

# Mapping the Intellectual Landscape of Big Data in Accounting and Finance: A Decade of Bibliometric Analysis (2013-2023)

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## ABSTRACT

This study examines the intellectual structure and research trends at the intersection of big data, accounting, and finance using a bibliometric analysis of 295 Scopus-indexed papers from 2013 to 2023. The study tackles the need to understand collaboration networks and topic evolutions in this dynamic environment. We discovered dominating research clusters, essential contributors, and topic trajectories before and after COVID-19 using co-authorship and keyword co-occurrence analyses. The methodology uses tools like VOSviewer and Biblioshiny to map collaboration patterns and thematic map concentrations. The findings show that international collaboration, notably amongst scholars from China, the United States, and the United Kingdom, is critical to advance the discipline. Traditional subjects such as “big data”, “finance”, and “accounting” dominate keyword research, while emergent topics such as “artificial intelligence”, “cloud computing”, and “risk assessment” represent technological improvements. The COVID-19 pandemic sparked new research avenues, introducing concepts like “neural networks” and “sustainable development goals”. The findings emphasise big data’s disruptive impact on financial and accounting procedures and the need for future studies to address regulatory, ethical, and transdisciplinary issues. This study adds to the literature by providing a complete analysis of big data research trends and a road map for scholars and practitioners to navigate the changing academic and industrial settings.

**Keywords:** Big data, Accounting, Finance, Bibliometric analysis, Thematic map analysis, Co-authorship analysis.

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## INTRODUCTION

Big data has rapidly gained prominence in the fields of accounting and finance.<sup>[1]</sup> In finance, big data pertains to extensive datasets that are significant in absolute or comparative terms. It’s more than just sheer volume; it also comprises many variables in relation to the sample size, frequently analysed using machine learning techniques. Moreover, big data captures economic activities in conventional and unstructured formats like text, images, and audio. This versatility enables it to explore research areas that traditional data sets might overlook.

However, the term “big data” remains somewhat nebulous. Nissim<sup>[2]</sup> suggests it’s a catch-all phrase encompassing everything from vast data collections to sophisticated analytical techniques for discerning patterns. The European Commission describes big

data as enormous volumes of varied data from diverse origins, whether humans, machines, or sensors<sup>1</sup>. This definition could include anything from climate data and satellite imagery to transaction records and GPS signals. Big data might also comprise personal data, encompassing individual-specific information, from names and photographs to medical records and IP addresses. Oracle characterises big data by its “Three Vs”: volume, variety, and velocity. Unlike the structured nature of traditional data, big data introduces unstructured formats, demanding advanced processing. Its magnitude can span from terabytes to petabytes, and its swift accumulation rate poses challenges for organisations regarding assimilation and practical application.

Previous research has highlighted several areas of big data in accounting and finance that deserve further exploration, such as risk and security, data visualisation, predictive analytics and data quality.<sup>[3]</sup> These domains offer promising avenues for research that could refine industry practices and foster interdisciplinary partnerships. While accounting and finance are accustomed to handling vast data volumes, the actual deployment of big data and its analytical methodologies is still budding. This inclination



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highlights a discernible gap between big data's potential and its present-day application in these sectors.

The extensive literature on big data in accounting and finance has prompted numerous scholars to review the existing body of work. However, many such reviews have been narrowly focused on specific facets of big data rather than its holistic application in accounting and finance. For instance, the current body of literature has been segmented into particular research areas, such as accounting and auditing,<sup>[4,5]</sup> finance,<sup>[6]</sup> sustainable supply chain finance,<sup>[7]</sup> and accounting.<sup>[8]</sup> Given that recent studies, notably by Nobanee<sup>[6]</sup> and Varma *et al.*,<sup>[8]</sup> have only conducted bibliometric analyses in 2021, we recognise an urgent need for a comprehensive review in accounting and finance, which has inspired this paper.

In this paper, we set out a tripartite objective. Firstly, we examine the most influential publications, authors, and institutions in big data research within accounting and finance. Next, we scrutinise patterns of co-authorship and the co-occurrence of both author-specific and index keywords. Finally, we turn our attention to the prevailing topics and construct a thematic map based on keywords, aiming to trace the progression of these keywords over time, emphasising the periods before and during the COVID-19 pandemic. To our understanding, our research is pioneering in examining keyword and thematic evolutions across different phases of the COVID-19 pandemic. This unique perspective is our most significant contribution to the burgeoning literature on big data within accounting and finance.

The paper is organised as follows: Section 2 discusses the literature pertaining to big data in accounting and finance. Section 3 delineates the bibliometric data and methodologies employed in this investigation. Section 4 highlights the results and discussion, while Section 5 offers the conclusion of the study.

## LITERATURE REVIEW

With numerous potentials for practice and research, big data is generally regarded as a disruptive factor in accounting and finance. Six under-researched areas of big data in accounting and finance were found by Cockcroft and Russell,<sup>[3]</sup> including risk and security, data visualisation, predictive analytics, and data management. Warren *et al.*<sup>[9]</sup> showed how big data might improve the quality and relevance of accounting information, hence fostering more openness and better decision-making among relevant parties. Moreover, Younis<sup>[10]</sup> emphasised the value of big data methods in auditing procedures and financial forecasting models and their possibilities in stock market prediction and financial failure avoidance.

Big data clearly affects accounting processes, according to research. Abueid and Hakami<sup>[11]</sup> underlined the great importance of big data analysis in accounting and finance and said that illuminating academics and researchers in this area depends on offering seminars and training. Gepp *et al.*<sup>[5]</sup> found an

increasing trend towards using big data in accounting processes in their analysis of the existing advancements and projected possibilities of big data approaches in auditing research and practice. Ren,<sup>[12]</sup> who mentioned its power to increase efficiency, risk control capabilities, and the scope of financial management, also highlighted the tremendous impact of big data on financial management. Furthermore, thanks to big data technology, the evolution of corporate financial information provides tools for the junction of business and finance, as Xu and Zhou<sup>[13]</sup> note.

Integration of big data has taken the front stage in accounting. Many research have looked at how big data might affect accounting procedures. Concerning the Sustainable Development Goals of the United Nations, Esteban *et al.*<sup>[14]</sup> performed a bibliometric study on accounting, big data, and global development. This paper thoroughly evaluates the academic scene in this field. Arnaboldi *et al.*<sup>[15]</sup> investigated accountants' opinions on big data, stressing the benefits and difficulties it presents related to social media and responsibility. Moreover, according to Akbulut and Kaya,<sup>[16]</sup> big data analytics can change accounting and financial reporting. They showed how well big data analytics might capture real-time cause and correlation processes, therefore transforming conventional financial reporting methods.

Focussing on internal consumption and user-centric visualisation methods, Coyne *et al.*<sup>[17]</sup> examined how accountants engage with big data information governance in the information governance framework. This paper highlights how accounting techniques are evolving in reaction to the influx of big data. Dagilienė and Klovienė<sup>[18]</sup> looked at the reasons for using analytics and big data in external audits, shedding light on companies' strategies to welcome these technologies for auditing goals.

Big data has revolutionised finance and opened fresh opportunities for investment strategies, technical development, financial management, and technological change.<sup>[6]</sup> Big data is being used increasingly in finance, as seen by the increasing number of bibliometric evaluations focused on big data research in finance.<sup>[19]</sup> These research show how important big data is for changing methods of financial management and decision-making procedures.

By using big data analytics, financial institutions can acquire a competitive advantage, lower risks, and investigate fresh development and innovation opportunities in the evolving financial scene of today. By clarifying the trends, challenges, and possibilities connected to big data integration in finance, these bibliometric studies help to prepare the ground for the next studies and sectoral developments. Integrating big data into accounting and finance will likely revolutionise current practices by offering improved insights, efficiency, and decision-making ability. Maintaining competitiveness and satisfying the aspirations

