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Research Article

Banking Performance Research in the Era of Business Intelligence and Big Data Analytics: A Bibliometric Analysis

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ABSTRACT

Business Intelligence (BI) and Big Data Analytics (BDA) are central to banking performance management, yet the literature remains fragmented with no integrated bibliometric synthesis focused on performance outcomes. This study analyzes 92 peer-reviewed articles indexed in Scopus (2016-2025) using a search protocol informed by PRISMA 2020 transparency guidelines. *Bibliometrix*, Biblioshiny, and VOSviewer were used to examine publication trends, influential sources, conceptual structures, keyword co-occurrence patterns, and geographic distribution. Scientific output has grown steadily, but a persistent lack of conceptual integration between analytical capabilities and banking performance outcomes exists, alongside significant geographic concentration in South and Southeast Asia and the Middle East. Banking practitioners should invest in organizational enablers alongside technology, policymakers should support BI/BDA adoption in underrepresented regions. This study provides the first structured bibliometric map of performance-focused BI and BDA research in banking, identifying three research gaps: absence of integrative performance models, insufficient empirical validation using banking-specific metrics, and limited geographic diversity.

Keywords: Banking Performance, Bibliometric Analysis, Big Data Analytics, Business Intelligence, VOSviewer, Scopus.

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INTRODUCTION

During the last decade, there have been several substantial advancements within the banking sector resulting from an increased reliance on digital technology, increased competition, increased volume of transactions, and the exponential increase in data storage. For banks to remain viable in today's competitive environment which is full of data, they must build their capabilities to turn large quantities and multiple types of data into actionable intelligence. Therefore, BI and BDA are now critical components of modern banking information systems as they support decision-making based on data and performance management (Akter *et al.*, 2016; Chen *et al.*, 2012).

According to (Mbaidin *et al.*, 2024; Watson and Wixom, 2007), BI can be described as a collection of architecture, tools, and methods for collecting, integrating and analyzing data for improving managerial decision-making quality and enhancing their organization's effectiveness. On the other hand, (Chen *et al.*, 2012) indicate that BDA can be viewed as the extension of BI using advanced analytical techniques with very large amounts of high-speed, volume and data variety.

Prior to this, there has been a body of research which supports the notion that the application of BI and BDA enhances the performance of an organization. These enhancements can occur through operational efficiency, financial performance, effective decision making, risk management, and customer analytics performance (Akter *et al.*, 2016; Gupta and George, 2016; Rialti *et al.*, 2019). The application of BI and BDA within the banking industry is extensive when evaluating areas of critical performance such as credit risk analysis, fraud detection, regulatory compliance, and CRM (Ghasemaghaei, 2021).

Although there is now a large number of studies on this topic, the literature is fragmented across multiple research disciplines, including information systems, management, decision sciences, and computer science, and has different performance measures, conceptual frameworks, and methods used (Balas *et al.*, 2019; Popovič *et al.*, 2012; Wixom *et al.*, 2013). This makes it difficult to understand how the field has developed as a whole and what is at the intellectual core of the field. While a few papers have discussed either BDA or analytical capabilities as broad topics (Akter *et al.*, 2016; Gupta and George, 2016), none have provided a structured, quantitative mapping of how performance-based BI and BDA research has evolved specifically in the banking industry.

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Bibliometric analyses are a rigorous, reproducible way of assessing the intellectual structure of a research domain by tracking publication activity, citation patterns, keyword relationships, and academic networks through time (Donthu *et al.*, 2021; Zupic and Čater, 2015). No other bibliometric study has provided an organized and complete mapping of performance-oriented BI and BDA research in banking, which is the goal of this research study.

In light of this context, the current research investigates three specific research questions:

RQ1: How has the scientific output on BI and BDA in the banking sector evolved between 2016 and 2025, and what are the dominant publication trends?

RQ2: What are the main thematic clusters and conceptual structures characterizing BI and BDA research in the banking domain?

RQ3: What are the key intellectual gaps and future research directions in performance-oriented BI and BDA research in banking?

After discussing the RQs, the remaining sections of this study will cover a literature review, the research design used in this study, bibliometric analyses of the literature associated with the RQs, theoretical and practical contributions to the field through application of the RQs, limitations, and directions for future research.

