

Mapping the Research Landscape of Business Analytics

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ABSTRACT

This study presents a bibliometric analysis of business analytics research, examining its evolution, key themes, and future directions. Using data from Scopus, 650 articles published between 2005 and 2024 were analyzed to identify influential journals, key contributors, and thematic clusters. The findings reveal significant growth in business analytics research, reflected in increasing publications and citations. Six dominant research themes emerge: value creation, emerging technologies and digital transformation, adoption and implementation, strategic advantages and organizational performance, technology integration in business and education, and data-driven decision-making. This study provides a comprehensive mapping of the field's development, categorizing its thematic evolution and intellectual contributions. By synthesizing existing literature and outlining future research avenues, it serves as a valuable resource for academics and practitioners aiming to advance business analytics scholarship and application.

Keywords Business analytics, Business management technology, bibliometric analysis.

INTRODUCTION-

The rapid advancement of digital technology and the Internet in the 2000s has transformed business operations and daily activities (Antikainen et al., 2018; Kraaijenhagen et al., 2016). The integration of information technology (IT) and information systems (IS) has led to an exponential increase in data generation, encompassing both structured and unstructured formats (Agarwal & Dhar, 2014). When effectively processed and analyzed, this data becomes a valuable asset, offering meaningful insights that enhance decision-making and business strategies (Delen & Ram, 2018; Pagoropoulos et al., 2017). Furthermore, business analytics facilitates the development of new business models aligned with evolving consumer preferences (Duan et al., 2018; Zhan et al., 2018), and enables organizations to adapt to rapid technological changes (Mohamed & Weber, 2020). The origins of business analytics can be traced back to the 1940s when management science practitioners introduced optimization and simulation techniques to maximize productivity with limited resources. Interest in the field grew significantly during the 1960s and 1970s with the development of management information systems (MIS) and decision support systems (DSS). Today, the fusion of operations research, machine learning, and information systems underscores the increasing demand for business analytics (Delen & Zolbanin, 2018). As organizations strive for better decision-making, business analytics continues to evolve, shaping modern business strategies (Daradkeh, 2019; Duan et al., 2018; O'Neill & Brabazon, 2019; Zhan et al., 2018).

Business analytics is broadly defined as the extensive use of data, statistical and quantitative analysis, predictive modelling, and fact-based management to drive business decisions and actions (Davenport & Harris, 2007). It is generally defined through its processes and objectives (Delen & Zolbanin, 2018; Holsapple et al., 2014; Yang et al., 2019). Business analytics is a multidisciplinary approach, combining both art and science to process and interpret data from diverse sources (Delen & Ram, 2018). These data sources often originate from various internal and external information systems, including Operations Support Systems (OSS), Enterprise Resource Planning (ERP) systems, Procure-to-Pay (PTP) systems, Human Resource Information Systems (HRIS), Contract Management Systems (CMS), eCommerce platforms, Point-of-Sale (PoS) systems, and Customer Relationship Management (CRM) tools. The seamless integration of these systems ensures an efficient flow of information across departments, enhancing decision-making capabilities.

Holsapple et al. (2014) classified business analytics definitions into key themes: movement, collection of practices and technologies, transformation processes, capability sets, specific activities, and decisional paradigms. While business analytics encompasses both general and technical components, its primary objective remains the identification of evidence-based solutions to business challenges. The field continues to evolve with the integration of artificial intelligence (AI) and big data analytics. According to Agarwal & Dhar (2014), business analytics enables organizations to achieve strategic goals by analysing observed patterns and developing predictive models. It provides businesses with a competitive advantage by leveraging data-driven insights. The extracted data is processed using sophisticated analytical techniques, including statistical methods, machine learning algorithms, network analysis, and expert-driven approaches. These techniques facilitate insight generation (Delen & Ram, 2018) and trend identification that informs business strategy (Bose, 2009; Kache & Seuring, 2017). Consequently, business analytics supports faster and more informed decision-making (Daradkeh, 2019), enhances business value (O'Neill & Brabazon, 2019), and fosters innovation (Duan et al., 2018). At its core, business analytics transforms raw data into actionable insights that drive efficiency, accuracy, and strategic growth (Delen & Zolbanin, 2018; Fernando et al., 2018), enabling organizations to remain adaptable in an evolving business environment.

Business analytics serves as a critical tool for data-driven decision-making, allowing organizations to optimize performance, improve efficiency, and sustain a competitive edge (Alharti et al., 2017; Fernando et al., 2018; Kache & Seuring, 2017; Torre et al., 2022). Apart from that, business analytics include real-time and actionable insights (Dinabandhu Bag, 2017), strategic forecasting and planning such as market trends, consumer behaviour, and industry shifts, facilitating more accurate forecasting and strategic planning, improved targeting and personalization by understanding customer preferences, enabling them to tailor products, services, and marketing efforts more effectively (Duan et al., 2018; IBM, 2011; Kache & Seuring, 2017; Raguseo & Vitari, 2018). In addition, business analytics serve better in operational efficiency and risk mitigation by identifying inefficiencies and potential risks, business analytics supports continuous improvement and proactive risk management (Ayoubi & Aljawarneh, 2018; Bose, 2009; Fernando et al., 2018). Furthermore, organizations utilizing analytics can uncover new opportunities, drive innovation, and differentiate themselves in the marketplace for innovation and competitive differentiation (Duan et al., 2018).

The key attributes of business analytics encompass such as purposefulness, intuition, and expedience (Dinabandhu Bag, 2017). Addressing managerial challenges related to efficiency, growth, compliance, risk, and productivity requires a thorough understanding of business analytics within functional areas such as finance, marketing, sales, and customer service. Beyond uncovering hidden patterns, business analytics provides actionable insights that drive informed decision-making and strategic execution, ensuring that businesses can navigate complex market environments effectively.

Business analytics is an indispensable tool for modern enterprises, integrating data science, statistical techniques, and technology-driven insights to optimize decision-making and performance. By leveraging advanced analytics, businesses can enhance strategic planning, improve operational efficiency, and maintain a competitive edge in an increasingly data-driven world. The ability to transform data into actionable insights enables businesses to not only solve existing challenges but also to innovate and adapt to future market dynamics effectively, ensuring sustainable growth and long-term success.

Despite its growing significance, there remains a lack of comprehensive bibliometric studies mapping the evolution and intellectual structure of business analytics research. While prior studies have focused on specific applications, an overarching assessment of publication trends, key contributors, and thematic developments is still missing. This study addresses this gap by conducting a bibliometric analysis to explore research trends, identify influential contributors, and highlight thematic clusters within the field. To achieve these objectives, this study addresses the following key research questions:

- RQ1. What are the publication trends and impact of business analytics research?
- RQ2. Who are the leading contributors in the field?
- RQ3. What is the intellectual research structure concerning business analytics?
- RQ4. What are the most influential articles shaping the field?