1 See the EU Data Protection Reform and Big Data; <https://data.europa.eu/doi/10.2838/190200>.

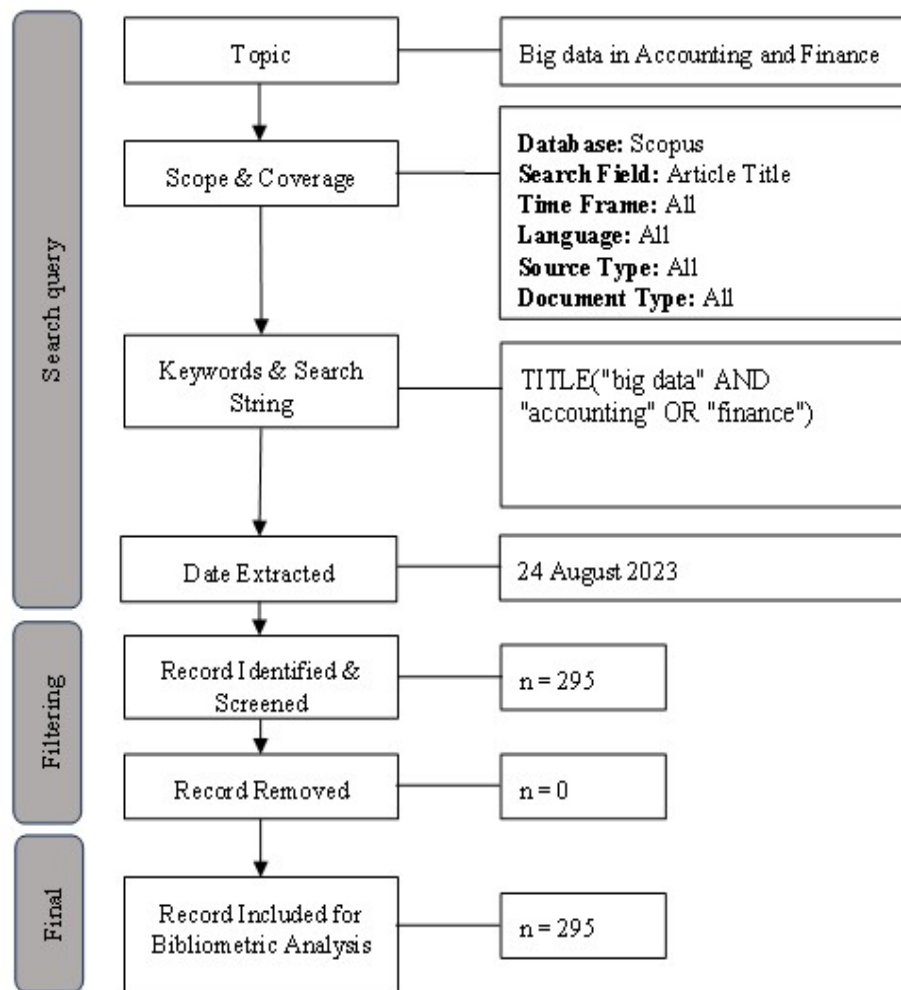
of a data-driven financial sector depends on using big data technologies as the industry develops.

Big data in accounting and finance has been the subject of bibliometric study in several works. Tseng *et al.*<sup>[7]</sup> bibliometrically investigated Sustainable Supply Chain Financing (SSCF) using big data analytics. Their studies underlined the essential functions of blockchain, cash flow problems, reverse factoring, risk assessment, and the triple bottom line in SSCF. To address field uncertainty, they used qualitative and quantitative approaches. Including big data in accounting systems has also drawn academic interest. Focussing on the interaction between big data and accounting, Varma *et al.*<sup>[8]</sup> performed a bibliometric analysis showing how big data technologies change accounting methods.

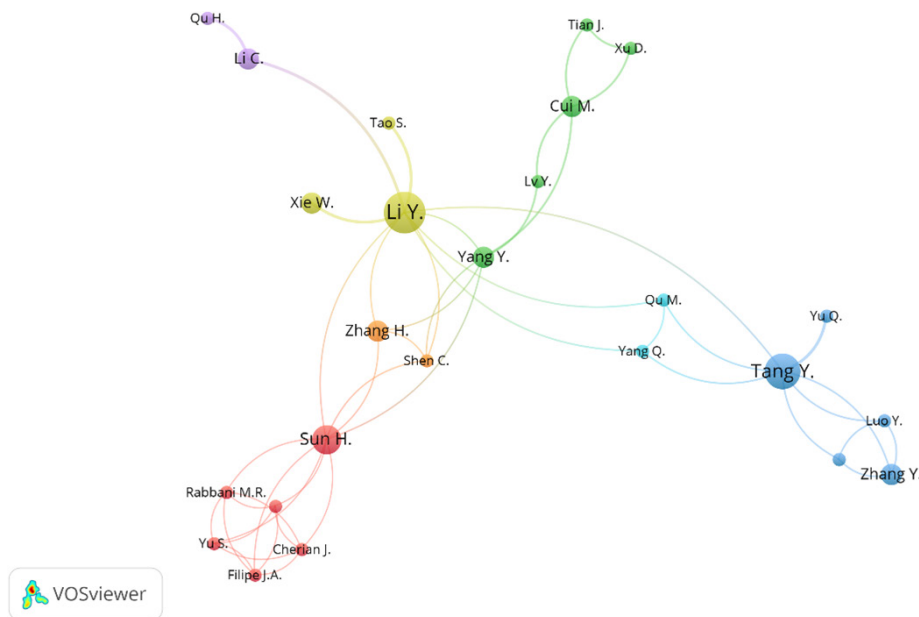
Murthy and Geerts<sup>[20]</sup> also examined the relationship between accounting information systems and big data. With an eye towards better integrating structured external data with transactional processing elements, their study presented an ontology-based

model that links big data aspects to accounting information systems. Agustí and Orta-Pérez<sup>[4]</sup> conducted a bibliometric study on utilising big data and artificial intelligence, providing insights into how these technologies are being used inside auditing and accounting firms in the context of auditing and accounting.

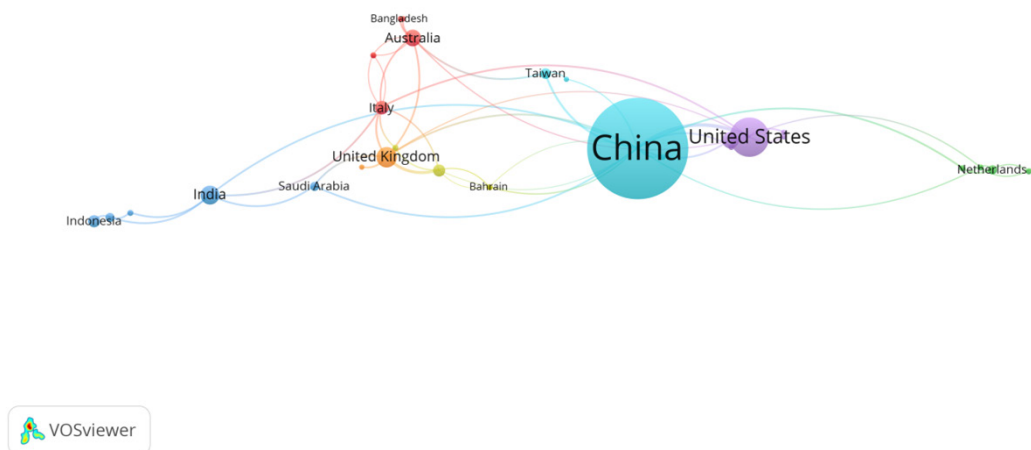
Likewise, bibliometric research has investigated how big data might be used in the financial industry. For example, Nobanee<sup>[6]</sup> primarily examined big data in financial matters, stressing the improvement of cooperation and information sharing through aggregated bibliographic databases that visualised research results. Emphasising the need for data-driven strategies in enhancing operational efficiencies and strategic financial decision-making, Mishra *et al.*<sup>[21]</sup> conducted a comprehensive research and bibliometric analysis of the literature on big data and supply chain management. Big data applications in finance enhance decision-making procedures and offer insights into financial technology, supply chain management, and risk assessment.



**Figure 1:** Bibliometric search query process from Scopus database. Note: This illustration shows the search query process in the Scopus database.



**Figure 2:** Co-authorship analysis (author level). Note: This figure, created using fractional counting in *VOSviewer*, shows the network between co-authors at author level.



**Figure 3:** Co-authorship analysis (country level). Note: This figure, created using fractional counting in *VOSviewer*, shows the network between co-authors at country level.

## BIBLIOMETRIC DATA AND METHODS

Bradford<sup>[22]</sup> was the first to introduce bibliometric analysis, subsequently developed by Price.<sup>[23]</sup> The primary metric used to evaluate and assess scholarly articles is citation counts, which Price introduced in various bibliometric methods. Kim and McMillan<sup>[24]</sup> elaborated on this process, emphasising the article as the fundamental unit of analysis. The influential aspects of big data within accounting and finance literature can be highlighted through bibliometric citation analysis. This method is particularly adept at identifying the connections between articles and various authors.

Elsevier Scopus, a renowned repository for its comprehensive collection of peer-reviewed articles, serves as our source for bibliometric data. We implemented the search query TITLE (“big data” AND accounting OR finance) to extract relevant papers within paper titles. 295 records were obtained during this inquiry, conducted on 24 August 2023. These records were subsequently incorporated into our bibliometric analysis. Figure 1 provides a comprehensive overview of our search methodology, outlining our steps to retrieve pertinent papers from the Scopus database.

