantly, with the number of publications projected to be around 84, accounting for 8.29% of the total, which is the lowest point in the time range depicted. Given that this year is still ongoing or recently completed, the lower number of publications can be attributed to the fact that not all research from this year may have been published or indexed yet. The final count for 2024 could increase as more works are finalized and disseminated.

Overall, the data illustrates a clear recovery and growth in research output following the initial impact of the COVID-19 pandemic. The peak in 2023 suggests a particularly productive year, possibly influenced by a backlog of research coming to fruition and increased global collaboration. The trend also highlights the resilience and adaptability of the academic community in the face of unprecedented challenges.

RQ2: What are the types of documents by subject of research?

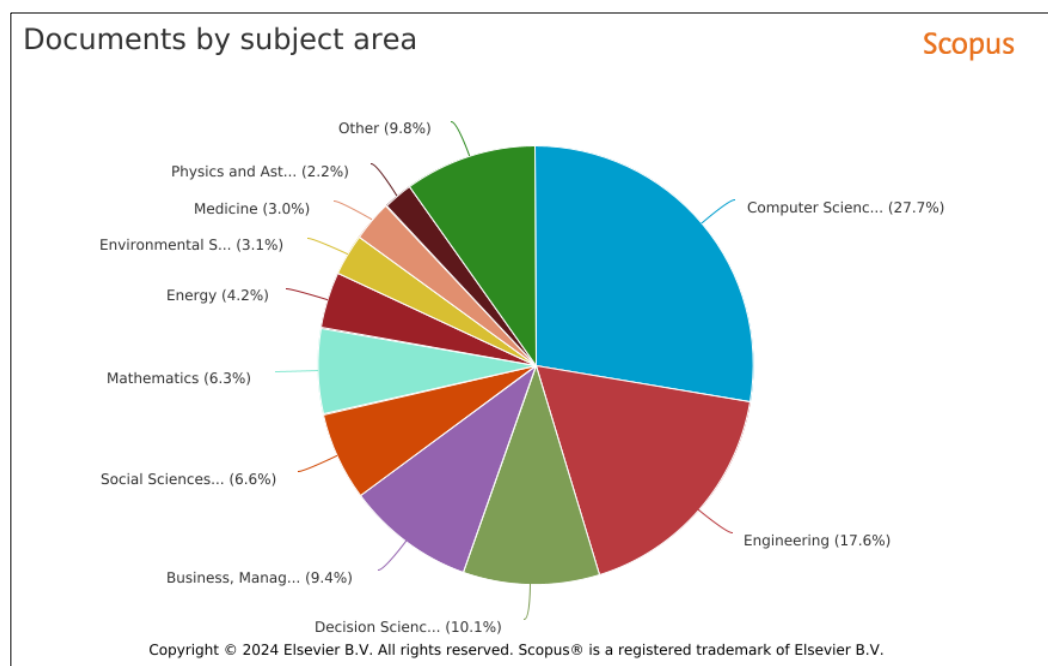


Figure 2: Research publications by subject area

The pie chart illustrates the distribution of publications by subject area, providing insight into the research focus and output across different disciplines. The chart is divided into several slices, each representing a specific subject area and its corresponding percentage. The data reveals a significant concentration of publications in specific fields, indicating the focal areas of scholarly activity and research trends. The largest slice, colored in blue, represents Computer Science, which accounts for 27.7% of the publications. This significant portion highlights the prominence of computer science research and reflects the growing importance of technology and

digital advancements in various fields. The second-largest slice, colored in red, represents Engineering at 17.6%. This suggests a strong emphasis on engineering research, which is crucial for developing and applying practical solutions to real-world challenges.

Decision Sciences, colored in gray, occupies 10.1% of the pie chart, indicating a substantial contribution to decision-making processes, data analysis, and operations research. Business and Management, shown in purple, accounts for 9.4% of the publications, highlighting the importance of research in areas such as strategy, organizational behavior, and business management practices. Social Sciences, colored in orange, holds a 6.6% share, indicating research in fields related to human behavior, societies, and social structures. Mathematics, represented by the yellow slice, accounts for 6.3% of the publications, reflecting the fundamental role of mathematical theories and applications across various disciplines.