This study contributes to the existing body of knowledge by providing a structured assessment of business analytics research. The findings will help academics and practitioners understand key trends, emerging themes, and future research opportunities in this rapidly evolving domain.

METHODOLOGY

Bibliometric analysis is a quantitative research method used to assess the intellectual structure, research trends, and impact of a specific research domain by applying mathematical and statistical techniques to bibliographic data (Ahmi & Mohamad, 2019). This study employs bibliometric analysis to evaluate the evolution and current state of business analytics research, providing an objective assessment and minimizing researcher bias (Donthu et al., 2021; Kent Baker et al., 2020). Given its ability to systematically analyze large datasets, bibliometric analysis has become increasingly popular across various disciplines, including management and business studies (Donthu et al., 2021; Kumar et al., 2023; Lee et al., 2024; Lim et al., 2022).

Data collection

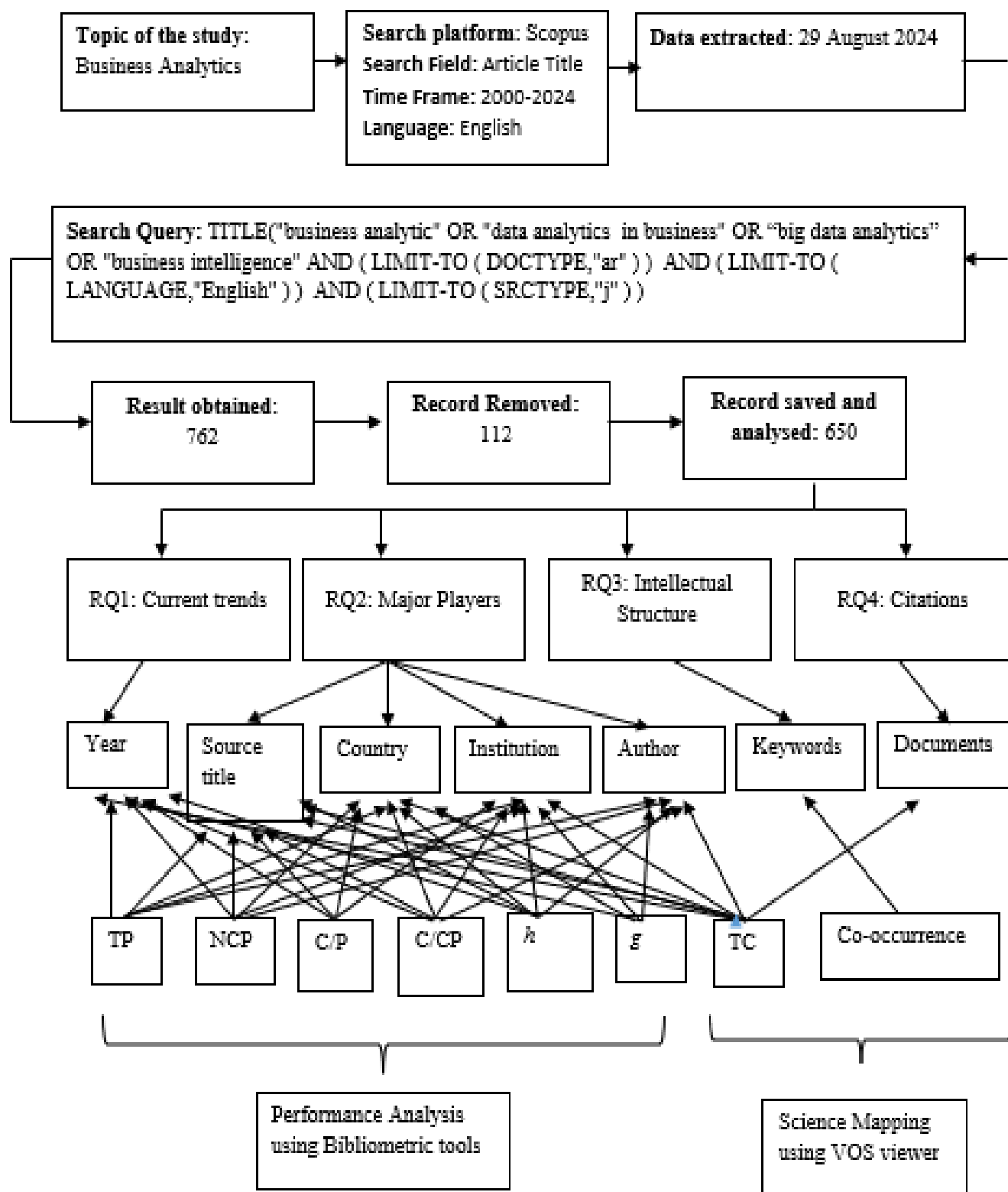
The dataset for this study was extracted from Scopus, a widely recognized database that provides comprehensive coverage of peer-reviewed academic literature (Donthu et al., 2021; Drahansky et al., 2016). A systematic search strategy was employed using Boolean operators to refine the dataset. The following keywords were used in the title, abstract, and keywords fields; "business analytics," "data analytics in business," "big data analytics," and "business intelligence," limited to subject area in business, management, and accounting; decision science; and economics, econometrics, and finance. The initial search retrieved 762 documents. To enhance data quality of the dataset, only peer-reviewed journal articles were included, while conference papers, editorials, notes, and book chapters were excluded. In addition, non-English articles were excluded to maintain linguistic consistency in analysis. After applying these filters, the final dataset consisted of 650 articles. The bibliographic metadata, including authorship, publication year, journal source, citations, and keywords, was extracted and exported into several formats, including Research Information System (.ris), Comma-Separated Value (.csv) and BibTex (.bib). The data was analyzed using the Microsoft Excel, VOS viewer (Van Eck and Waltman, 2014) and Bibliometric tools (Aria & Cuccurullo, 2017).

Data analysis

There are two main categories of bibliometric analysis: performance analysis and science mapping. Performance analysis evaluated research productivity and the impact of articles, authors, countries, and journals. The measurement of performance is based on the number of citations and publications. For this study, a performance analysis measures publication trends by assessing the number of articles published annually to identify growth patterns in the field of business analytics; most prolific authors and institutions by identifying leading contributors and their impact based on citation metrics; journal impact by evaluating the top journals publishing business analytics research in terms of article count and citation impact; and the geographical distribution by analysing the contributions from different countries to assess global research influence. Meanwhile, science mapping is used to construct the relationship or networks of article attributes based on article characteristics. To map the intellectual structure of business analytics research, two key science mapping techniques were employed in this study; Citation Analysis- to identify the most influential publications in a business analytics field (Donthu et al., 2021); and Keyword Co-occurrence network- to identify theme clusters and understand how knowledge in business analytics has evolved over time (Aria & Cuccurullo, 2017; Donthu et al., 2021).