### Bibliometric search query process

A systematic approach was employed to identify articles related to “big data” in Accounting and Finance from the Scopus database

during this study's bibliometric search query procedure. The following is a comprehensive account of the procedure:

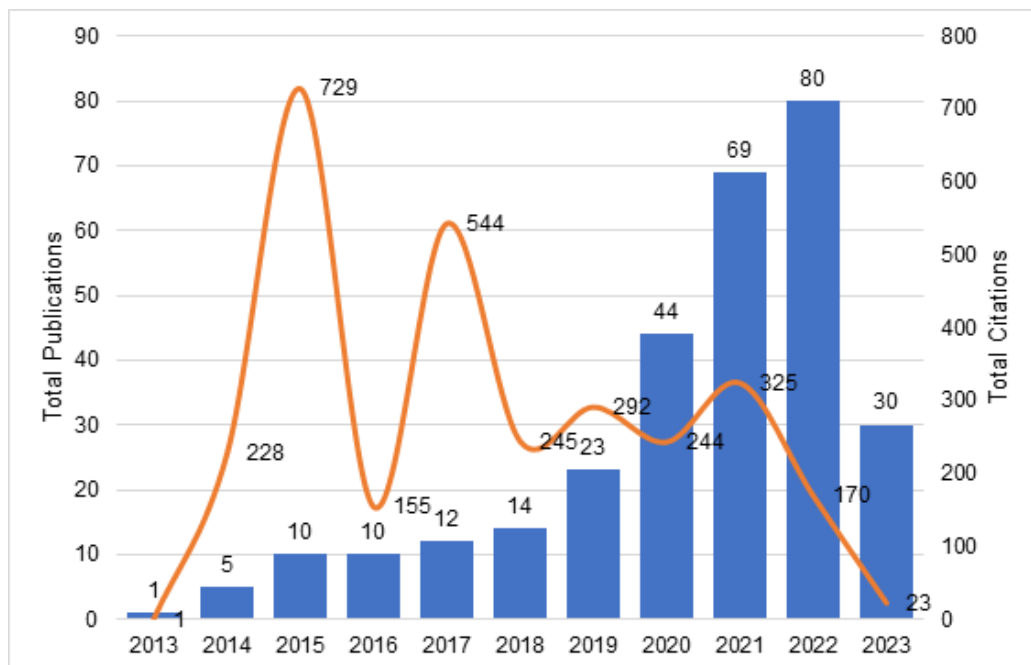
1. Database: We employed the Scopus database, a comprehensive multidisciplinary database that indexes scientific literature.

2. Search Field: The search was conducted with a specific concentration on the titles of articles pertinent to the research topic, specifically in the Article Title field.

3. Time Frame: The search was comprehensive, encompassing articles from all periods, suggesting no limitations on the publication dates.

**Table 1: Main information.**

Main information		Year	Total publications	Total citations
Publication years	2013 - 2023	2013	1	1
Total publications	295	2014	5	228
Citable year	11	2015	10	729
Number of contributing authors	675	2016	10	155
Number of single-authored papers	114	2017	12	544
Number of multiple-authored papers	181	2018	14	245
Number of cited papers	161	2019	23	292
Total citations	2956	2020	43	244
Citation per paper	9.92	2021	68	325
Citation per cited paper	18.36	2022	80	170
Citation per year	295.60	2023	29	23
Citation per author	4.38	Grand total	295	2956
Author per paper	2.27			
Citation sum within h-core	2698			
<i>h</i> -index	27			
<i>g</i> -index	51			
<i>m</i> -index	2.45			



**Table 2: Most influential publications.**

<b>A. By number of Publications (TP)</b>										
	<b>Source title</b>	<b>TP</b>	<b>NCA</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>
1	ACM International Conference Proceeding Series	22	57	6	25	1.14	4.17	3	4	0.60
2	Journal of Physics: Conference Series	20	33	14	34	1.70	2.43	3	4	0.60
3	Advances in Intelligent Systems and Computing	11	16	3	6	0.55	2	2	2	0.33
4	Lecture Notes on Data Engineering and Communications Technologies	11	15	1	1	0.09	1	1	1	0.50
5	Lecture Notes in Electrical Engineering	8	14	0	0	0	0	0	0	0.00
6	Wireless Communications and Mobile Computing	8	13	5	15	1.88	3	2	3	0.67
7	IOP Conference Series: Materials Science and Engineering	6	18	4	5	0.83	1.25	1	1	0.17
8	E3S Web of Conferences	6	8	2	3	0.50	1.5	1	1	0.25
9	Accounting Horizons	5	12	5	665	133	133	5	5	0.56
10	Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering	4	4	2	3	0.75	1.5	1	1	0.33
<b>B. By Total Citations (TC)</b>										
	<b>Source title</b>	<b>TP</b>	<b>NCA</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>
1	Accounting Horizons	5	12	5	665	133	133	5	5	0.56
2	Accounting and Business Research	2	3	2	223	112	112	2	2	0.20
3	Journal of Information Systems	3	8	3	219	73	73	3	3	0.43
4	Journal of Accounting Education	3	8	3	160	53.3	53.3	2	3	0.29
5	Accounting, Auditing and Accountability Journal	1	3	1	131	131	131	1	1	0.14
6	Emerging Markets Finance and Trade	3	11	2	117	39	58.5	2	3	0.33
7	Journal of Monetary Economics	2	4	2	88	44	44	2	2	0.33
8	Journal of Big Data	1	3	1	79	79	79	1	1	0.25
9	Annals of Operations Research	2	10	1	73	36.5	73	1	2	0.50
10	Australian Accounting Review	1	2	1	71	71	71	1	1	0.17
<b>C. By number of Citations per Cited Publications (C/CP)</b>										
	<b>Source title</b>	<b>TP</b>	<b>NCA</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>
1	Accounting Horizons	5	12	5	665	133	133	5	5	0.56
2	Accounting, Auditing and Accountability Journal	1	3	1	131	131	131	1	1	0.14
3	Accounting and Business Research	2	3	2	223	112	112	2	2	0.20
4	Journal of Big Data	1	3	1	79	79	79	1	1	0.25
5	Journal of Information Systems	3	8	3	219	73	73	3	3	0.43
6	Annals of Operations Research	2	10	1	73	36.5	73	1	2	0.50
7	Australian Accounting Review	1	2	1	71	71	71	1	1	0.17
8	Emerging Markets Finance and Trade	3	11	2	117	39	58.5	2	3	0.33
9	Journal of Accounting Education	3	8	3	160	53.3	53.3	2	3	0.29
10	International Journal of Production Economics	1	4	1	53	53	53	1	1	0.33

Notes: TP=Number of publications; NCA=Number of contributing authors; NCP=Number of cited publications; TC=Total number of citations; C/P=Average of citations per publication; C/CP=Average of citations per cited publication.



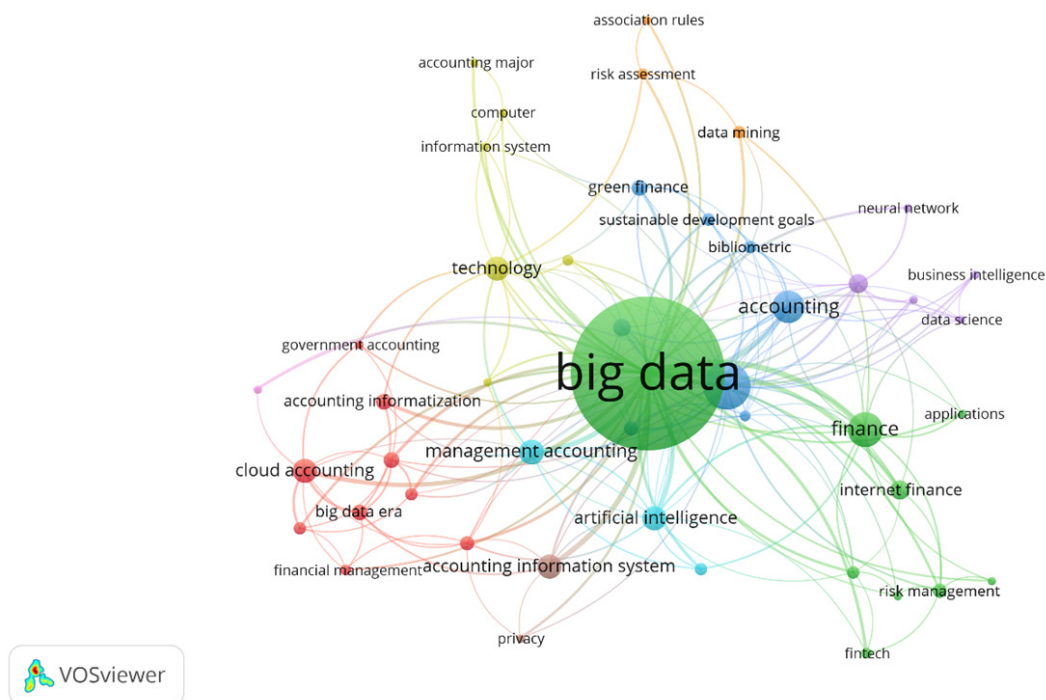
4. Language: The search encompassed articles in all languages, guaranteeing comprehensive subject matter coverage.
5. Source Type: The search was comprehensive, encompassing articles from various publications, including conference proceedings and periodicals.
6. Document Type: The search encompassed all document types, indicating that various documents, including research articles and reviews, were considered.
7. Search Query: The search query that was employed was as follows: TITLE("big data" AND "accounting" OR "finance"). This query concentrated on articles that featured the keywords "big data" in conjunction with either "accounting" or "finance."
8. Record Identification and Screening: The search query yielded 295 documents. Subsequently, these records were evaluated for their relevance to the "big data" field in Accounting and Finance.
9. Topic Scope and Coverage: Records were filtered to ensure they followed the research concentration on big data in Accounting and Finance.
10. Record Inclusion for Bibliometric Analysis: Following the screening and filtering process, no document was excluded, and 295 records were included for bibliometric analysis.
11. Date Extracted: The search results were extracted on 24 August, 2023.