The remaining slices of the pie chart show additional topic areas that have made smaller contributions to the study on big data analytics for decision-making. The inclusion of these varied subject areas highlights the complex and diversified nature of research on e-learning during the COVID-19 pandemic. It extends beyond the realm of technology and explores the energy, environmental sciences, medicine, physics, astronomy, and other fields, suggesting a diverse range of additional subject areas that contribute to the overall research output.

This breakdown provides a comprehensive overview of the research landscape, highlighting the predominant fields and the interconnectedness of various disciplines. It underscores the dynamic nature of scientific inquiry and the importance of cross-disciplinary collaboration in addressing complex global challenges. Additionally, it can highlight potential deficiencies and areas for future investigation, thereby enhancing the overall comprehension of the influence and consequences of big data analytics in decision-making and beyond.

RQ3: Who writes the most-cited articles?

Table 3: Number of publications according to most-cited articles

Authors	Title	Year	Source Title	Cited by
Sharma R. et al.	A systematic literature review on machine learning applications for sustainable agriculture supply chain performance	2020	Data Science Journal	371
Wang J. et al.	Thirty Years of Machine Learning: The Road to Pareto-Optimal Wireless Networks	2020	Government Information Quarterly	360
Ferraris A. et al.	Big data analytics capabilities and knowledge management: impact on firm performance	2019	Cities	357
Luo J. et al.	Flexible and durable wood-based triboelectric nanogenerators for self-powered sensing in athletic big data analytics	2019	Smart Cities	343

Authors	Title	Year	Source Title	Cited by
Hariri R.H. et al.	Uncertainty in big data analytics: survey, opportunities, and challenges	2019	Big Data and Society	314
Gupta S. et al.	Circular economy and big data analytics: A stakeholder perspective	2019	Global Policy	281
Zhou G. et al.	Knowledge-driven digital twin manufacturing cell towards intelligent manufacturing	2020	International Journal of Environmental Research and Public Health	233
Osman A.M.S.	A novel big data analytics framework for smart cities	2019	Cities	197
Maraoufkhani P. et al.	Big data analytics adoption: Determinants and performances among small to medium-sized enterprises	2020	Ecological Economics	192
Awan U. et al.	Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance	2021	International Journal of Obesity	165

The bibliometric analysis of the top 10 authors based on citations reveals critical insights into the influential research works and scholars in the field. The table showcases the most highly cited articles, highlighting key contributions across various domains, especially focusing on machine learning, big data analytics, and their applications. Sharma R. et al. lead the list with their 2020 article titled "A Systematic Literature Review on Machine Learning Applications for Sustainable Agriculture Supply Chain Performance," published in the Data Science Journal. This work has garnered 371 citations, indicating its substantial impact on the academic community. The paper's focus on integrating machine learning to enhance the sustainability and efficiency of agricultural supply chains addresses a crucial global challenge, thus attracting considerable scholarly attention.