LITERATURE REVIEW

Business Intelligence as an Organizational Capability

A new understanding of the concept of business intelligence can be seen in the contemporary literature on information systems, instead of focusing exclusively on IT infrastructure as before, there has been a broader conceptualization of business intelligence within the context of organizational capability. More specifically, developing BI capability is comprised of data infrastructures, analytical tools, and the organizational processes necessary to generate business value and enable performance management (Seddon *et al.*, 2017; Trieu, 2017). Therefore, BI can provide support for improvements in the performance of an organization by: improving the quality of managerial decisions, enhancing process efficiencies and providing overall organizational responsiveness and agility, not just through the utilization and sophistication of technology (Torres *et al.*, 2018). Further, the performance benefits of BI are primarily contingent upon the organizational and management context such as leadership support, data governance, and strategic alignment rather than solely technological factors as was the case previously.

Big Data Analytics and Dynamic Capabilities

Organizations now have access to more analytical capabilities than ever before thanks to Big Data Analytics (BDA). Based on the dynamic capabilities theory, BDA allows organizations to identify market changes, determine new market opportunities and re-allocate their internal resources to maintain a competitive advantage (Mikalef *et al.*, 2020). These findings are supported by empirical research that shows BDA capable organizations outperform non-BDA capable organizations on both operational and financial metrics; especially when BDA is aligned with an organization's strategy and governance framework (Mikalef *et al.*, 2020; Talwar *et al.*, 2021).

Theoretical Fragmentation and the Need for Synthesis

Although a great deal of empirical research has been conducted, there is a lack of a unified theory among BI and BDA researchers. Many researchers use different theoretical frameworks and tools in their research, including the resource-based view, the dynamic capability theory, or the information systems success model. Therefore, there is no clear or cohesive theory for future researchers to build on when they conduct research in this area.

The way that some researchers measure the success of their business or their performance, such as by using profit, efficiency, decision making ability, service and/or risk, can differ greatly from other researchers or studies. This inconsistency between studies can lead to a lack of future researchers being able to create a body of work around BI/BDA banking performance (Donthu *et al.*, 2021; Zupic and Čater, 2015).

Bibliometric methods provide researchers with a way to quantitatively and reproducibly map their research area and also identify distinct areas of research that may exist. These methods also provide researchers with a way to illustrate the timeline or history of the research area, which makes these methods particularly useful for researchers in rapidly changing or emerging interdisciplinary fields, such as the intersection of BI, BDA, and banking performance.

METHODOLOGY

Review Protocol and Data Source

This study aims to use an organized bibliometric methodology to provide a clear map of the performance of Banking BI and BDA research with respect to methodological rigor, transparency and reproducibility, following a systematic search of the literature according to the PRISMA 2020 framework (Page *et al.*, 2020). One point of clarification is that this project is a bibliometric analysis and not a systematic review or meta-analysis as traditionally defined. The objective here is to apply PRISMA 2020 as a transparency framework for identifying, screening and selecting literature; thus, bibliometric researchers are beginning to use

PRISMA 2020 as a methodology for conducting bibliometric studies (Donthu *et al.*, 2021). No quality appraisal or evidence synthesis was completed in this bibliometric analysis as these procedures form the basis for traditional systematic reviews. Scopus was selected as the sole data source given its extensive, standardized coverage of peer-reviewed journals in information systems, business, and management; the primary disciplines of this study.

Scopus offers certain features that make it more suitable as a source for bibliometric research than other available databases such as Web of Science (WoS), which include the availability of quality bibliographic metadata to support citation, co-occurrence, and network analysis, making it the most commonly used bibliometric resource in the social science literature (Donthu *et al.*, 2021), and the fact that in comparative studies of bibliometric data there has been significant evidence supporting that coverage by the Scopus database is larger in both fields of study than the WoS database (Mongeon and Paul-Hus, 2016), which is particularly important for this study's focus; therefore, the decision to use either bibliography as the sole source of bibliometric data represents one limitation of the present study (see Section 6).

The literature search was conducted on March 15, 2025, using the following search string applied to title, abstract, and keywords fields:

TITLE-ABS-KEY (((Business Intelligence OR Big Data Analytics) AND (banking OR bank OR "financial institution") AND (performance OR efficiency OR "decision-making")) AND (PUBYEAR>2015 AND PUBYEAR<2026))

The inclusion of only articles that had been published between 2016 and 2025 in English language and peer-reviewed journals. The exclusion, to maintain methodological consistency and quality of data, was made for conference papers, books, and gray literature. The upper limit on publication dates was set to 2025 to avoid including partially indexed journals in an incomplete year, which would affect temporal trends.