Our objective was to identify pertinent articles for bibliometric analysis on the subject of "big data" in Accounting and Finance by adhering to this systematic search query procedure. The search query's criteria were instrumental in reducing the number of search results and concentrating on articles that were most relevant to the research topic.

### Scopus as the source of bibliometric analysis

Scopus is a reliable source for bibliometric analysis because of its extensive coverage, robust search capabilities, and high-quality data. Scopus is employed for bibliometric investigations because it allows for precise analysis of scientific research.<sup>[25-27]</sup> Scopus provides access to high-quality bibliometric data for academic research, including quantitative science.<sup>[28]</sup> It is an ideal subject for bibliometric research due to its financing data, citation accuracy, and content coverage.<sup>[29]</sup>

Due to its extensive scientific literature coverage, Scopus is an exceptional tool for conducting bibliometric assessments and analyses across various domains.<sup>[30]</sup> The search capabilities and user-friendly interface facilitate the identification of authors, publication years, abstracts, institutions, and countries for bibliometric studies.<sup>[31]</sup> Scopus is the preferred tool for bibliometric analysis due to its more comprehensive article index.<sup>[32]</sup> Scholars can analyse bibliometric data with the help of Scopus's bibliometric software and bibliographic data.<sup>[33]</sup> The primary international scientific database is regarded as reliable for bibliometric studies.<sup>[34]</sup> Scopus is the preferred database



**Figure 4:** Author keywords co-occurrence network visualisation. Note: This figure, created using fractional counting in VOSviewer, visualises the network of co-occurrence within authorial cues, with a minimum occurrence of three.





Researchers can refine their search by concentrating on article titles, which may produce more precise and pertinent results. Titles are a valuable place to look for papers that satisfy research aims since they contain a wealth of phrases that summarise the core ideas of the research.<sup>[40]</sup> With this targeted search, researchers can improve the quality and relevance of bibliometric analyses by avoiding irrelevant or needless articles.<sup>[41]</sup> Bibliometric analysis that solely looks up article titles can increase effectiveness, accuracy, and relevance. By concentrating on titles, researchers can expedite data collection, identify important publications quickly, and ensure that retrieved articles align with research objectives-all contribute to a more relevant and focused bibliometric analysis.

### Data-cleaning process

We used the proprietary program Bibliomagika to clean the Scopus data after the extraction comprehensively.<sup>[42]</sup> First, we separated the data from Scopus by using Microsoft Excel's "Separate Value" macro to separate the full names and affiliations of the authors. Thanks to this process, we could identify every author-even those whose names were missing. We manually looked for the names of any missing or unreachable authors inside

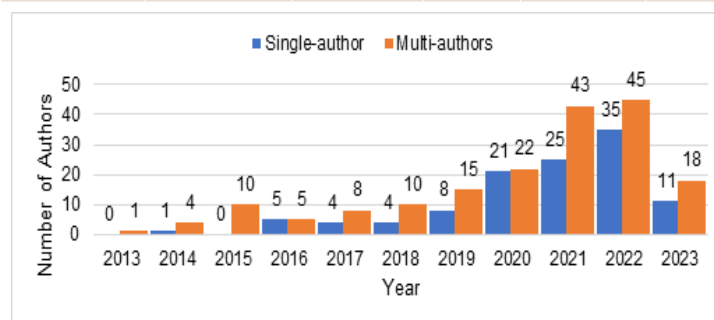
the published document. Author affiliations were occasionally missing, necessitating a search of the published papers, publisher websites, or the authors' Scopus or Google Scholar profiles. The most time-consuming aspect of the procedure turned out to be filling in these blanks. Now and again, Scopus neglected to update this data in its database; thus, to move forward with bibliometric analysis, we had to finish these details.

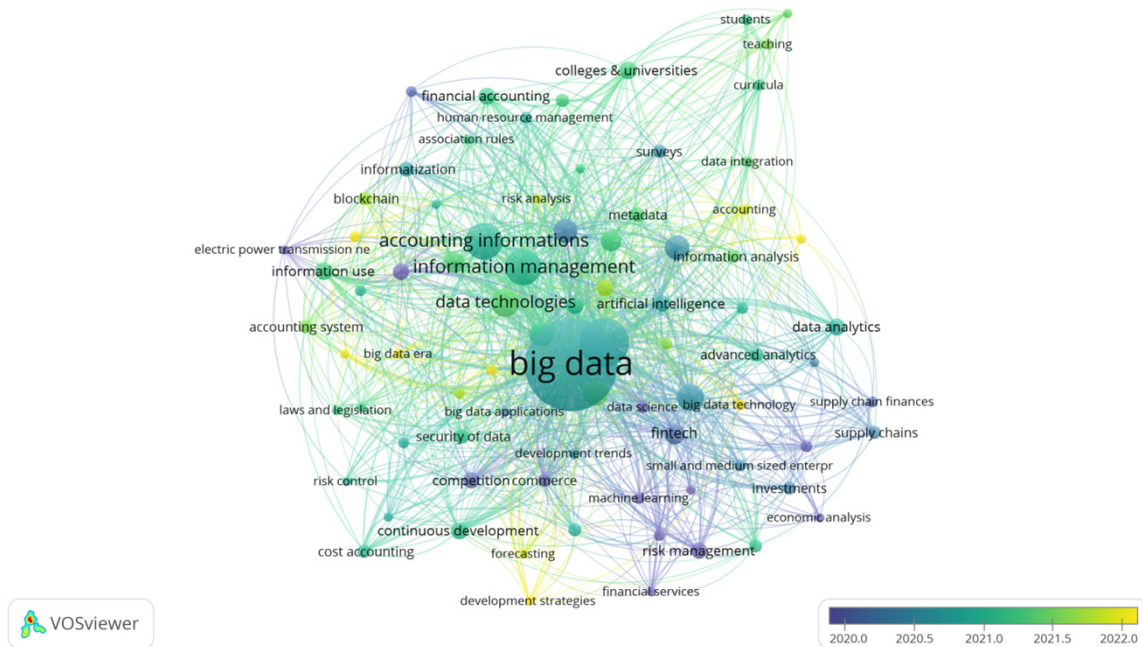
After completing any missing data, we proceeded to standardise the information. Authors frequently used initials instead of full names, occasionally omitted middle names, and used various first names. Moreover, discrepancies in affiliations or addresses in the published documents that Scopus had recorded required to be aligned. We used OpenRefine to address these inconsistencies and guarantee reliable bibliometric analysis.<sup>[43]</sup> A useful tool for harmonising and standardising bibliometric data from various sources is OpenRefine. Researchers can improve the quality and usefulness of bibliometric data for analysis by using OpenRefine to clean, convert, and reconcile it.<sup>[44]</sup>

Researchers frequently encounter data from many sources in bibliometric analysis, each with its own formats and patterns. To facilitate effective data harmonisation, OpenRefine provides

**Table 3: Single-vs multiple-authors publications.**

No of author(s) per document		Single-vs multiple-authors			
No of author(s)	Frequency	Year	Single	Multiple	Total
1	114	2013	.	1	1
2	72	2014	1	4	5
3	54	2015	.	10	10
4	32	2016	5	5	10
5	14	2017	4	8	12
6	7	2018	4	10	14
7	1	2019	8	15	23
8	1	2020	21	22	43
Grand total	295	2021	25	43	68
		2022	35	45	80
		2023	11	18	29
		Grand Total	114	181	295





**Figure 7:** Index keywords co-occurrence overlay visualisation. Note: This figure, created using fractional counting in VOSviewer, visualises the overlay of co-occurrences within the index keywords, with a minimum number of occurrences of five.

features to standardise data fields, fix mistakes, eliminate duplication, and harmonise data formats.<sup>[45]</sup> The harmonisation process guarantees data consistency and preparedness for analysis, resulting in more accurate and reliable research findings. Researchers can save time and effort while preserving the integrity and coherence of the bibliometric data by using OpenRefine to streamline the data harmonisation process.<sup>[46]</sup>

### Bibliometric thematic map analysis

We then performed cartographic analysis, concentrating on co-occurrence and co-authorship of keywords. VOSviewer is used for this analysis.<sup>[47]</sup> Furthermore, Biblioshiny is employed for a co-word thematic map analysis.<sup>[48]</sup>

Cartographic and thematic map analyses study and interpret maps to express particular thematic content and extract spatial information from maps. While thematic map analysis looks at the theme content or specific subject matter portrayed on maps, cartographic analysis concentrates on the visual depiction of geographic data. Through the study of spatial relationships, design features, symbols, and colours, cartographic analysis allows academics to understand the visual communication of geographic information. This study evaluates the map's scale, projection, legend, and other cartographic elements to identify spatial patterns and relationships.<sup>[49]</sup> Understanding the creation of maps and the visual representation of geographical information is essential to cartographic analysis.