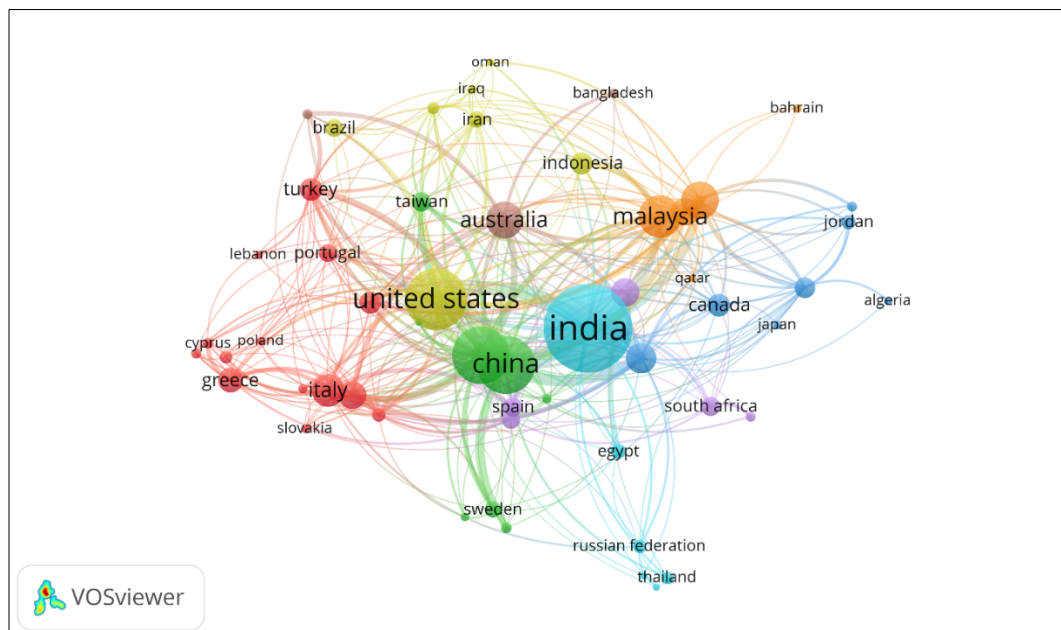
Wang J. et al. follow closely with their 2020 paper, "Thirty Years of Machine Learning: The Road to Pareto-Optimal Wireless Networks," published in Government Information Quarterly, which has received 360 citations. This article provides a comprehensive review of three decades of machine learning advancements and their application to optimizing wireless networks. The high citation count reflects its importance in both historical context and future research directions in the field of wireless communications. Ferraris A. et al. have also made a significant contribution with their 2019 article, "Big Data Analytics Capabilities and knowledge management: impact on firm performance," published in Cities. This work, cited 357 times, explores the intersection of big data analytics and knowledge management, demonstrating how these capabilities can enhance organizational performance. The research's relevance to business and urban development sectors explains its high citation rate. Luo J. et al.'s (2019) article, "Flexible and durable wood-based triboelectric nanogenerators for self-powered sensing in athletic big data analytics," published in Smart Cities, has been cited 343 times. This innovative study presents the development of sustainable,

wood-based nanogenerators for energy harvesting, which can be applied in smart city infrastructures. The interdisciplinary nature of this research, bridging materials science and big data analytics, has contributed to its widespread recognition.

Hariri R.H. et al.'s (2019) survey, "Uncertainty in big data analytics: survey, opportunities, and challenges," published in *Big Data and Society*, has received 314 citations. This comprehensive review addresses the inherent uncertainties in big data analytics, offering valuable insights into opportunities and challenges. The article's critical examination of the field's limitations and potential has resonated widely with researchers. Gupta S. et al. have made notable contributions with their 2019 article, "Circular economy and big data analytics: A stakeholder perspective," published in *Global Policy* and cited 281 times. This research highlights the role of big data analytics in supporting circular economy initiatives, emphasizing stakeholder involvement. The paper's focus on sustainable development and policy implications has attracted significant academic and practical interest. Zhou G. et al.'s (2020) article, "Knowledge-driven digital twin manufacturing cell towards intelligent manufacturing," published in the *International Journal of Environmental Research and Public Health*, has been cited 233 times. This study introduces the concept of digital twins in manufacturing, leveraging knowledge-driven approaches to enhance intelligent manufacturing processes, reflecting the increasing importance of digital transformation in industry.

Osman A.M.S.'s (2019) work, "A Novel Big Data Analytics Framework for Smart Cities," published in *Cities*, has received 197 citations. This article proposes a comprehensive framework for integrating big data analytics into smart city initiatives, addressing urban challenges through innovative technological solutions. The high citation count underscores the relevance of smart city research in contemporary urban planning. Maraoufkhani P. et al.'s (2020) article, "Big Data Analytics Adoption: Determinants and Performances among small to medium-sized enterprises," published in *Ecological Economics*, has been cited 192 times. This study examines the factors influencing big data analytics adoption among SMEs and its impact on their performance. The research's focus on the economic and environmental benefits of big data for smaller enterprises has garnered substantial academic interest. Finally, Awan U. et al.'s (2021) paper, "Big Data Analytics Capability and decision-making: The Role of Data-driven Insight on Circular Economy Performance," published in the *International Journal of Obesity*, has 165 citations. This article explores how big data analytics capabilities can enhance decision-making processes, particularly in the context of circular economy performance. The relatively recent publication date and already significant citation count reflect the growing importance of data-driven approaches in sustainable economic models.