The visually represent the scientific landscape, the results of the bibliometric analysis were illustrated through network diagrams generated using VOS viewer. The citation analysis highlighted the most influential studies and identified high-impact papers that have significantly contributed to the development of business analytics research that shaped the field. Meanwhile, the keyword co-occurrence network provided an overview of dominant research themes and their interconnections. This study follows a systematic and replicable bibliometric methodology, ensuring methodological rigor in assessing business analytics research. By integrating performance analysis and science mapping, it provides a comprehensive evaluation of research trends, influential contributors, and thematic evolution in the field. The findings offer a valuable insight to both academics and practitioners, enhancing their understanding of the trajectory and future direction of business analytics research.

Figure 1 illustrates the research protocol for this study.



Notes: TP = total number of publications; NCP = number of cited publications; TC = Total citations; C/P = average citations per publication; C/CP = average citations per cited publications; h = h index; g = g-index.

Figure 1. Research Protocol

RESULTS AND FINDINGS

All documents that met the business analytics criteria were analysed in this section. The documents were

evaluated based on various factors, such as the trend of research, major contributors, source titles, the geographical distribution of the publications, institutions affiliated with the publications, the number of authors of the publications, keyword analysis and citations. The analysis was structured according to the present study's research questions. Descriptive information about the data set of 650 documents is presented below. All the document types are 100% from articles, the source types are 100% from journals, and all are 100% in English.

Table 1 shows the information regarding the published article's source title's subject area related to business analytics. The most published articles' source titles were categorised under business, management and accounting, contributing to 498 publications (76.62%). Next is followed by social sciences which contributes 270 publications (41.54%), and the decision sciences with 261 publications (28.15%).

Subject Area	TP	%
Business, Management and Accounting	498	76.62%
Social Sciences	270	41.54%
Decision Sciences	261	40.15%
Computer Science	183	28.15%
Engineering	108	16.62%
Economics, Econometrics and Finance	62	9.54%
Psychology	31	4.77%
Environmental Science	28	4.31%
Mathematics	26	4.00%
Arts and Humanities	23	3.54%
Energy	22	3.38%
Agricultural and Biological Sciences	5	0.77%
Medicine	3	0.46%
Biochemistry, Genetics and Molecular Biology	2	0.31%
Earth and Planetary Sciences	2	0.31%
Health Professions	2	0.31%
Neuroscience	1	0.15%
Pharmacology, Toxicology and Pharmaceutics	1	0.15%
Physics and Astronomy	1	0.15%

Table 1. Subject area

Evolution of published studies concerning business analytics

The annual impact of publications in the field of business analytics, spanning from 2005 to 2024, presents a rich tableau of research activity in this niche area. It becomes

immediately apparent, upon an in-depth examination of the presented data in Table 2, that this academic field has experienced significant growth, as evidenced by the rising trend in the total number of publications (TP) and their corresponding annual percentages. In the early years, from 2005 to 2013, the field of business analytics was still in its nascent stage, with minimal to non-existent publications. However, a gradual increment can be observed starting from the year 2014, hinting at the budding interest in this research area. The volume of published studies saw a slow but steady rise until 2014, suggesting a building momentum within the academic

community. A noteworthy surge in research outputs can be seen from the year 2014 onwards, with an escalating trend reaching a peak in 2022. The total publications in 2022 accounted for a substantial 100 publications. This was closely followed by the year 2022, comprising 15.38% of the total publications. Table 2 shows the year and impact of publications on business analytics.

Year	TP	%	TC	C/P	C/CP	Citable Year
2005	2	0.31%	17	8.50	8.50	21
2007	3	0.46%	87	29.00	29.00	19
2008	3	0.46%	255	85.00	85.00	18
2010	4	0.62%	496	124.00	124.00	16
2011	5	0.77%	323	64.60	64.60	15
2012	5	0.77%	182	36.40	45.50	14
2013	9	1.38%	330	36.67	36.67	13
2014	26	4.00%	2497	96.04	99.88	12
2015	23	3.54%	1099	47.78	54.95	11
2016	29	4.46%	711	24.52	25.39	10
2017	33	5.08%	1677	50.82	50.82	9
2018	55	8.46%	2524	45.89	48.54	8
2019	68	10.46%	2454	36.09	38.95	7
2020	63	9.69%	1489	23.63	24.82	6
2021	68	10.46%	1434	21.09	22.76	5
2022	100	15.38%	1708	17.08	18.77	4
2023	68	10.46%	383	5.63	7.37	3
2024	86	13.23%	207	2.44	5.31	3
Grand Total	650	100.00%	17873	27.50	32.15	21

Notes: TP ¼ total number of publications; % ¼ percentage of publications; TC ¼ total citations; C/P ¼; Citation per paper; C/Y ¼ Citation per year

Table 2. Years and impact of publications on business analytics

Next, in Figure 2, it shows the trend fluctuation in business analytics studies from 2005 until 2024 regarding the total number of publications and citations received. Business analytics research began gaining significant interest among scholars in 2014. The highest number of citations was received by documents published in 2018 (2524 citations). Starting in 2014, research concerning business analytics has gained significant interest among scholars and has become an important field.