On the other hand, thematic map analysis looks at maps intended to illustrate particular themes or subjects, such as population

distribution, land use, or natural resources. Thematic maps contain thematic data and provide significant information about a topic using visual characteristics such as colour, size, and pattern.<sup>[50]</sup> Scholars scrutinise thematic maps to derive meaning, detect geographical trends, and arrive at well-informed conclusions about the subject matter.

## RESULTS AND DISCUSSION

Table 1 presents the primary data from our dataset, comprising 295 publications from 2013 to 2023, contributed by 675 authors. Notably, publications from 2015 received the highest number of citations. In our attempt to identify the ten most influential publications, we categorised them based on a) number of publications, b) total citations, and c) average citations per cited publication. These findings are detailed in Table 2.

Conference proceedings, including the ACM International Conference Proceeding Series, Journal of Physic Conference Series, and Advances in Intelligent Systems and Computing, overwhelmingly dominate the top publications by volume. However, Accounting Horizons stands out as the sole journal publication in this category, ranking ninth. Intriguingly, when assessing total and average citations per cited publication, Accounting Horizons emerges as the frontrunner. For both these metrics, journals occupy most of the top ten spots. Specifically, the journals leading in total citations are Accounting Horizons, Accounting and Business Research, and Journal of Information Systems. On the other hand, in terms of average citations per cited publication, Accounting Horizons, Accounting, Auditing

and Accountability Journal, and Accounting and Business Research take the lead. This result suggests that journals garner more academic citations while conference proceedings frequently publish on big data in accounting and finance.

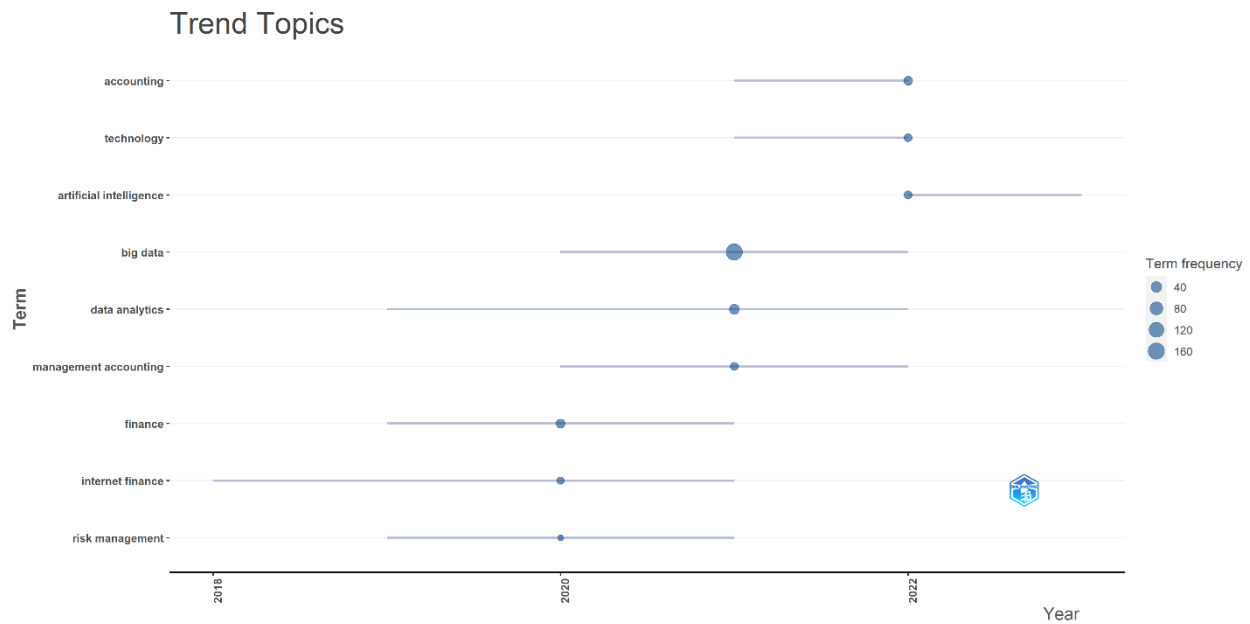
Table 3 investigates the trend of single author versus co-authored publications. Of the 295 publications, 114 are solo authored, while 181 have multiple authors. As a general trend, publications with multiple authors have been more prevalent. Table 4 highlights the most influential papers based on total citations and average citations per citable year. The top three papers, all centred on big data and accounting, are: 1) “Big Data in Accounting: An Overview”;<sup>[51]</sup> Accounting Horizons); 2) “Digitisation, Big Data and the Transformation of Accounting Information”;<sup>[52]</sup> Accounting and Business Research); and 3) “How Big Data Will Change Accounting”;<sup>[9]</sup> Accounting Horizons). The leading paper on big data in finance is “Big Data in Finance and the Growth of Large Firms” by Begenau *et al.*;<sup>[53]</sup> Journal of Monetary Economics. Evidently, the most influential work on big data is predominantly focused on accounting rather than finance.

The most well-known papers in Table 4 shows how much study and interest incorporating big data into accounting and finance processes generate. Emphasising big data’s transforming power in redefining accounting procedures, Vasarhelyi *et al.*<sup>[51]</sup> offer an overview of its impact on accounting, stressing its interaction with traditional data sources and its influence on audit judgement and behavioural research. Bhimani and Willcocks<sup>[52]</sup> challenge conventional accounting classification and highlight the evolving terrain of accounting information in the digital era by exploring how digitisation and big data modify accounting data. Warren *et al.*<sup>[9]</sup> also emphasise how, by raising the quality and relevance of accounting data, big data would change accounting processes-especially those in financial accounting. Using big data in accounting can help to improve openness and stakeholder decision-making procedures.

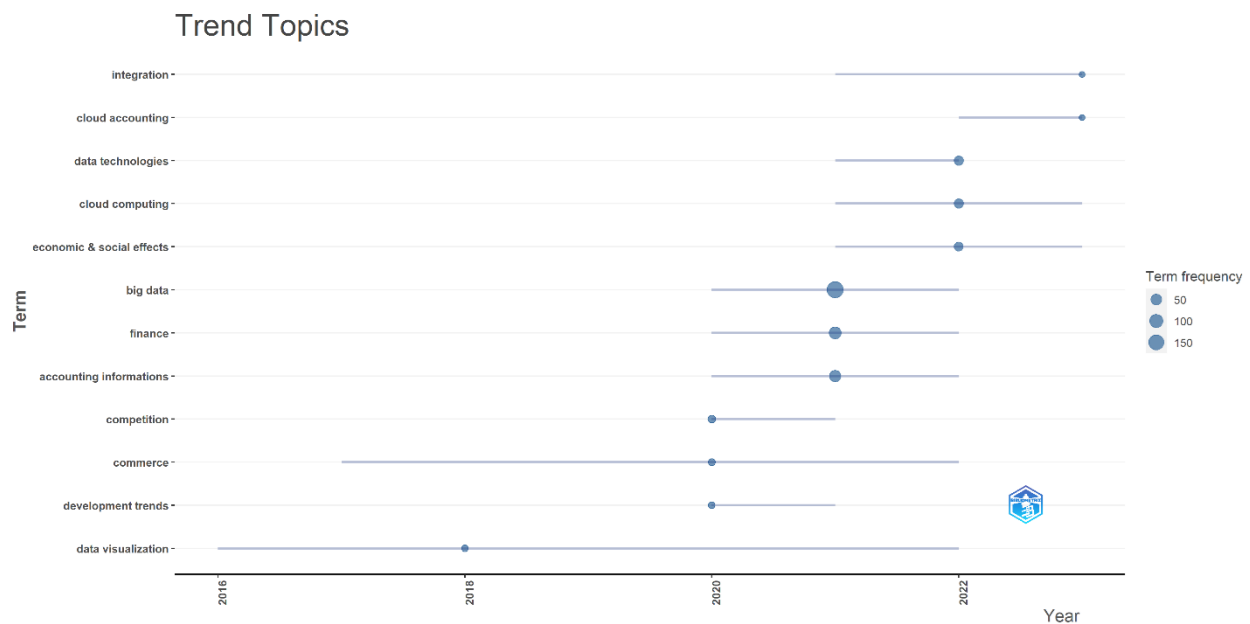
Emphasising structured and unstructured data analysis, Richins *et al.*<sup>[54]</sup> also offer a conceptual framework for big data analytics in accounting. Emphasising the advantages and drawbacks of big data in accounting procedures, this paradigm provides insights

**Table 4: Most influential papers**

SI.No.	Author(s)	Paper title	Journal	TC	C/Y
1	Vasarhelyi M.A.; Kogan A.; Tuttle B.M. (2015)	Big data in accounting: An overview	Accounting Horizons	260	28.89
2	Bhimani A.; Willcocks L. (2014)	Digitisation, Big Data and the transformation of accounting information	Accounting and Business Research	206	20.60
3	Warren J.D., Jr.; Moffitt K.C.; Byrnes P. (2015)	How big data will change accounting	Accounting Horizons	201	22.33
4	Richins G.; Stapleton A.; Stratopoulos T.C.; Wong C. (2017)	Big data analytics: Opportunity or threat for the accounting profession?	Journal of Information Systems	135	19.29
5	Arnaboldi M.; Busco C.; Cuganesan S. (2017)	Accounting, accountability, social media and big data: revolution or hype?	Accounting, Auditing and Accountability Journal	131	18.71
6	Krahel J.P.; Titera W.R. (2015)	Consequences of big data and formalisation on accounting and auditing standards	Accounting Horizons	120	13.33
7	Sledgianowski D.; Gomaa M.; Tan C. (2017)	Toward integration of Big Data, technology and information systems competencies into the accounting curriculum	Journal of Accounting Education	95	13.57
8	He P.; Niu H.; Sun Z.; Li T. (2020)	Accounting Index of COVID-19 Impact on Chinese Industries: A Case Study Using Big Data Portrait Analysis	Emerging Markets Finance and Trade	86	21.50
9	Begenau J.; Farboodi M.; Veldkamp L. (2018)	Big data in finance and the growth of large firms	Journal of Monetary Economics	85	14.17
10	Hasan M.M.; Popp J.; Oláh J. (2020)	Current landscape and influence of big data on finance	Journal of Big Data	79	19.75



**Figure 8:** Trending topics based on author keywords. Note: This figure, derived from *Biblioshiny*, presents the trending topics based on the author keywords.