In summary, the bibliometric analysis identifies leading authors and their influential works, emphasizing the critical role of machine learning and big data analytics in various applications. These highly cited articles reflect the dynamic and interdisciplinary nature of contemporary research, addressing key challenges and opportunities across different sectors.

RQ4: How are the collaborations of co-authorship countries?**Figure 3: The countries whose authors collaborate for research publications**

The table presents a detailed bibliometric analysis of scholarly documents based on country, citations, and total link strength using VOSviewer. India emerges as the leading country with the highest number of documents (205) and a substantial total link strength (105), underscoring its active research output and robust network of academic collaborations. Despite having fewer documents (118), the United States leads in citations with 3554 and a total link strength of 94, indicating the high impact and influential nature of its research publications. China is also a major contributor with 108 documents and 2568 citations, accompanied by a total link strength of 91, reflecting its significant presence and interconnectedness in the academic community. The United Kingdom, although having a slightly lower document count (107), boasts the highest citation count (3681) and the highest total link strength (129), highlighting its strong influence and extensive academic networking.

Malaysia, with 67 documents, 925 citations, and a total link strength of 52, demonstrates considerable academic activity and collaboration. Saudi Arabia shows a notable performance with 56 documents, 764 citations, and a total link strength of 62, indicating its growing research influence and connectivity. Australia contributes significantly with 54 documents and 1270 citations, coupled with a total link strength of 54, reflecting its active research environment and collaborative efforts. Italy and France also show strong academic outputs, with Italy producing 45 documents with 1232 citations (total link strength of 49) and France with 41 documents and 1602 citations (total link strength of 60), both indicating substantial research impact and collaboration.

Other countries, such as Germany and Pakistan, have notable contributions, with Germany producing 36 documents and 768 citations (total link strength of 43) and Pakistan with 35 documents and 951 citations (total link strength of 44). These figures highlight their active participation and influence in academic research. Smaller countries like Greece (30 documents, 331 citations, total link strength 23) and Canada (26 documents, 381 citations, total link strength 22) also demonstrate meaningful

contributions to the research landscape. Turkey and Indonesia, with 26 and 25 documents, respectively, and total link strengths of 40 and 16, show emerging academic activities and collaborations. Several countries have moderate contributions, such as South Korea (25 documents, 294 citations, total link strength 26) and the United Arab Emirates (23 documents, 177 citations, total link strength 32), indicating their growing academic presence. South Africa and Spain, with 21 and 20 documents, respectively, show moderate citation counts and total link strengths, reflecting their developing research activities. Taiwan and the Netherlands, with 20 and 19 documents, respectively, exhibit strong citation impacts and total link strengths, emphasizing their active participation and influence in global research. Brazil and Portugal have 18 documents each, with Brazil having lower citations and link strength, indicating emerging research activities. In comparison, Portugal shows a more significant presence with higher citations and link strength.

Iran, Sweden, and Egypt, each with 16 and 14 documents, respectively, show varying degrees of citations and link strengths, highlighting their academic contributions and collaborative efforts. Countries like Jordan and the Czech Republic, despite having fewer documents, exhibit notable citation counts and total link strengths, indicating impactful research outputs. Smaller research outputs are seen in countries like the Russian Federation, Romania, and Thailand, with each producing around 10-12 documents and varying citation impacts, reflecting their contributions to the global research community. Vietnam, Cyprus, and Hong Kong, with around 9-10 documents, show emerging academic activities with varying degrees of influence and collaboration. Countries with minimal contributions, such as Nigeria, Tunisia, and Bangladesh, show limited research outputs and influence, indicating areas for potential growth and development. Similarly, smaller countries like Algeria, Bahrain, and Finland have minimal documents but still contribute to the global research landscape.