Search Strategy and Study Selection

The first search yielded 316 records. Document refinement criteria were applied to increase the consistency of thematic relevance and methodology, such as restricting to articles that were published in English and excluding anything outside the research scope of this study (for example agriculture, pure algorithm development, infrastructure engineering…). The records have undergone removal of duplicate records and both title and abstract review, and the remaining records have been reviewed for their applicability to performance-based BI and BDA in banking.

The PRISMA 2020 framework was used for the screening and eligibility process, comprising four steps: identification (n=316), screening (n=180), eligibility (n=92), and full inclusion (n=92). At the screening step, 88 records were excluded because they did not address banking performance outcomes in relation to BI or BDA. No records were excluded at the eligibility step. The complete selection process is illustrated in Figure 1.

Data Preprocessing and Bibliometric Mapping Tools

Using the *Bibliometrix* package version 4.1.4 (Aria and Cuccurullo, 2017), a total of 92 articles were exported from Scopus into a CSV file and then imported into R. Data preprocessing included: 1) Converting all author keywords to a uniform format by using the convert2df() function, 2) Combining semantically similar keyword descriptors (for example: Big Data Analytics and BDA would be combined into BDA), 3) Removing keywords that contained no useful information or were too generic in meaning (for example: study, analysis), 4) Confirming that author names were properly disambiguated using the Scopus Author ID when one was available. This dataset contained no author names that required manual disambiguation.

Descriptive metrics and a network analysis of the dataset was completed using Biblioshiny (R-Shiny version of *Bibliometrix*), which included annual publication trends, key authors, journals equivalency measures and citation structures. The co-occurrence networks of keywords were created by the full counting method using VOSviewer (Ver.1.6.20; Van Eck and Waltman, 2010). A co-occurrence value of 1 was used as the minimum threshold in order to capture emerging themes from the much smaller dataset (n=92). VOSviewer's built-in modularity clustering algorithm was used with the default resolution parameter of 1.0 to identify clusters; the association strength normalization method (recommended for use with co-occurrence datasets) was utilized for normalization (Van Eck and Waltman, 2010).

RESULTS

Descriptive Analysis of the Publication Landscape

The bibliometric analysis maps BI and BDA scientific output in the banking sector over the period 2016-2025, examining publication activity, authorship patterns, citation structures, and thematic focus (see Figure 2 for annual publication trends).

Intellectual, Geographical, and Collaborative Structure

Table 1 shows the most frequently cited research papers in this area. Some of these papers focus on advanced data analytics, while others emphasize the use of AI in finance, or how effective BI systems will be, all reflect a strong focus on both technology and performance within the area. Many of these articles had high levels of citation intensity each year (TC/Year) and recent publications, such as (Ahmed *et al.*, 2022) appear to be indicative of increasing academic interest in AI-based analytics used by financial institutions.

The author productivity analysis Table 2 shows structural differences in volumes of publication and citation impact: the authors Casado A-M and Ramos C.M.Q., who both produced 4 publications, have virtually no citations of their work (TC/TP = 0.25). This indicates that the development of new knowledge in this field is being done by an unconnected group of contributors with no consolidated citation base, as is also evidenced from the intermediate theoretical maturity of this field.

There is a significant geographic concentration of publications, as illustrated in Figure 3 and detailed in Table 3 for additional research to cover more regions geographically in the future (Vidgen *et al.*, 2017).

Keywords and Cluster Analysis

Figure 4 presents the keyword treemap, which reveals that Business Intelligence (BI) is the most frequently occurring term.

There were five main themes that were identified when looking at how concepts appear together Figure 5: (1) A core cluster linking BI, BDA and financial performance, examples are for the banking sector where there is value creation, (2) Decision support cluster for decision-making, decision support systems and managerial analytics, (3) A methodological cluster of data mining, machine learning, predictive analytics and neural networks, (4) New cluster to support intelligent banking using AI, fraud detection and cybersecurity and (5) New cluster surrounding digital transformation and fintech. In addition, a majority of the identified clusters were of an organizational or strategic enabler nature. These include governance, data quality and strategic alignment, none were found to be within the network as the technical themes were much more prevalent than those of an organizational or managerial nature. This is consistent with previous research that has found similar patterns across BI and analytical literature (Torres *et al.*, 2018).