**Figure 9:** Trending topics based on index keywords. Note: This figure, derived from *Biblioshiny*, presents the trending topics based on the index keywords.

into exploratory study and problem-solving. Emphasising the transforming power of these technologies in decision-making processes and governance structures, Arnaboldi *et al.*<sup>[15]</sup> also look at the convergence of accounting, responsibility, social media, and big data. They also classify study projects and point up possible future directions for inquiry in the evolving terrain of accounting practices. Seeking to raise the value and relevance of the accounting profession, Krahel and Titera<sup>[55]</sup> advocate a change in accounting and auditing rules to give data analysis first priority above presentation. This shift in focus on data operations and

analysis could empower customers and increase capital market efficiency at the same time.

Furthermore, underlined by Sledgianowski *et al.*<sup>[56]</sup> is the need to include information systems, technology, and big data knowledge in accounting education. They contend that curricula should reflect the evolving technology environment and that it is imperative to enable accounting professionals to apply big data in their daily work. He *et al.*<sup>[57]</sup> use big data portrait analysis to investigate how COVID-19 affects Chinese businesses. Their studies underline the need to leverage big data to better grasp the

pandemic's economic effects and optimum resource allocation for effective crisis control.

In the field of big data in finance, Begenau *et al.*<sup>[53]</sup> look at the paths of major financial companies under the effect of big data adoption. Emphasising the value of data-driven insights in driving success, their research clarifies how big data technologies influence major financial institutions' operational efficiency, competitive positioning, and growth plans. Focussing on numerous aspects of financial markets, including return estimates, volatility projections, risk evaluations, and algorithmic trading, Hasan *et al.*<sup>[58]</sup> investigate the impact of big data on finance, thereby highlighting the relevance of big data in forming financial decision-making procedures.

Underlining the requirement of adaptation, creativity, and integration of technology developments in the area, these well-known publications essentially highlight the transforming potential of big data in reforming accounting and financial procedures.

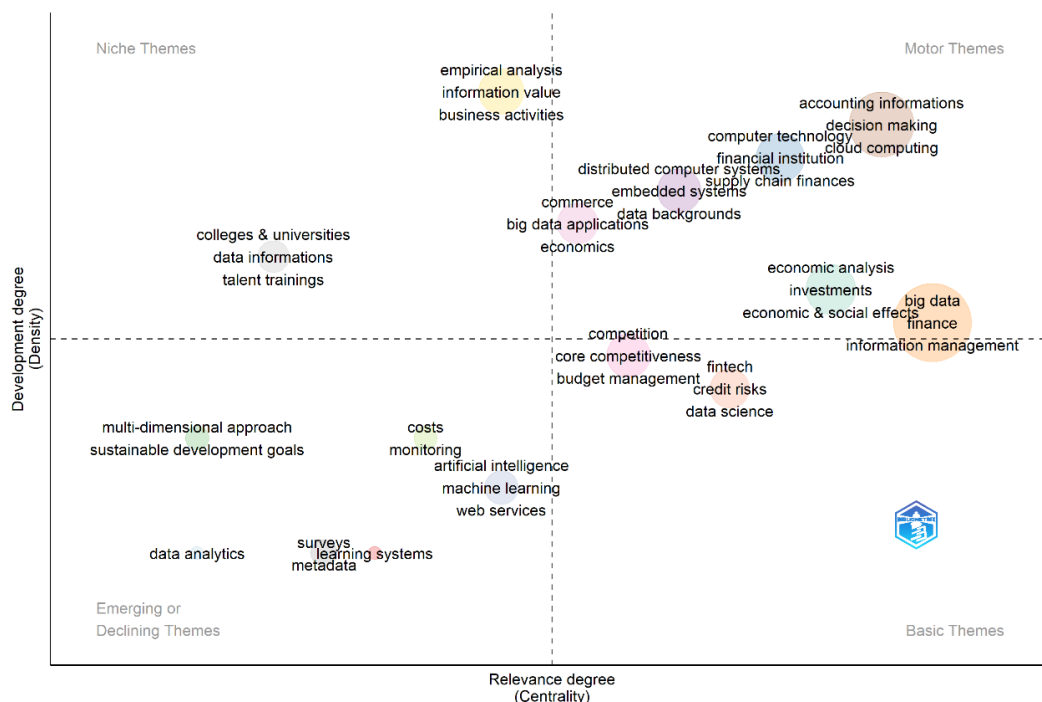
Table A5 ranks the most eminent writers based on total citations and publishing count. Three most prolific writers are a) Ionescu, L.; b) Faccia, A.; and c) McAleer, M. Table 4 shows that the writers with the most citations have helped to produce the most often cited works. For example, Vasarhelyi *et al.*<sup>[51]</sup> co-authored "Big Data in Accounting: An Overview," which ran in Accounting Horizons in 2015.

**Table 5: Most influential authors.**

<b>A. By number of Publications (TP)</b>										
	<b>Author</b>	<b>TP</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>	<b>Pub year start</b>
1	Ionescu, Luminița	4	2	35	8.75	17.5	2	1	0.4	2019
2	Faccia, Alessio	4	3	19	4.75	6.3	2	1	0.4	2019
3	McAleer, Michael	3	2	6	2	3	2	1	0.25	2016
4	Rao, Sandeep	2	1	73	36.5	73	1	1	0.5	2022
5	Sharma, Dipasha	2	1	73	36.5	73	1	1	0.5	2022
6	Kumar, Satish	2	1	73	36.5	73	1	1	0.5	2022
7	Lim, Weng Marc	2	1	73	36.5	73	1	1	0.5	2022
8	Mangla, Sachin Kumar	2	1	73	36.5	73	1	1	0.5	2022
9	Zhang, Peng	2	2	61	30.5	30.5	2	0	0.25	2016
10	Mosteanu, Narcisa Roxana	2	2	15	7.5	7.5	1	1	0.2	2019
<b>B. By Total Citations (TC)</b>										
	<b>Author</b>	<b>TP</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>	<b>Pub year start</b>
1	Tuttle, Brad M.	1	1	260	260	260	1	0	0.11	2015
2	Vasarhelyi, Miklos A.	1	1	260	260	260	1	0	0.11	2015
3	Kogan, Alexander	1	1	260	260	260	1	0	0.11	2015
4	Willcocks, Leslie	1	1	206	206	206	1	0	0.10	2014
5	Bhimani, Alnoor	1	1	206	206	206	1	0	0.10	2014
6	Warren, J. Donald	1	1	201	201	201	1	0	0.11	2015
7	Moffitt, Kevin C.	1	1	201	201	201	1	0	0.11	2015
8	Byrnes, Paul	1	1	201	201	201	1	0	0.11	2015
9	Richins, Greg	1	1	135	135	135	1	0	0.14	2017
10	Wong, Christopher	1	1	135	135	135	1	0	0.14	2017
11	Stapleton, Andrea	1	1	135	135	135	1	0	0.14	2017
12	Stratopoulos, Theophanis C.	1	1	135	135	135	1	0	0.14	2017

Notes: TP=Number of publications; NCP=Number of cited publications; TC=Total citations; C/P=Average citations per publication; C/CP=Average citations per cited publication.





**Figure 10:** Thematic map 2013-2020 (pre-COVID-19 pandemic era).

Table A6 showcases the most influential institutions based on their publication volume and average citations per cited publication. The three institutions with the highest number of publications are Spiru Haret University (Romania), Yunnan University DianChi College (China), and Swinburne University of Technology (Malaysia). In terms of citations per publication, the top three institutions are the University of South Carolina (US), The State University of New Jersey (US), and the London School of Economics (UK). A clear pattern emerges: Chinese universities are the most prolific (with 7 out of the top 12 institutions by publication count), and US institutions dominate in citations, with 9 out of the top 12.