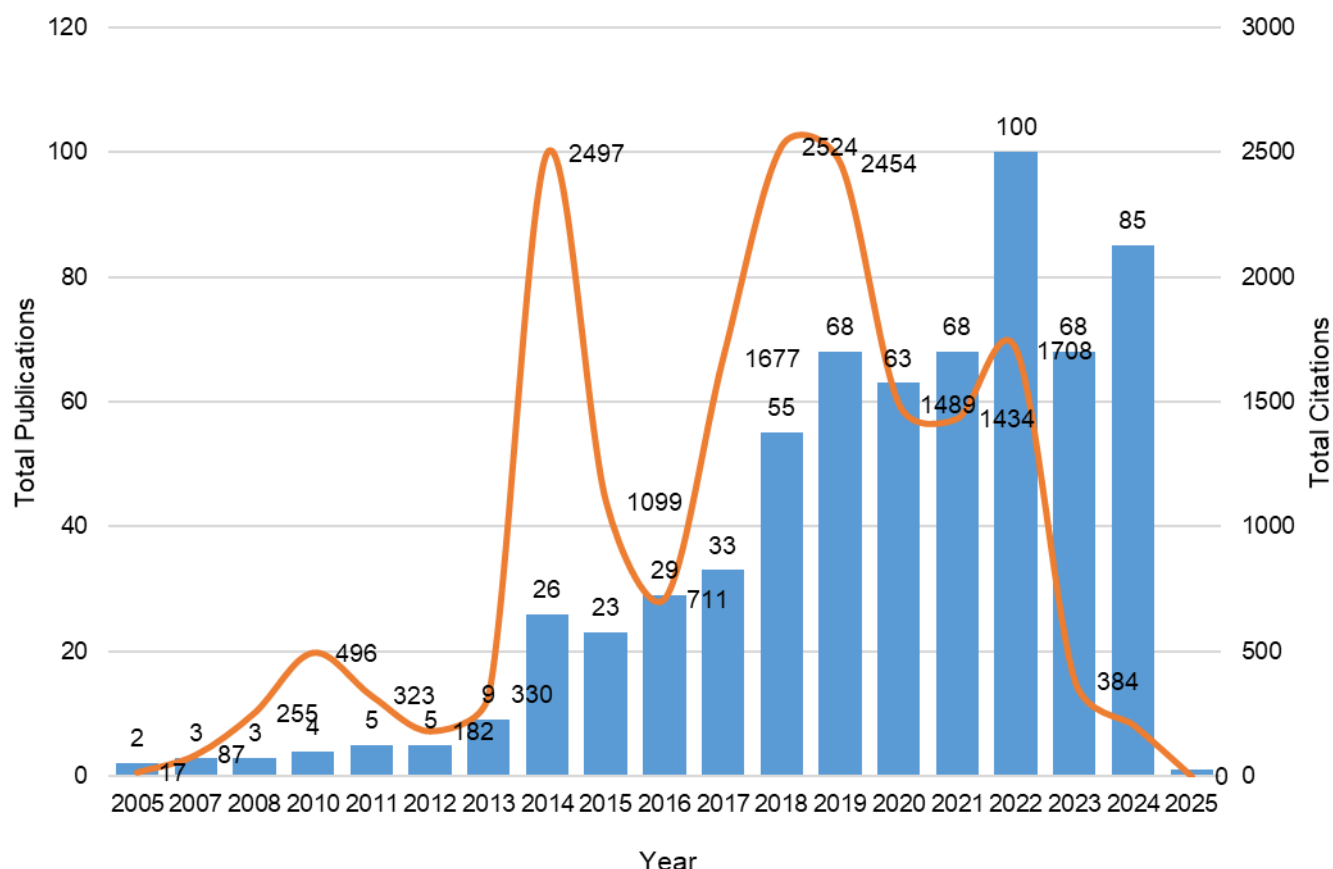


Figure 2. Total publications and citations by year

Source titles publishing business analytics research

Table 3 displays the most productive journals, each with at least five publications concerning business analytics. This table also shows the number of publications, total number of papers cited (NCP), publisher, citations per paper, citations per cited papers, h-index, g-index, m-index and the year of the first publication. This table shows that the Decision Science Journal of Innovative Education produced the highest number of articles, 28, followed by the Journal of Information Systems Education with 23 publications, and Decision Support System with 16 publications. Table 3 shows that these source titles were the core avenues for business analytics publications.

Source Title	TP	NCP	TC	C/P	C/CP	h	g	m
Decision Sciences Journal of Innovative Education	28	24	280	10.00	11.67	8	16	0.615
Journal of Information Systems Education	23	17	119	5.17	7.00	8	10	0.800
Decision Support Systems	16	15	1344	84.00	89.60	13	16	0.684
Sustainability (Switzerland)	14	14	217	15.50	15.50	7	14	0.875
Production and Operations Management	14	12	164	11.71	13.67	9	12	1.286
INFORMS Transactions on Education	12	11	43	3.58	3.91	5	5	0.625
Omega (United Kingdom)	10	10	244	24.40	24.40	8	10	0.800
International Journal of Information Management	10	10	920	92.00	92.00	9	10	0.692
Journal of Business Analytics	10	9	259	25.90	28.78	7	10	0.875
Management Science	9	9	1342	149.11	149.11	9	9	0.750

Journal of Modelling in Management	9	9	88	9.78	9.78	5	9	0.714
Information and Management	9	9	585	65.00	65.00	8	9	0.800
Journal of Information Technology Teaching Cases	9	3	9	1.00	3.00	2	3	0.200
Information Technology and People	8	7	258	32.25	36.86	7	8	1.400
INFORMS Journal on Applied Analytics	8	5	20	2.50	4.00	3	4	0.429
International Journal of Production Research	8	8	495	61.88	61.88	7	8	0.583
Journal of Computer Information Systems	8	8	362	45.25	45.25	5	8	0.556
Technological Forecasting and Social Change	8	7	909	113.63	129.86	6	8	0.600
Management Decision	7	7	444	63.43	63.43	6	7	0.667
Journal of Business Research	7	7	869	124.14	124.14	7	7	0.875

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; m=m-index

Table 3. Top sources titles that published five or more documents on business analytics

Country contributions to business analytics publication worldwide

Table 4 presents the worldwide contribution, by country of publication, on business analytics studies based on the author's affiliation. The United States has been the leading country contributing to 285 business analytics publications based on the number of contributing authors, followed by the United Kingdom, 51 publications on business analytics.

Country	Continent	TP	%
United States	North America	285	43.85%
United Kingdom	Europe	51	7.85%
India	Asia	49	7.54%
Australia	Oceania	41	6.31%
China	Asia	30	4.62%
Germany	Europe	25	3.85%
Canada	North America	19	2.92%
Indonesia	Asia	18	2.77%
Italy	Europe	17	2.62%
Turkey	Europe	17	2.62%
Brazil	South America	16	2.46%
South Korea	Asia	16	2.46%
Taiwan	Asia	16	2.46%
Iran	Asia	14	2.15%
France	Europe	13	2.00%

Ireland	Europe	13	2.00%
Jordan	Asia	13	2.00%
Spain	Europe	12	1.85%
United Arab Emirates	Asia	11	1.69%
Netherlands	Europe	10	1.54%
Russian Federation	Europe	10	1.54%
Saudi Arabia	Asia	10	1.54%
Switzerland	Europe	10	1.54%

Table 4. Countries for production of more than 10 publications in business analytics research

Institution publishing business analytics research

The amount of research concerning business analytics published by the most productive higher education institutions are presented in Table 5. In total, 817 higher education institutions contributed to the 650 articles on business analytics. According to this table, IPB University located at Indonesia was the highest institution contributing a total of 34 publications, followed by California State University at United States (19), Universidade Federal do Espírito Santo at Brazil (17), Northern Arizona University at United States (17), Melbourne University, Australia (16), University of Houston (14), Montclair State University (13), Waseda University (12), James Madison University (12), and Allameh Tabataba'i University (11). Regarding the impact, which is based on the total number of citations, Norwegian University of Science and Technology was the highest, with 2183 total citations, followed by Oklahoma State University (729 citations) and Allameh Tabataba'i University (713 citations).