DISCUSSION

Conceptual Fragmentation and Limited Theoretical Integration

The bibliometric co-occurrence studies clearly show there is a lot of research related to BI and BDA in banking but it is still quite fragmented and the researchers come to the same conclusion regarding the state of research in BI and BDA, still quite fragmented at the conceptual level. Even though BI/BDA are the main words that provide a cohesive and common foundation on which they can build, at this point in time that does not provide a unified theoretical foundation through which they can view this body of research. (Aria and Cuccurullo, 2017) suggest

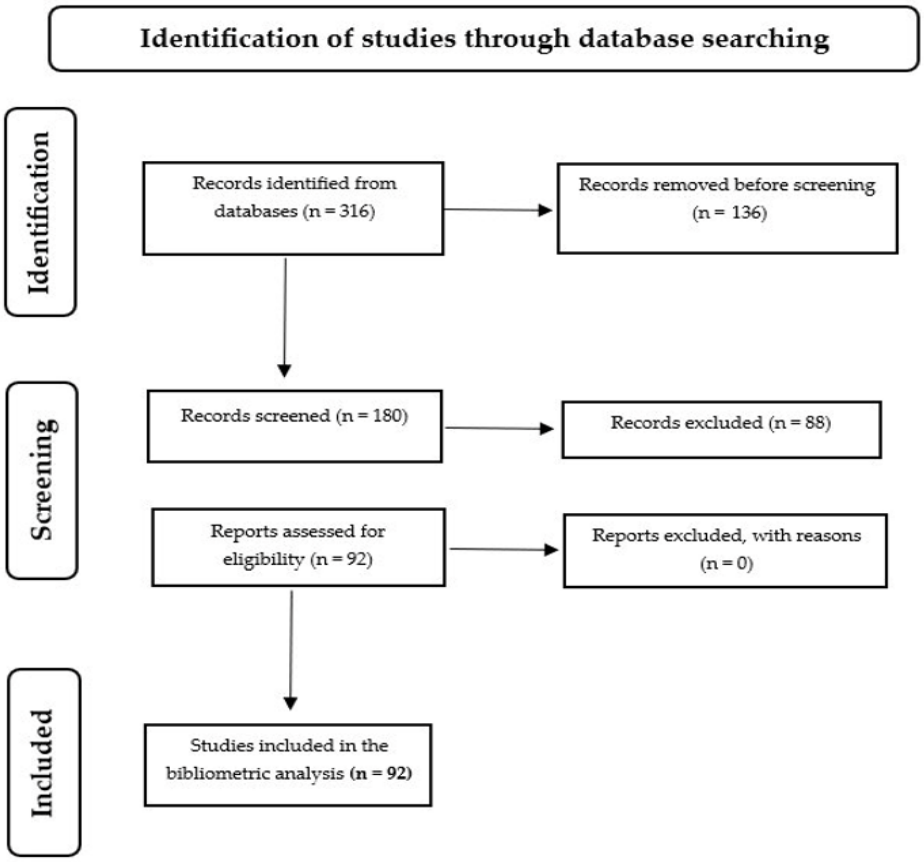

Figure 1: Literature search and selection process (search protocol informed by PRISMA 2020 transparency guidelines; adapted from (Page *et al.*, 2020).

Table 1: Most cited documents in BI and BDA research in the banking sector (2016-2025).

Rank	Article Title	Authors, Year	Journal	TC	TC/Year
1	Big Data Analytics: Deep Learning for financial sentiment analysis	Sohangir S., 2018	Journal of Big Data	334	37.11
2	Artificial intelligence and machine learning in finance: A bibliometric review	Ahmed S. *et al.*, 2022	Research in International Business and Finance	308	61.60
3	An empirical study on data warehouse systems effectiveness: the case of Jordanian banks	Al-Okaily A. *et al.*, 2023	EuroMed Journal of Business	112	28.00
4	Big Data Analytics for supply chain relationship in banking	Hung J.-L. *et al.*, 2020	Industrial Marketing Management	105	15.00
5	Privacy preservation techniques in Big Data Analytics: a survey	Rao P., 2018	Journal of Big Data	105	11.67
6	The efficiency measurement of BI systems in the BDA-driven economy: a multidimensional model	Al-Okaily A. *et al.*, 2023	Information Discovery and Delivery	91	22.75
7	Optimization of cluster-based evolutionary undersampling for ANNs in corporate bankruptcy prediction	Kim H.-J. *et al.*, 2016	Expert Systems with Applications	83	7.55
8	The Effects of Technological Innovation on the Banking Sector	Campanella F. *et al.*, 2017	Journal of the Knowledge Economy	75	7.50