One specific aspect of bibliometrics is the analysis of networks formed through collaborations, known as co-authorship networks. Analysing these networks can provide insights into the collaborative patterns of researchers, institutions, or countries and help identify influential entities, emergent trends, and clusters of research activity. Using *VOSviewer*, we perform co-authorship analysis and present the results for author level in Figure 2 and country level in Figure 3. These analyses explore the nationality of researchers who collaborate with their international counterparts. These figures show that researchers from China, the US and the UK are generally the most active in global collaboration.

Scopus offers a myriad of metadata for each publication. A significant element among these is the keywords. These can be divided broadly into two categories: “Author keywords” and “Index keywords”. The publication’s authors provide the former, encapsulating the most pertinent terms to their research. By incorporating these keywords, authors aim to bolster the

discoverability of their work, giving readers a concise snapshot of the paper’s focal points. Conversely, index keywords are added by Scopus, derived from its controlled vocabulary titled “Scopus Subject Areas”. This vocabulary, curated by experts, seeks to standardise terminology, enhancing the search and discovery process across the database. Table A7 enumerates the most prevalent keywords, illustrating distinctions between author and index keywords.

Subsequently, by analysing co-occurrence patterns using *VOSviewer*, we discern the clusters of frequently paired keywords. Figures 4 and 5 depict the author keywords co-occurrence network and overlay visualisations, with a minimum occurrence of three. In Figure 4, the green cluster-centred on big data and finance-emerges as the most prominent. This is followed by the blue cluster, anchored in data analytics and accounting, and then by the red cluster, focusing on cloud and advanced technologies. Each cluster, while intersecting with finance and accounting, has its unique thematic emphasis. Figure 4 also indicates that the latest research in big data in accounting and finance frequently employs author keywords such as artificial intelligence and cloud computing.

Figures 6 and 7 display the index keywords’ co-occurrence network and overlay visualisations, with a minimum occurrence of five. In Figure 6, the red cluster, encompassing modern data technologies and fintech, stands out. It’s followed by the yellow cluster, which revolves around data and financial management, and then the green cluster, which focuses on information systems and accounting. These figures shed light on the centrality and interconnectedness of an index keyword within the broader

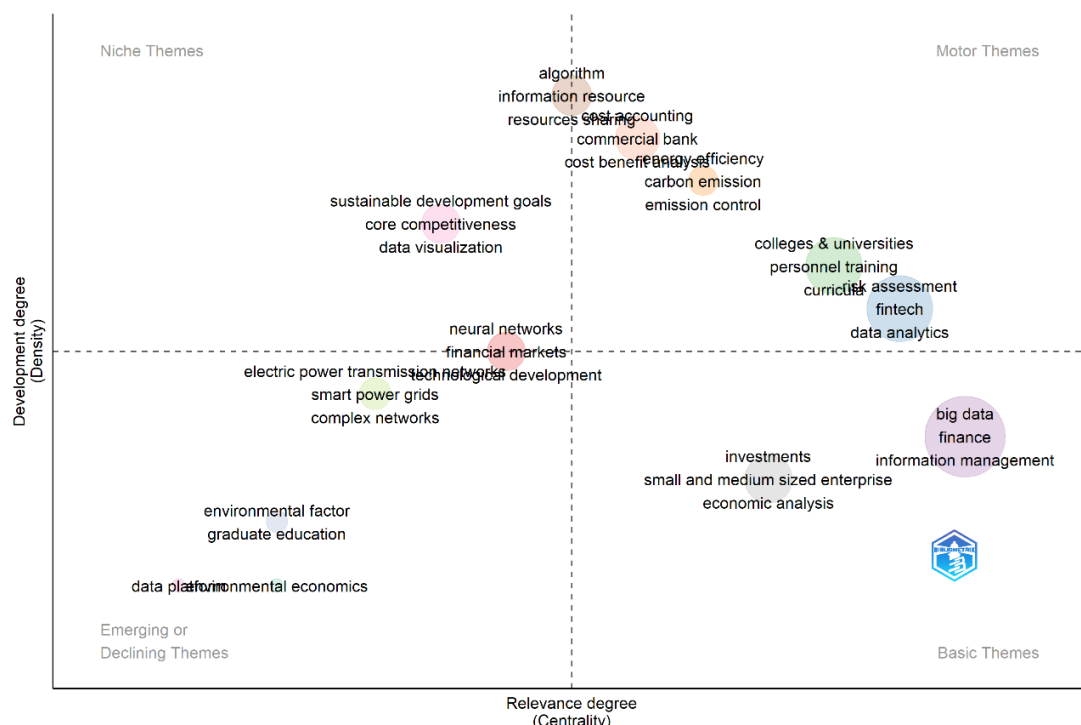
nexus. In Figure 7, specific index keywords like development strategies, cloud accounting, and digital storage appear to be recent additions to research in big data within the accounting and finance sectors.

Figures 8 and 9, crafted using *Biblioshiny*, present the trending author and index keywords. “Big data” emerges as a favoured choice in both categories. Within the author’s keywords, “artificial intelligence” is a recent addition. In contrast, terms like integration, cloud accounting, cloud computing, and economic and social effects have recently gained popularity for index keywords. An intriguing query arises: How have these keywords evolved, especially during the pre-and post-onset of the COVID-19 pandemic? A visual assessment indicates a propensity for terms like “internet finance”, “finance”, and “risk management” before the pandemic. However, during the pandemic, there’s an evident tilt towards contemporary data and technology keywords such as “big data”, “technology”, “artificial intelligence”, and more traditional terms like “accounting” and “management accounting”. Similarly, “data visualisation” and “commerce” were the preferred index keywords before the pandemic. During the pandemic, there’s a clear lean towards terms like “big data”, “integration”, and “cloud accounting”, among others.

We used Biblioshiny to do a co-word thematic map study to grasp the theme evolution in the field. We split the data into the 2013–2020 pre-COVID-19 era and the 2020–2022 COVID-19 era. The theme maps in Figures 10 and 11 use different colours to indicate distinctive term groups.

accounting information, and information management” helped the cluster centred on “big data” to become the central issue in the pre-pandemic period. The high degrees of “betweenness centrality” for these phrases highlight their essential function as links between pieces of the network. Moreover, the “big data” cluster showed the most critical average betweenness centrality and commanded the highest frequency of occurrences. This trend suggests that the body of research under examination primarily depends on “big data” issues, which act as fundamental connectors in the terminological network.

The “big data” cluster kept its central importance in frequency and betweenness centrality during the COVID-19 pandemic. Still, this era also saw the emergence of fresh theme clusters like “neural networks” and “sustainable development goals,” suggesting a change in research direction. Although “big data” stayed a significant influence, other terms like “colleges and universities” and “investments” started to rise in importance, implying a subtle change in academic debate during the pandemic. The thematic study reveals minor but significant shifts in research concentration between the two eras. Although “big data analytics” is still a constant focus, the COVID-19 period has expanded the thematic terrain to embrace many subjects, from technology advancements like neural networks to societal needs like sustainability and education. This diversified attention could be seen as a reaction to the difficult issues and conversations sparked by the pandemic, underlined by the growing significance of concepts connected to decision-making in many spheres.



**Figure 11:** Thematic map 2020-2022 (COVID-19 era).

**Table 6: Most influential institutions.**

<b>A. By number of Publications (TP)</b>										
	<b>Institution</b>	<b>TP</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>	<b>Pub year start</b>
1	Spiru Haret University.	4	35	2	8.75	17.5	2	1	0.4	2019
2	Yunnan University DianChi College.	4	5	1	1.25	5	1	1	0.33	2021
3	Swinburne University of Technology Malaysia.	4	146	2	36.5	73	2	1	1	2022
4	Harbin Finance University.	3	2	1	0.667	2	1	1	0.25	2020
5	Yunnan University of Finance and Economics.	3	3	2	1	1.5	1	1	0.25	2020
6	Shandong Women's University.	3	8	2	2.667	4	2	1	0.22	2015
7	Bina Nusantara University.	3	0	0	0	0	0	1	0	2022
8	Beijing Normal University.	3	23	1	7.667	23	1	1	0.2	2019
9	Asia University.	3	25	2	8.333	12.5	2	1	0.25	2016
10	Yunnan Technology and Business University.	3	2	1	0.667	2	1	1	0.25	2020
11	The University of Sydney Business School.	3	134	2	44.67	67	2	1	0.29	2017
12	Renmin University of China.	3	67	2	22.33	33.5	2	1	0.33	2018
<b>B. By average Citations per Cited Publication (C/CP)</b>										
	<b>Institution</b>	<b>TP</b>	<b>NCP</b>	<b>TC</b>	<b>C/P</b>	<b>C/CP</b>	<b>h-index</b>	<b>g-index</b>	<b>m-index</b>	<b>Pub year start</b>
1	University of South Carolina US.	1	260	1	260	260	1	0	0.11	2015
2	The State University of New Jersey US.	2	461	2	230.5	230.5	2	0	0.22	2015
3	London School of Economics UK.	1	206	1	206	206	1	0	0.1	2014
4	University of Hartford US.	1	201	1	201	201	1	0	0.11	2015
5	University of Waterloo Canada.	1	135	1	135	135	1	0	0.14	2017
6	Politecnico di Milano Italy.	1	131	1	131	131	1	0	0.14	2017
7	Roehampton University US.	1	131	1	131	131	1	0	0.14	2017
8	Loyola University Maryland US.	1	120	1	120	120	1	0	0.11	2015
9	Ernst and Young Professional Practice group US.	1	120	1	120	120	1	0	0.11	2015
10	Hofstra University US.	1	95	1	95	95	1	0	0.14	2017
11	Centre for Economic Policy Research US.	1	85	1	85	85	1	0	0.17	2018
12	Stanford University US.	2	85	1	42.5	85	1	1	0.17	2018

Notes: TP=Number of publications; NCP=Number of cited publications; TC=Total citations; C/P=Average citations per publication; C/CP=Average citations per cited publication.