This analysis reveals a comprehensive overview of the academic output, impact, and collaboration strength of various countries, highlighting the leading contributors and emerging players in the field of research. The total link strength metric is particularly insightful, as it highlights the extent of international collaborations and the interconnectedness of different countries within the research community.

RQ5: How about network mapping based on co-citation by authorship?

In the bibliometric analysis conducted using VOSviewer, the co-citation network of authors reveals significant insights into the scholarly impact and collaborative linkages in the research field. The table highlights key authors, their citations, and their total link strength, providing a comprehensive view of their influence and interconnectedness within the academic community. The author with the highest number of citations is Gunasekaran A., who has amassed 477 citations and a total link strength of 45,042, indicating a broad and deep influence across numerous scholarly works. This suggests that Gunasekaran A. is a pivotal figure in the research field, with his work being widely recognized and frequently cited by peers.

Similarly, Dubey R. stands out with 359 citations and a total link strength of 36,344. The substantial link strength signifies that Dubey R.'s contributions are not only highly cited but also integral to the network of related research, reflecting strong collaborative and interdisciplinary ties. Authors like Akter S., with 302 citations and a total link strength of 26,397, and Dwivedi Y. K., with 136 citations and a total link

strength of 11,945, also demonstrate notable scholarly influence. Akter S.'s high link strength relative to the number of citations suggests that his work forms a crucial nexus in the literature, bridging various research streams and enhancing the overall connectivity of the scholarly network.