Note: TC = Total Citations; TC/Year = Average Annual Citations. Rows 1-8 represent the most-cited articles within the Scopus corpus (n = 92).

Table 2: Leading contributing authors in BI and BDA research in banking.

Rank	Author	TP	SA	CoA	TC	TC/TP	Affiliation
1	CASADO A-M	4	0	4	1	0.25	University of Malaga, Spain
2	RAMOS C.M.Q	4	0	4	1	0.25	University of Malaga, Spain
3	FAROUK F.M	3	0	3	0	0.00	Universiti Teknologi Malaysia
4	AL-OKAILY A	2	0	2	3	1.50	University of Jordan
5	AL-OKAILY M	2	0	2	3	1.50	University of Jordan
6	AWAMLEH F.T	2	0	2	2	1.00	Middle East University, Jordan
7	BUSTAMI A.N	2	0	2	2	1.00	Middle East University, Jordan
8	ROJAS-DE-GRACIA M-M	2	0	2	1	0.50	University of Malaga, Spain

Note: TP = Total Publications; SA = Single-authored papers; CoA = Co-authored papers; TC = Total citations; TC/TP = citations per publication.

that this type of early-mid stage of theoretical development is characteristic, when some foundational constructs exist but have not yet been developed into an integrated theoretical framework through which those constructs relate to each other.

In addition to the structural fragmentation of the research literature to date, the influential work on BI/BDA in Banks has been published in various journals as opposed to there being a "core" journal to which most of this work has been published and since this work has not yet developed into an integrated theoretical framework, theoretical integration across disciplines could be limited. (Günther *et al.*, 2017) also have suggested that while research in analytics has progressed more rapidly than academic research has made towards developing theoretical foundations it has also limited the extent; to which work on analytics may be compared and theoretically developed across

Table 3: Countries' Scientific Production in BI and BDA Banking Research.

Rank	Country	TP
1	India	40
2	Jordan	31
3	Malaysia	15
4	USA	13
5	Indonesia	11
6	United Arab Emirates	8
7	Spain	6
8	UK	6

Note: TP = Total Publications based on authors' affiliations.

studies. The findings presented in this research support this critique in the context of banking.

Dominant Thematic Priorities and Research Imbalances

The existing banking literature is largely concentrated on operational and technical dimensions, including digital analytics and machine-based information systems (Davenport, 2005; LaValle *et al.*, 2010). Research on banking generally ignores critical elements for enabling an organization to successfully manage risk while achieving operation success (Torres *et al.*, 2018; Watson and Wixom, 2007). Even though both previously cited authors have relatively high form of technological overlap between business identity and information systems strengths, they conclude that an organization can achieve value from BI/BDA only if they have complementary capabilities in place to operate their current business model.

Furthermore, performance-related terms are also found within the corpus, although they appear to exist mostly on the outskirts of the network rather than centrally located. Their peripheral location indicates that a great deal of the literature denotes performance as an implicit construct rather than being subjected to rigorous measurement through empirical methods as a dependent variable (Popovič *et al.*, 2012). The reputation created by the existing gap within the framework presents an impetus for further studies to provide empirical evidence of a direct relationship between BI/BDA capabilities and validated performance measures in the banking sector using robust empirical research methodologies.

Geographic Asymmetries and Research Maturity

The geographic distribution of research published from India, Jordan, and Malaysia raises concerns regarding the generalizability of current available evidence. Each of these three countries has differing regulatory regimes, levels of digital readiness and banking systems that, unless one conducted a truly global comparison, are unlikely to be representative of either Western Europe, North America, or sub-Saharan Africa. (Vidgen *et al.*, 2017) caution researchers that analytics-related research which has been produced solely within different institutional settings may not be able to apply their findings in a wider context; therefore, they recommend including additional developing regions with significant banking sector growth into future research on this topic.