Institution Name	Country	TP	NCP	TC	C/P	C/CP	<i>h</i>	<i>g</i>	<i>m</i>
IPB University	Indonesia	34	27	131	3.85	4.85	7	11	1.167
California State University	United States	19	18	263	13.84	14.61	7	16	0.700
Universidade Federal do Espírito Santo	Brazil	17	17	210	12.35	12.35	4	14	0.308
Northern Arizona University	United States	17	8	23	1.35	2.88	2	4	0.286
Melbourne University	Australia	16	16	660	41.25	41.25	13	16	0.929
University of Houston	United States	14	14	345	24.64	24.64	11	14	1.833
Montclair State University	United States	13	11	174	13.38	15.82	6	13	0.750
Waseda University	Japan	12	12	100	8.33	8.33	5	10	0.455
James Madison University	United States	12	9	81	6.75	9.00	7	9	0.583
Allameh Tabataba'i University	Iran	11	11	713	64.82	64.82	7	11	0.700
Creighton University	United States	11	8	86	7.82	10.75	5	9	0.625
Korea Advanced Institute of Science and Technology	South Korea	10	10	358	35.80	35.80	7	10	0.778
Deakin University	Australia	10	7	220	22.00	31.43	5	10	0.500
Embry-Riddle Aeronautical University	United States	10	7	84	8.40	12.00	5	9	0.625

National Institute of Development Administration	Thailand	10	5	92	9.20	18.40	4	9	0.364
Norwegian University of Science and Technology	Norway	10	10	2183	218.30	218.30	9	10	1.500
Oklahoma State University	United States	10	9	729	72.90	81.00	7	10	0.875
Indian Institute of Technology	India	9	9	345	38.33	38.33	6	9	0.750
Feng Chia University	Taiwan	9	9	156	17.33	17.33	7	9	0.778
University of Central Florida	United States	9	9	348	38.67	38.67	7	9	0.467
University of Melbourne	Australia	9	9	464	51.56	51.56	5	9	0.333
The University of Queensland	Australia	8	3	55	6.88	18.33	3	7	0.429
University of North Texas	United States	8	7	50	6.25	7.14	3	7	0.750
Radford University	United States	8	8	74	9.25	9.25	4	8	0.571
University of Bologna	Italy	8	8	285	35.63	35.63	6	8	0.462

Table 5. Most productive institutions on business analytics research

Authors publishing business analytics research

Table 6 presents the top 10 most productive business analytics publication authors. Overall, 1829 authors contributed to publications related to this area. Based on Table 6, Dursun Delen from Oklahoma State University, United States, was the most productive business analytics publications author. So far, he has contributed a total of ten publications. Arif Imam Suroso from IPB University Indonesia ranked the second most productive author with nine publications, and Ali Dag from Creighton University, United States, ranked third with seven publications. In terms of the author's impact, based on the total number of citations, Dursun Delen from Oklahoma State University, United States, ranked highets with a total of 737 citations. Table 6 also presents other measurements of the impact of the publications, including the h-, g- and m-indices.

Full Name	Current Affiliation	Country	TP	NCP	TC	C/P	C/CP	<i>h</i>	<i>g</i>	<i>m</i>
Delen, Dursun	Oklahoma State University	United States	10	9	737	73.70	81.89	8	10	1.000
Suroso, Arif Imam	IPB University	Indonesia	9	7	37	4.11	5.29	4	6	0.800
Dag, Ali	Creighton University	United States	7	7	68	9.71	9.71	4	7	0.571
Chongwatpol, Jongsawas	National Institute of Development Administration	Thailand	7	5	92	13.14	18.40	4	7	0.364
Cao, Guangming	Ajman University	United Arab Emirates	6	5	360	60.00	72.00	5	6	0.455
Wu, Pei-Ju	Feng Chia University	Taiwan	6	6	116	19.33	19.33	4	6	0.444
Daradkeh, Mohammad	University of Dubai	United Arab Emirates	6	6	67	11.17	11.17	4	6	0.800

Tandra, Hansen	IPB University	Indonesia	6	5	26	4.33	5.20	3	5	0.600
De Oliveira, Marcos Paulo Valadares	Universidade Federal do Espírito Santo	Brazil	6	6	519	86.50	86.50	4	6	0.250
Duan, Yanqing	University of Bedfordshire	United Kingdom	6	5	360	60.00	72.00	5	6	0.455

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index, m=m-index.

Table 6. Top 10 most productive authors on business analytics research

Analysis of citations contained in business analytics research

Table 7 summarises the citation metrics for documents retrieved in August 2024. Seventeen thousand eight hundred seventy-three total citations were received for all the documents published since 2005 regarding business analytics. This result was obtained using Harzing’s Publish and Perish software application.

Metrics	Data
Publication Years	2005 - 2024
Total Publications	650
Citable Year	21
Number of Contributing Authors	1828
Number of Cited Papers	556
Total Citations	17,873
Citation per Paper	27.50
Citation per Cited Paper	32.15
Citation per Year	893.65
Citation per Author	9.78
Author per Paper	2.81
Citation sum within h-Core	15,763
h-index	70
g-index	115
m-index	3.333

Table 7. Citation metrics

Table 8 represents the top 20 most cited articles (based on the number of documents cited) according to the Scopus database. The document entitled “Integration of online and offline channels in retail: The impact of sharing reliable inventory availability information” by Gallino & Moreno (2014) received the highest number of citations, with 490 total citations and an average of 40.83 citations per year. This paper examined how providing accurate inventory information across both online and offline retail channels influences consumer behavior and retailer performance. The study highlights that sharing reliable inventory data enhances customer satisfaction, reduces uncertainty, and can lead to increased sales by encouraging purchases across channels. However, the authors also caution that this integration requires robust inventory management systems to ensure accuracy and

prevent potential stockouts or overstock situations. Overall, the research underscores the importance of seamless information flow between online and offline platforms in modern retail strategies. The article “The Smart Circular Economy: A digital-enabled Circular Strategies Framework for Manufacturing Companies” by Kristoffersen et al. (2020) was ranked second, with 428 total citations and an average of 71.33 citations per year. This work presented a digital-enabled circular strategies framework and extended the existing knowledge on leveraging digital technologies for circular economy adoption. The third-ranked article titled “The Impact of Business Analytics on Supply Chain Performance” by Trkman et al. (2010) has 387 citations and an average of 24.19 citations per year. The article informed the existence of a statistically significant relationship between analytical capabilities and performance. The moderation effect of information systems support is considerably stronger than the effect of business process orientation.