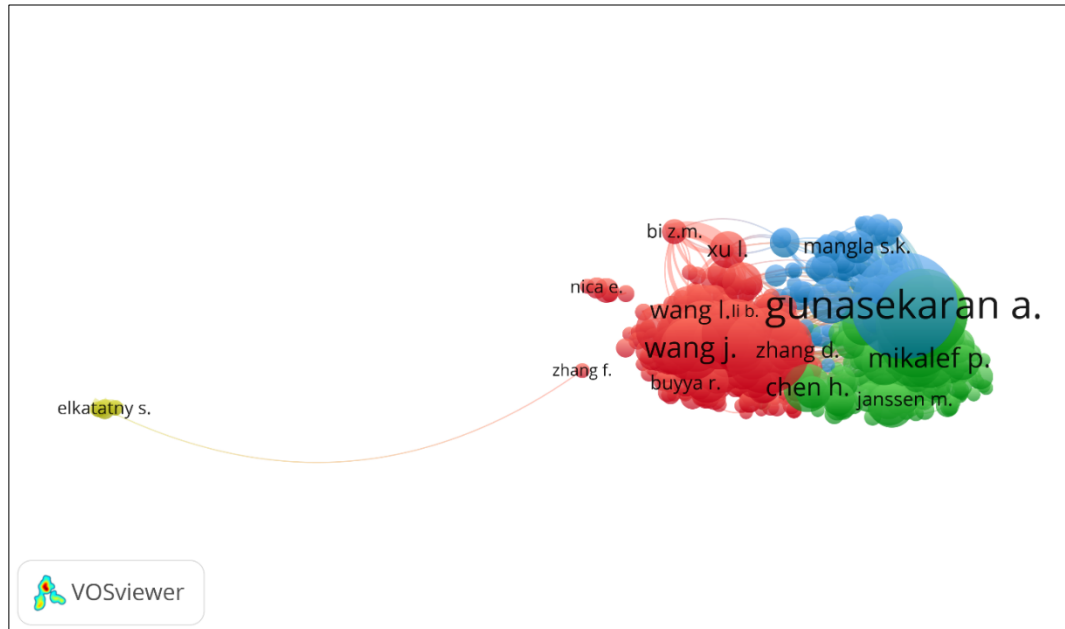


Figure 4: The authors who collaborate for research publications

The network analysis also highlights the prominence of authors such as Chen H., who, despite having 143 citations, shows a total link strength of 8,643, underscoring the high impact and extensive reach of his research within the academic community. Similarly, McAfee A., with 90 citations and a total link strength of 5,816, and Gupta S., with 130 citations and a total link strength of 9,485, indicate substantial influence and connectivity. Noteworthy is the presence of authors like Wang J. (210 citations, 11,249 link strength), Wang Y. (342 citations, 21,379 link strength), and Li Y. (169 citations, 9,409 link strength), whose high citation counts and significant link strengths reflect their key roles in advancing and interlinking research topics. Furthermore, the analysis of authors such as Brynjolfsson E. (119 citations, 7,069 link strength) and Davenport T.H. (125 citations, 8,750 link strength) showcases their foundational contributions to the field, likely in areas of digital transformation and analytics, given their high citation and link metrics.

This bibliometric overview, through VOSviewer, underscores the multifaceted impact of these authors. The interplay of citations and link strength metrics provides a nuanced understanding of their scholarly influence, highlighting key figures who are central to the propagation and development of knowledge within their respective domains. This network of co-citations not only maps the intellectual landscape but also identifies pivotal authors who contribute significantly to the cohesion and evolution of research fields.

6. DISCUSSION AND CONCLUSION

The bibliometric analysis of leveraging Big Data Analytics (BDA) for decision-making highlights several key trends and insights within the research landscape from 2019 to 2024. The data indicates a growing interest and substantial research output in

BDA, particularly during the years following the initial impact of the COVID-19 pandemic. The significant increase in publications in 2023 suggests a recovery and heightened research activity, possibly driven by increased funding, global collaborations, and the urgent need for data-driven decision-making during the pandemic. This period saw a focus on integrating advanced technologies such as IoT and machine learning with BDA, reflecting the interdisciplinary nature and expanding applications of BDA in various fields.

The analysis also reveals the geographical distribution of research contributions, with India, the United States, and China emerging as leading contributors. India's prominent position underscores its robust research ecosystem and strategic investments in higher education and technology. The United States and China, with their well-established research infrastructures and significant government support, continue to lead in producing high-impact research. The collaborative nature of BDA research is evident from the total link strength metrics, highlighting extensive international collaborations that enrich the research quality and impact.

The thematic focus on computer science, engineering, and decision sciences indicates that these areas are pivotal in advancing BDA capabilities and applications. Additionally, the high citation counts of key authors and articles emphasize the critical contributions of specific researchers and their work in shaping the BDA landscape.

In conclusion, the bibliometric analysis provides a comprehensive overview of the research trends and contributions in leveraging Big Data Analytics for decision-making. The findings underscore the rapid growth and diversification of BDA research, driven by technological advancements and the increasing need for data-driven insights across various sectors. The analysis suggests that BDA is a critical enabler of operational efficiency and strategic decision-making, providing a robust framework for navigating complex and dynamic environments. Future research should continue to explore the evolving applications of BDA, address the challenges of data quality and governance, and enhance the integration of emerging technologies.

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REFERENCES

- Ahmed, R., Shaheen, S., & Philbin, S. P. (2022). The role of big data analytics and decision-making in achieving project success. *Journal of Engineering and Technology Management*, 65, 101697. <https://doi.org/10.1016/j.jengtecman.2022.101697>
- Alhameli, F., Ahmadian, A., & Elkamel, A. (2021). Multiscale decision-making for Enterprise-Wide Operations incorporating clustering of High-Dimensional attributes and big data analytics: Applications to energy hub. *Energies*, 14(20), 6682. <https://doi.org/10.3390/en14206682>
- Chen, D. Q., Preston, D. S., & Swink, M. (2021). How big data analytics affects supply chain decision-making: An empirical analysis. *Journal of the Association for Information Systems*, 22(5), 1224 – 1244. <https://doi.org/10.17705/1jais.00713>
- Chen, L., Liu, H., Zhou, Z., Chen, M., & Chen, Y. (2022). IT-business alignment, big data analytics capability, and strategic decision-making: Moderating roles of event criticality and disruption of COVID-19. *Decision Support Systems*, 161,