The existence of few high impact research papers linked to an overall low number of published articles in this field suggests it is currently at an 'intermediate' level of development. Although there are some thought-provoking contributions, these

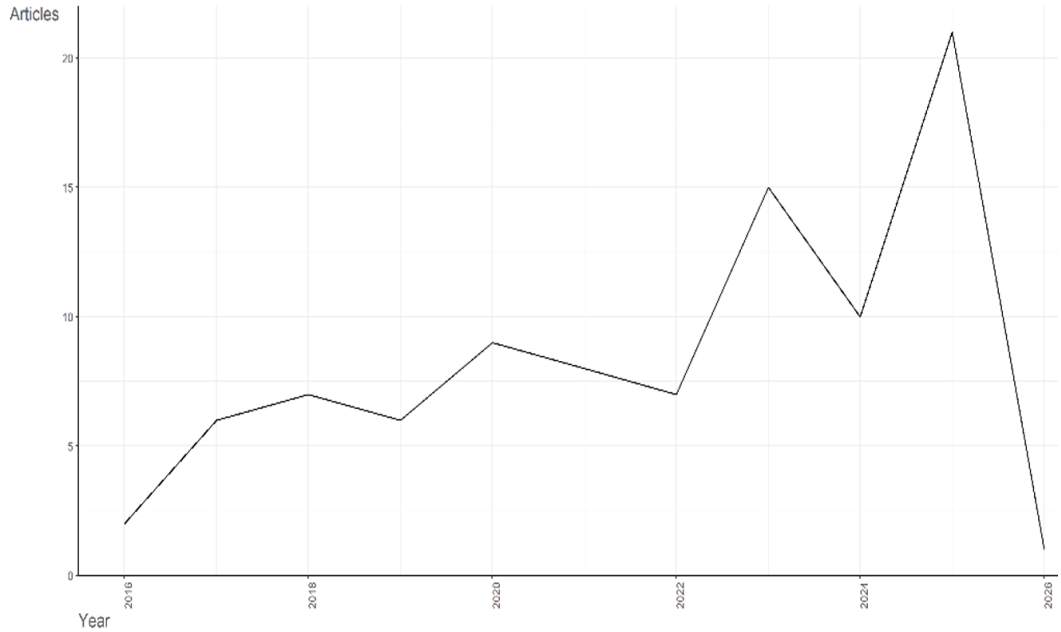

Figure 2: Annual Scientific Publications (2016-2025). Note: Data for 2025 may be incomplete due to ongoing indexing at the time of the search (March 2025).

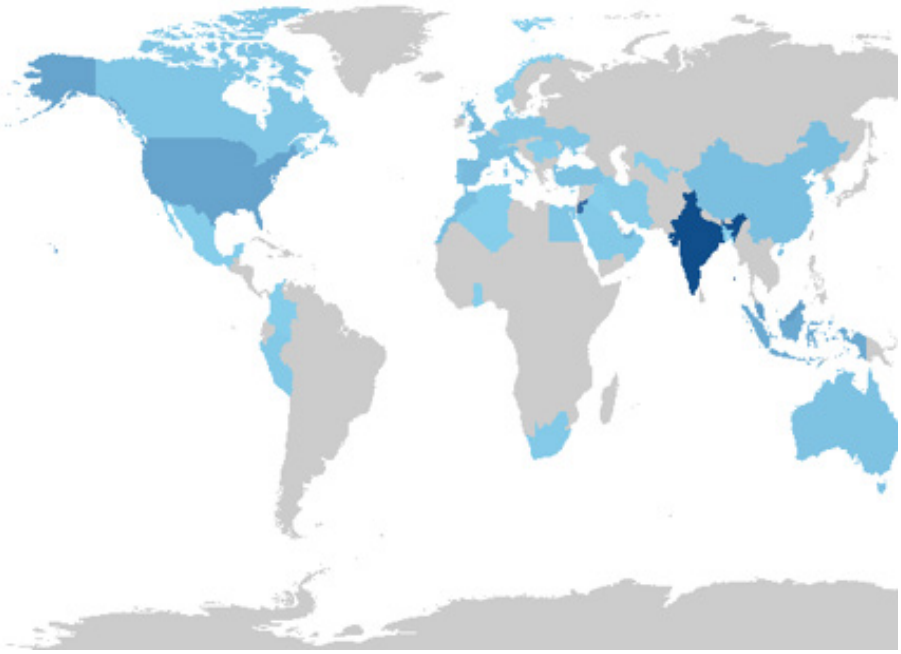

Figure 3: Geographical Distribution of Scientific Publications in BI and BDA Banking Research.