No.	Author(s)	Title	Source Title	TC	C/Y
1	Gallino S.; Moreno A. (2014)	Integration of online and offline channels in retail: The impact of sharing reliable inventory availability information	Management Science	490	40.83
2	Kristoffersen E.; Blomsma F.; Mikalef P.; Li J. (2020)	The smart circular economy: A digital-enabled circular strategies framework for manufacturing companies	Journal of Business Research	428	71.33
3	Trkman P.; McCormack K.; De Oliveira M.P.V.; Ladeira M.B. (2010)	The impact of business analytics on supply chain performance	Decision Support Systems	387	24.19
4	Müller O.; Fay M.; vom Brocke J. (2018)	The Effect of Big Data and Analytics on Firm Performance: An Econometric Analysis Considering Industry Characteristics	Journal of Management Information Systems	333	41.63
5	Appelbaum D.; Kogan A.; Vasarhelyi M.; Yan Z. (2017)	Impact of business analytics and enterprise systems on managerial accounting	International Journal of Accounting Information Systems	281	31.22
6	Holsapple C.; Lee-Post A.; Pakath R. (2014)	A unified foundation for business analytics	Decision Support Systems	281	23.42
7	Vecchio P.D.; Mele G.; Ndou V.; Secundo G. (2018)	Creating value from Social Big Data: Implications for Smart Tourism Destinations	Information Processing and Management	279	34.88
8	Bhimani A.; Willcocks L. (2014)	Digitisation, Big Data and the transformation of accounting information	Accounting and Business Research	278	23.17
9	Ashrafi A.; Zare Ravasan A.; Trkman P.; Afshari S. (2019)	The role of business analytics capabilities in bolstering firms’ agility and performance	International Journal of Information Management	271	38.71
10	Tambe P. (2014)	Big data investment, skills, and firm value	Management Science	271	22.58

11	Awan U.; Shamim S.; Khan Z.; Zia N.U.; Shariq S.M.; Khan M.N. (2021)	Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance	Technological Forecasting and Social Change	266	53.20
12	Rippa P.; Secundo G. (2019)	Digital academic entrepreneurship: The potential of digital technologies on academic entrepreneurship	Technological Forecasting and Social Change	245	35.00
13	Li X.; Wu C.; Mai F. (2019)	The effect of online reviews on product sales: A joint sentiment-topic analysis	Information and Management	245	35.00
14	Tussyadiah I.P.; Zach F. (2017)	Identifying salient attributes of peer-to-peer accommodation experience	Journal of Travel and Tourism Marketing	235	26.11
15	Aydiner A.S.; Tatoglu E.; Bayraktar E.; Zaim S.; Delen D. (2019)	Business analytics and firm performance: The mediating role of business process performance	Journal of Business Research	233	33.29
16	Jourdan Z.; Rainer R.K.; Marshall T.E. (2008)	Business intelligence: An analysis of the literature	Information Systems Management	232	12.89
17	Kristoffersen E.; Mikalef P.; Blomsma F.; Li J. (2021)	The effects of business analytics capability on circular economy implementation, resource orchestration capability, and firm performance	International Journal of Production Economics	201	40.20
18	Rasmussen T.; Ulrich D. (2015)	Learning from practice: How HR analytics avoids being a management fad	Organizational Dynamics	195	17.73
19	Elbashir M.Z.; Collier P.A.; Sutton S.G. (2011)	The role of organizational absorptive capacity in strategic use of business intelligence to support integrated management control systems	Accounting Review	190	12.67
20	Rana N.P.; Chatterjee S.; Dwivedi Y.K.; Akter S. (2022)	Understanding dark side of artificial intelligence (AI) integrated business analytics: assessing firm's operational inefficiency and competitiveness	European Journal of Information Systems	184	46.00

Table 8. Top 20 highly cited articles on business analytics

Analysis of keywords in business analytics literature

The present research mapped the keywords provided for each document using the VOSviewer software application. VOSviewer is a software application for building and visualising bibliometric networks, including; journals, researchers, or individual publications. A total of 2955 author keywords used in the selected documents. This study set 5 as the minimum number of occurrences of a keyword, and 105 keywords met the threshold. This paper ignored keywords that were country names, such as India and Jordan.

Figure 3 visualises the keywords generated by the VOSviewer software application with the connection line's colour, size, font and thickness. The figure indicates the relationships' strength between keywords, also described

In Figure 3, there are six main clusters discovered in business analytics studies. These clusters have been indicated based on the colour they represent. For example, keywords such as business value, service quality, maturity model, performance, sustainability belonged to the red-coloured cluster; cluster number one. This cluster was referred to as value creation of business analytics. The second cluster represented in green, was called the emerging technology in business analytics cluster. The third cluster, represented in blue, symbolised adoption and implementation of business analytics, the fourth cluster in yellow colour, represented the strategic advantages and organizational performance cluster. Next, the fifth cluster in purple colour represented technology integration in business analytics education, and the sixth cluster in cyan colour represented data driven decision making. These clusters represented the main themes in business analytics research previously covered by scholars.

Furthermore, Table 9 presents the keyword's appearance showing its cluster and weight based on the link, total link strength and number of occurrences. Data mining, machine learning, and predictive analytics were the keywords with the highest occurrences in the top three positions.

Keywords	Cluster	Link	Total Link Strength	Occurrences	Theme
big data analytics	1	27	61	24	Value creation (red cluster)
business	1	7	10	9	
business intelligence	1	7	7	6	
business value	1	12	25	14	
data science	1	23	51	24	
digital transformation	1	10	16	8	
digitalization	1	5	8	7	
e-commerce	1	12	21	12	
industry 4.0	1	13	24	11	
management accounting	1	6	9	6	
maturity model	1	6	12	6	
modelling	1	3	6	5	
performance	1	11	16	11	
service quality	1	4	6	5	
simulation	1	13	21	13	
social media analytics	1	7	12	7	
social network analysis	1	4	7	5	
supply chain analytics	1	11	20	8	
supply chain management	1	22	39	19	
sustainability	1	12	19	12	
artificial intelligence	2	22	57	27	Emerging Technologies and Digital Transformation (green cluster)
big data	2	62	228	119	
business intelligence	2	55	203	108	
case study	2	3	3	5	
curriculum design & development	2	6	10	5	
data management	2	4	10	5	
data mining	2	37	101	45	
data visualization	2	9	18	12	
decision support system	2	5	8	5	
decision trees	2	4	10	5	
deep learning	2	14	23	7	
Hadoop	2	11	18	6	