113745. <https://doi.org/10.1016/j.dss.2022.113745>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Elnadi, M., & Abdallah, Y. O. (2024). Industry 4.0: critical investigations and synthesis of key findings. *Management Review Quarterly*, 74, 711–744. <https://doi.org/10.1007/s11301-022-00314-4>
- Haryandi, S., Suyidno, S., Misbah, M., Dewantara, D., Mahtari, S., & Ibrahim, M. A. (2021). Scientific creativity: A bibliometric review and analysis. *Momentum: Physics Education Journal*, 5(1), 10–20. <https://doi.org/10.21067/mpej.v5i1.5002>
- Hrouga, M., & Sbihi, A. (2023). Logistics 4.0 for supply chain performance: perspectives from a retailing case study. *Business Process Management Journal*, 29(6), 1892–1919. <https://doi.org/10.1108/BPMJ-03-2023-0183>
- Hussain, F., Nauman, M., Alghuried, A., Alhudhaif, A., & Akhtar, N. (2023). Leveraging Big Data Analytics for Enhanced Clinical Decision-Making in Healthcare. *IEEE Access*, 11, 127817 – 127836. <https://doi.org/10.1109/ACCESS.2023.3332030>
- Islam, M. T., & Khan, B. U. (2024). Big data and analytics: Prospects, challenges, and the way forward. In M. Khosrow-Pour, D.B.A. (Ed.), *Encyclopedia of Information Science and Technology, Sixth Edition. Advance online publication.* (pp. 1–30). <https://doi.org/10.4018/978-1-6684-7366-5.ch048>
- Jha, A. K., Agi, M. A. N. N., & Ngai, E. W. T. T. (2020). A note on big data analytics capability development in supply chain. *Decision Support Systems*, 138(2020), 113382. <https://doi.org/10.1016/j.dss.2020.113382>
- Kinra, A., Beheshti-Kashi, S., Buch, R., Nielsen, T. A. S., & Pereira, F. (2020). Examining the potential of textual big data analytics for public policy decision-making: A case study with driverless cars in Denmark. *Transport Policy*, 98, 68 – 78. <https://doi.org/10.1016/j.tranpol.2020.05.026>
- Koot, M., Mes, M. R. K., & Iacob, M. E. (2021). A systematic literature review of supply chain decision making supported by the Internet of Things and Big Data Analytics. *Computers and Industrial Engineering*, 154. <https://doi.org/10.1016/j.cie.2020.107076>
- Li, L., Lin, J., Ouyang, Y., & Luo, X. (Robert). (2022). Evaluating the impact of big data analytics usage on the decision-making quality of organizations. *Technological Forecasting and Social Change*, 175. <https://doi.org/10.1016/j.techfore.2021.121355>
- Ragazou, K., Passas, I., Garefalakis, A., Galariotis, E., & Zopounidis, C. (2023). Big data analytics applications in Information Management driving operational efficiencies and decision-making: Mapping the field of knowledge with Bibliometric Analysis using R. *Big Data and Cognitive Computing*, 7(1). <https://doi.org/10.3390/bdcc7010013>
- Sousa, M. J., Pesqueira, A. M., Lemos, C., Sousa, M., & Rocha, Á. (2019). Decision-making based on big data analytics for people management in healthcare organizations. *Journal of Medical Systems*, 43(9). <https://doi.org/10.1007/s10916-019-1419-x>
- van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>

- Van Eck, N. J., & Waltman, L. (2007). Bibliometric mapping of the computational intelligence field. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 15(5), 625–645. <https://doi.org/10.1142/S0218488507004911>
- Yarlagadda, D. (2022). Survey on big data analytics. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 10(9), 79–84. <https://doi.org/10.22214/ijraset.2022.46566>
- Yildizbasi, A., & Arioz, Y. (2022). Green supplier selection in new era for sustainability: A novel method for integrating big data analytics and a hybrid fuzzy multi-criteria decision making. *Soft Computing*, 26(1), 253 – 270. <https://doi.org/10.1007/s00500-021-06477-8>