### Further discussion-Major factors influencing emerging trends of big data in accounting and finance

This sub-section discusses the major factors driving the evolution of big data research in accounting and finance, such as technological advancements, interdisciplinary integration, international collaboration, the impact of the COVID-19

pandemic, shifting academic and industry focus, and regulatory concerns. It offers a concentrated analysis of the critical elements influencing research trends and a structured yet brief picture of how these drivers collectively affect the field.

First of all, the trends seen are much influenced by the fast development of big data tools, including artificial intelligence,

**Table 7: Most popular keywords.**

Top 30 Author keywords								
Sl.No.	Word	Freq	No	Word	Freq	No	Word	Freq
1	Big data	161	11	Machine learning	9	21	Data mining	5
2	Data analytics	31	12	Auditing	8	22	Financial accounting	5
3	Finance	20	13	Accounting informatisation	7	23	Financial services	5
4	Accounting	18	14	Big data era	7	24	Forensic accounting	5
5	Management accounting	13	15	Cloud computing	7	25	Internet	5
6	Accounting information system	12	16	Green finance	7	26	Micro small and medium-sized enterprises	5
7	Artificial intelligence	12	17	Accounting education	6	27	Sustainable development goals	5
8	Cloud accounting	12	18	Bibliometric	6	28	Financial management	4
9	Technology	12	19	Blockchain	6	29	Fintech	4
10	Internet finance	9	20	Risk management	6	30	Risk assessment	4
Top 30 Index keywords								
Sl. No.	Word	Freq	No	Word	Freq	No	Word	Freq
1	Big data	190	11	Data handling	22	21	Continuous development	12
2	Finance	69	12	Management accounting	20	22	Economics	12
3	Accounting information	60	13	Data analytics	17	23	Financial accounting	12
4	Information management	44	14	Fintech	16	24	Competition	11
5	Risk assessment	30	15	Financial management	15	25	Information systems	11
6	Data mining	28	16	Risk management	15	26	Informatisation	11
7	Data technologies	28	17	Blockchain	14	27	Investments	11
8	Decision making	27	18	Artificial intelligence	13	28	Advanced analytics	10
9	Cloud computing	26	19	Colleges and universities	13	29	Cost accounting	10
10	Economic and social effects	24	20	Information use	13	30	Credit risks	10

machine learning, and cloud computing. These technologies transform conventional accounting and financial practices by allowing enormous, unstructured data to be studied. As companies try to manage big datasets more effectively, the theme study suggests an increasing focus on artificial intelligence and cloud computing.<sup>[59]</sup> The COVID-19 pandemic accelerated the acceptance of these technologies; during worldwide lockdowns, cloud-based solutions became absolutely essential for operational continuity.<sup>[60]</sup>

Second, integrating big data with other fields, such as artificial intelligence, risk management, and sustainability, has extended study frontiers. Including sustainability in big data, research represents a more significant societal movement towards Environmental, Social, and Governance (ESG) concerns. Given that companies are under more and more pressure to include

sustainability in their operations, researchers are looking at how big data might track ESG performance. Artificial intelligence is also fast becoming a primary instrument for risk assessment and financial decision-making, particularly in predictive analytics.<sup>[61]</sup>

Thirdly, the discipline is much influenced by worldwide collaboration, particularly between academics from China, the US, and the UK. These countries' big data infrastructure investments drive this cooperation extensively. As scholars and organisations strive to innovate in financial risk assessment, data-driven decision-making, and financial management, globalising financial markets has further fostered cross-border partnerships. The globalisation of financial markets and the prevalence of investment have contributed to the rise of cooperation between these nations. Financial institutions in these nations seek cutting-edge methods to evaluate risk and make

data-driven choices in response to the increased cross-border cash flow. Researchers in these countries are thus more likely to work together, pool their resources and knowledge, to anticipate and adapt to emerging global trends in financial innovation.<sup>[62]</sup> This pattern was supported by the co-authorship analysis of the document, which reveals that the areas with the highest levels of funding have the strongest cooperation.

Fourth, the pandemic changed research objectives and sped the acceptance of big data technology. As companies tried to negotiate the uncertainty of the pandemic, risk management and real-time data analysis took the front stage. While themes like Sustainable Development Goals (SDGs) developed as academics focused on societal implications and global concerns, neural networks-a type of artificial intelligence-gained attention for their capacity to analyse real-time data.<sup>[63]</sup> The pandemic highlighted the need for sophisticated data analytics to control risks and guarantee corporate resilience.

Fifth, big data research initially concentrated primarily on accounting, especially in improving financial reporting and auditing procedures.<sup>[64]</sup> With rising interest in fintech, algorithmic trading, and financial risk assessment, recent developments nonetheless indicate a turn towards finance. This change captures the more prominent digital revolution in finance and the rising application of data analytics in investment plans. The emergence of fintech and blockchain technology has also helped to bring about this shift since companies search for creative ideas to improve security and efficiency.

Finally, the paper suggests an understudied but essential influence: the shape of big data research by ethics and regulation. Privacy, data security, and ethical data use are increasingly crucial as accounting and finance gather and evaluate more data. Investigating how extensive data can be utilised ethically while following new rules, such as the General Data Protection Regulation (GDPR) in Europe, researchers are probably reacting to these problems.<sup>[65]</sup> This issue is especially pertinent in finance, where data abuse can result in significant financial and reputation losses. Research on risk assessment and compliance has thus acquired momentum as academics investigate how big data may enable companies to negotiate ever more complex regulatory surroundings.

In summary, technical, societal, and economic considerations all propel the trends highlighted in this paper. Developments have significantly influenced the research landscape in big data technologies, the increasing significance of multidisciplinary research, and the globalisation of finance. Researchers were driven to investigate new topics, including sustainability and risk management, as the COVID-19 pandemic accelerated the use of digital tools.<sup>[66]</sup> Finally, regulatory demands and changes in academic priorities are pushing academics in different directions when studying the convergence of big data, accounting, and

finance. Understanding these underlying causes enhances the discussion by giving a more comprehensive context for the trends seen in the bibliometric analysis.

## CONCLUSION

This study has fulfilled its three main objectives quite successfully. First, it identified the most influential papers, authors, and institutions in big data research within accounting and finance. Focusing on institutions and academics from China, the US, and the UK, this study emphasises the leading players forming the research scene. These discoveries highlight significant personalities and places of excellence in the field, offering important direction for future research.

Second, studying co-authorship networks and keyword co-occurrence patterns helped one grasp the area's conceptual framework and cooperative dynamics. Big data research in accounting and finance is worldwide, as shown by the frequency of international cooperation, especially among academics from China, the US, and the UK. This trend emphasises how crucial cross-border cooperation is for fostering creativity and increasing the influence of research in a fast-changing field under development.

Thirdly, the thematic mapping of keywords provided a whole picture of the change of study subjects across time. While developing fields like "artificial intelligence," "cloud computing," and "risk assessment," the study revealed that "big data," "finance," and "accounting" remain prominent themes reflecting the increasing relevance of modern technologies in the industry. The COVID-19 pandemic especially had a transforming influence, hastening the establishment of new study areas, including "neural networks" and "sustainable development goals," implying a change towards combining technologically driven solutions with more general societal issues.

This paper contributes significantly to the field by thoroughly mapping newly developed research topics and pointing out the main forces behind the big data debate on accounting and finance. The research offers a road map for future studies by stressing established and new trends, especially in fields like AI-driven financial decision-making, cloud-based accounting systems, and integrating sustainability criteria in financial reporting. This work not only meets its stated goals but also advances the more general subject by providing a critical analysis of the direction of big data research and its consequences for accounting, finance, and multidisciplinary study. It emphasises the transforming power of big data technology and demands ongoing research of new ideas that fit world issues, including sustainability and technical development.

The study does, yet, also recognise its limitations. The exclusive reliance on the Scopus database could lead to a limited perspective of the research scene since other significant works



could be indexed in other databases. Furthermore, considering the dynamic character of the topic, depending just on bibliometric data could not adequately represent the most recent advancements or fast-changing patterns. Future studies could overcome these constraints by including a broader spectrum of databases, including Web of Science (WoS) and Dimensions, offering a more complete and sophisticated grasp of big data research in accounting and finance.

## CONFLICT OF INTEREST

The author declares no conflict of interest.

## AUTHOR CONTRIBUTIONS

Azhar Mohamad: Conceptualisation, Methodology, Formal analysis, Resources, Writing – Original Draft, Writing – Review and Editing.

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