machine learning	2	33	104	43	
predictive analytics	2	17	61	21	
prescriptive analytics	2	14	44	15	
privacy	2	3	5	5	
sentiment analysis	2	10	14	8	
social media	2	8	17	10	
adoption	3	9	16	8	Adoption and Implementation of Business Analytics (blue cluster)
business analytics	3	88	660	551	
business analytics capabilities	3	2	3	6	
content analysis	3	9	12	5	
dynamic capabilities	3	7	15	8	
firm performance	3	10	19	10	
manufacturing	3	6	11	6	
marketing analytics	3	7	13	8	
resource-based view	3	10	28	15	
retail operations	3	5	10	6	
SMEs	3	9	12	7	
strategic management	3	7	15	7	
supply chain	3	8	13	7	
technology	3	10	14	6	
text analytics	3	8	11	5	
text mining	3	10	19	11	
toe framework	3	5	11	5	
topic modelling	3	9	13	7	
absorptive capacity	4	3	9	7	Strategic Advantages and Organizational Performance (yellow cluster)
competitive advantage	4	13	22	12	
competitive intelligence	4	12	21	7	
data analysis	4	10	13	5	
data warehousing	4	8	14	5	
decision support	4	7	15	10	
experiential learning	4	6	8	8	
forecasting	4	6	8	6	

healthcare	4	7	11	5	
information technology	4	10	17	10	
knowledge management	4	14	32	15	
optimization	4	6	7	8	
R	4	4	7	5	
cloud computing	5	4	8	6	Technology Integration in Business and Education (purple cluster)
curriculum	5	5	7	5	
curriculum design	5	9	9	5	
education	5	7	14	7	
enterprise resource planning	5	7	12	5	
higher education	5	8	10	9	
information systems	5	17	24	13	
innovation	5	12	23	13	
learning analytics	5	6	6	5	
online learning	5	3	3	5	
statistics	5	8	10	5	
data warehouse	6	6	9	5	Data-Driven Decision Making (cyan cluster)
data-driven decision making	6	9	15	7	
decision making	6	15	40	20	
decision support systems	6	10	33	17	
descriptive analytics	6	14	33	11	
hr analytics	6	6	9	5	
human resource management	6	6	10	7	
organizational performance	6	7	10	6	
performance management	6	7	14	7	
structural equation modelling	6	7	8	6	
visualization	6	3	3	6	

Table 9. Keyword appearance

DISCUSSION

This study examines the current state of research on business analytics through bibliometric analysis. The analysis evaluates research productivity and publication trends within the field, providing valuable insights into its overall performance. Research-related agencies can leverage these findings to inform funding allocation policies and assess scientific inputs and outputs. Additionally, the results help identify key factors that contribute to the study's impact within the research domain, guiding scholars in producing high-impact studies in the field of business analytics.

This study has undertaken an exploration with the primary objective of ascertaining the prevalent trend and impact of research contributions pertaining to the domains of business analytics (RQ1). A chronological exploration reveals that the term “business analytics” marked its initial entry into the academic arena in 2005, as affirmed by Scopus. The deductions drawn from the analysis elucidate a compelling trajectory, wherein scholarly interest in business analytics has seen a noteworthy surge, rapidly elevating it to a critical field of academic investigation since the year 2014. This earmarks the inception of scholarly dialogue surrounding this theme. The bibliometric analysis highlights a significant surge in business analytics research, particularly after 2014, signalling its transition into a critical academic field. This acceleration was driven by technological innovations, industry adoption, and expanding academic engagement. A key catalyst was Gartner's introduction of Hybrid Transactional/Analytical Processing (HTAP) in early 2014, which eliminated the traditional separation between operational and analytical systems, enabling real-time data-driven decision-making. This paradigm shift heightened interest in integrated analytics, prompting further research in the field (Gartner, 2014). Simultaneously, the official release of Apache Spark in May 2014 marked a breakthrough in big data processing, significantly improving the efficiency, speed, and scalability of large-scale analytics. As an open-source analytics engine, Spark democratized complex data processing, making business analytics more accessible and feasible, thereby stimulating research in data analytics methodologies. Beyond technological advancements, industry-wide adoption of analytics during this period further propelled research growth. Companies across finance, healthcare, retail, and manufacturing recognized the strategic value of data-driven decision-making in optimizing operations, enhancing customer insights, and driving innovation. The increased business reliance on analytics necessitated academic exploration, leading to a surge in publications exploring frameworks, applications, and emerging techniques. Additionally, the expansion of dedicated academic platforms solidified business analytics as a distinct research domain. Conferences such as IEEE International Conference on Big Data and journals such as the Journal of Business Analytics provided scholars with specialized venues to publish and discuss advancements, further accelerating publication output post-2014 (IEEE, 2014). Together, these interrelated factors catalyzed a sustained increase in business analytics research, making it one of the most dynamic and evolving fields in data science and business strategy today.

The year 2022 emerged as a landmark in the publication landscape with 100 publications, accounting for 15.38% of the total article publications in the area of business analytics. This stands as a testament to the increasing academic resonance of this area of study. Moreover, the year 2023 and 2024 followed closely behind, with a commendable contribution of 68 and 85 publications, respectively, which constitute 10.46% and 13.08% of the total research output. This phenomenon suggests an observable growth trajectory in the scholarly contributions in this area. Anticipating the publication trend for the remainder of 2024, it is predicted that the number of publications will surpass the previous year's total, given that the count has already reached 85 in the first eight months. This is indicative of a sustained and potentially escalating interest within the academic community in further unravelling the nuances of business analytics.

Furthermore, this study also attempted to discover the major contributors to business analytics studies (RQ2). The results showed that the United States had the highest proportion of authors contributing to business analytics research. Meanwhile, IPB University located in Indonesia was the highest institution contributing a total of 34 business analytics publications. In addition, business analytics research has been widely published in; business, management, accounting and social science publications rather than focusing on other research fields, such as neuroscience, pharmacology, physics and astronomy. The citation metrics described in this study showed the impact of publications concerning business analytics. According to a Scopus database search for business analytics research, there were 650 documents published with a total of 17873 citations over nearly 20 years

(2005–2024), with a total of 893.65 citations per year, 27.50 citations per paper and 2.81 authors per paper. Studies focused on business analytics were collected through a Scopus database search. The present study discovered 650 articles from the Scopus database using predefined search queries. The growing demand for technology management in business organisations contributes to positive growth of this research area.

The focus of this research area can be seen from the results that the VOS viewer software application presented in its keyword analysis. The present study also drew on potential thematic contexts and methodological frameworks from previous research to develop future research directions to pave the way for incorporating the concept of business analytics into broader settings. Furthermore, this study has strongly encouraged future research regarding business analytics to contribute to the potential challenges of contemporary business analytics development (RQ3). The identification of these six themes reflects the multifaceted nature of business analytics research. These findings provide valuable insights into emerging trends, adoption challenges, strategic applications, and technological advancements that are shaping the field. Future research should further explore the integration of AI, cloud computing, and data-driven strategies in business analytics to enhance innovation, efficiency, and competitive advantage.

The foundation of business analytics research lies in artificial intelligence (AI) and big data analytics, which form the technological backbone for all subsequent research themes. The early emergence of machine learning, data mining, and predictive modelling provided organizations with the capability to process and analyze massive datasets, enabling evidence-based decision-making. As firms began to realize the potential of business intelligence (BI) tools to extract strategic insights, the focus shifted from descriptive analytics toward value creation—leveraging big data for innovation, efficiency, and competitive differentiation. This value creation cluster thus represents both the origin and outcome of analytics maturity, serving as the catalyst for technological evolution and organizational adaptation. However, most studies quantify firm performance but neglect intangible outcomes such as innovation culture or social impact. Future research should integrate ESG metrics and sustainability-driven analytics.

Building on the big data revolution, the next research phase emphasized the integration of emerging technologies including cloud computing, IoT, and blockchain, into business analytics systems. This movement accelerated digital transformation, marking a shift from traditional analytics processes to automated, AI-driven decision systems. Here, emerging technologies and digital transformation act as enablers for analytics adoption, providing the computational infrastructure and connectivity required for real-time insight generation. These advancements positioned analytics not merely as a supportive tool but as a core strategic function, fundamentally reshaping business operations. However, the path from technological capability to organizational impact is not linear. Despite the rapid pace of innovation, many organizations struggled with adoption and implementation challenges, such as inadequate data literacy, fragmented systems, and resistance to change. Research in this cluster highlights that organizational readiness, technical expertise, and data-driven culture are decisive in determining successful analytics adoption. In essence, digital transformation and emerging technologies create the opportunity, but adoption and implementation determine the extent to which organizations can transform technological potential into tangible performance gains.

Once adopted, analytics capabilities directly influence strategic advantage and organizational performance. Companies that successfully integrate analytics into their processes exhibit improved forecasting, innovation management, and operational efficiency. This cluster bridges the gap between adoption and tangible value realization. The concept of absorptive capacity becomes pivotal—firms must not only acquire analytics tools but also assimilate and exploit data-driven insights to generate sustained competitive advantage. Here, value creation re-emerges as both an antecedent and a consequence: analytics creates value by transforming operations, and that value, in turn, fuels further technological investment and strategic growth.

Parallel to business implementation, technology integration in education has emerged as a supporting cluster, addressing the growing need for human capital development in analytics. Educational institutions and corporate training programs have incorporated analytics, cloud computing, and digital learning technologies into their curricula. This integration ensures a steady pipeline of data-literate professionals who can sustain and expand analytics ecosystems, thereby linking knowledge diffusion with organizational capability building. The

educational dimension thus reinforces the broader analytics ecosystem, feeding back into adoption and strategic advantage.

The culmination of this evolution is represented by the data-driven decision-making cluster, which synthesizes all previous themes. Organizations increasingly rely on real-time data, predictive analytics, and decision-support systems to move from intuition-based to evidence-based strategies. At this stage, analytics becomes institutionalized within organizational cognition—where insights are continuously transformed into actionable intelligence that closes the loop between data, technology, and business performance.

Collectively, these clusters form a virtuous cycle linking technological advancement, organizational adaptation, and knowledge diffusion. AI and big data serve as the technological foundation; emerging technologies drive transformation; adoption and implementation operationalize capabilities; strategic advantage and performance reflect realized outcomes; education sustains human capital; and data-driven decision-making integrates the entire ecosystem. This interdependence underscores that the evolution of business analytics is not a linear progression but an iterative, mutually reinforcing process—one that continues to redefine how organizations create, manage, and sustain value in the digital age.

The present research has also revealed the most influential articles on business analytics (RQ4). The document entitled “Integration of online and offline channels in retail: The impact of sharing reliable inventory availability information” by Gallino & Moreno (2014) received the highest number of citations, with 490 total citations and an average of 40.83 citations per year. The concept of business analytics and the utilization of business analytics in both real online and offline inventory make up the industry examined in this paper. It has provided illustrations of a few of the most recent best practices from around the globe. Also, the discussion has been about the benefits and drawbacks of promoting and growing business analytics. Thus, the most influential article “Integration of online and offline channels in retail: The impact of sharing reliable inventory availability information” by Gallino & Moreno (2014), promotes business analytics development. With this article, the topic of business analytics research will develop more, and many subsequent articles will discuss business analytics.

CONCLUSION AND IMPLICATIONS

The evolution of business analytics research is a continuous process driven by the increasing demands of technological advancements. This study utilized data extracted from the Scopus database to assess various aspects of business analytics. By analysing multiple bibliometric indicators—including contributing authors, citations, influential journals, keywords, and abstracts from 650 downloaded publications—this study applied bibliometric analysis to identify key elements contributing to the growth of business analytics. Additionally, the study employed VOS viewer software to map associations between terms, offering a visual representation of the conceptual framework within this research domain.

This study contributes to the existing literature in several significant ways. First, by examining yearly trends in research output, it provides insights into publication patterns within the field. Second, it identifies major contributors in business analytics research, analysing bibliometric data related to authorship, country of origin, institutional affiliations, and source titles. Third, it maps the intellectual structure of the field and highlights dominant themes through an analysis of author keyword co-occurrence. Furthermore, the study identifies the top twenty research papers in business analytics, as well as the most-cited studies both in total and on an annual basis.

The study also outlines few potential directions for future business analytics research. Emerging technologies, such as artificial intelligence and machine learning, should be further explored in relation to business analytics applications. It is recommended to develop holistic models linking technological capability, human capital, and value co-creation to understand systemic impacts of business analytics adoption. Additionally, future research should investigate theoretical frameworks that integrate business analytics with AI-enabled technologies that embedded ethics, governance, and sustainability frameworks. Organizational capabilities and innovation in the context of business analytics should also be given greater attention. Moreover, core business analytics methodologies, including techniques and tools, should be widely implemented in future research to assess their impact on strategic decision-making and competitive advantage. Finally, examining the role of business analytics

as a strategy for achieving sustainability and maintaining competitive advantage presents a valuable avenue for further exploration. The future research should employ mixed methods, bibliometric-cum-semantic analysis, and machine learning-based meta-reviews to deepen understanding of evolving research trajectories.

It is important to acknowledge the inherent limitations of this study, which are common in similar bibliometric research. First, the study relies solely on data from the Scopus database, which, while comprehensive, may not encompass all relevant sources. Future research could enhance its scope by incorporating data from additional well-established databases, such as Web of Science (WoS), Google Scholar, Dimensions, PubMed, CiteSeerX, and Microsoft Academic. Second, expanding the range of keywords related to business analytics would improve the comprehensiveness of future studies. Furthermore, employing advanced bibliometric techniques, such as co-citation, co-authorship, and co-word analysis, would provide deeper insights into the intellectual structure and evolution of the field.

Despite these limitations, this study makes a meaningful contribution by presenting current trends in business analytics research and expanding upon prior findings through a bibliometric approach. In conclusion, it offers a comprehensive assessment of the current state of business analytics research, shedding light on key aspects of the field and identifying future research directions.

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