contributions have not yet accumulated into a substantial body of theory which would indicate a mature research domain. This creates an opportunity for those researchers who wish to work with analytical methodologies. It also provides encouragement to researchers who are producing empirical research regarding increasing their theoretical ambition.

Synthesis and Identified Research Gaps

The bibliometric analysis of banking research on BI and BDA shows that the main drivers of research dissemination in terms of BI and BDA in banking are technological evolution, operationally driven types of research articles, and a geographic concentration in South and Southeast Asia and the Middle East, with insufficient theoretical integration and limited use of objective performance metrics. In addition, three major areas of needed research include: (1) The absence of an integrated theoretical model linking BI and BDA competencies to organizational performance with specific mechanisms for providing outcomes and boundary conditions, (2) Limited empirical testing of the relationship between these variables using objective financial performance measures within a banking-specific context and (3) The lack of geographic and/or institutional diversity in available empirical evidence. Addressing these gaps will lead to an evolution of BI and BDA research away from exploratory application-based models toward cumulative and theoretical research grounded in sound empirical evidence that is applicable to the outcomes of BI and BDA studies.

Theoretical and Practical Implications

Theoretical Implications

This research has contributed to the theoretical development of Business Intelligence (BI) and Big Data Analytics (BDA) in the banking context in several ways. The bibliometric analysis provided a mapping of the intellectual landscape of BI and BDA thereby providing a basis for evidence-based theory development into the future. The analysis demonstrated that there is currently conceptual fragmentation with respect to BI and BDA and that performance outcomes are primarily located on the periphery of the co-occurrence network, demonstrating an urgent need for theoretical development.

The second contribution of this research is the identification of the potential for existing theoretical frameworks to serve as a unifying framework for BI and BDA; specifically, the Resource-Based View (RBV) of the firm, Dynamic Capabilities Theory, and IS Success Models. These frameworks can enable future theorists to create mid-level models that define the relationship between specific BI/BDA capabilities and banking performance outcomes using organizational and contextual factors.

Another way in which this theory has contributed to our understanding is that we identified that the co-occurrence network is largely comprised of technical constructs and lacks any organizational enablers. A conceptual framework linking the technology-organization interface to BI/BDA will offer considerable value to the field by providing insight into how and why BI/BDA investments do not lead to superior performance and in what situations they do lead to superior performance.

Practical Implications

This study's findings indicate the key role of better-informed use of Business Intelligence (BI) and Big Data Analytics (BDA) tools as a means of enhancing performance for those engaged in the practice of banking. Evidence has provided further support for this contention by illustrating that the elements listed below: data governance, analytical talent acquisition and development and strategic alignment, are also important in providing the needed support for banks to implement a technology-based infrastructure upon which to build on.

It is therefore imperative that banking management make a conscious and deliberate effort when identifying and utilizing the BI and BDA tools available to them to invest in these organizational enablers.

The publications associated with this study demonstrate significant geographic clustering that should prompt policymakers to create appropriate incentives and assistance to facilitate the adoption of BI and BDA tools in banking the developing areas of the banking community. Such support may take the form of additional regulations that create greater access to data, establish standards for the quality of data, or provide incentives for investing in analytical capabilities.

There are also a large number of articles published on this subject in a number of unrelated disciplines, which suggest there is a need for publishers of academic journals to create one or more special editions that focus on this subject and provide a forum for developing a cumulative body of academic literature related to BI/BDA tools.

LIMITATIONS

There are limitations to this analysis, and when interpreting the findings of this research these issues need to be taken into consideration.

The analysis is based solely on the literature found in the Scopus database. Although the Scopus database covers a large body of literature related to business and management, restricting the analysis to one database could create coverage bias. For instance, literature related to the topic but not indexed in the Scopus database (for instance, indexed in the Web of Science or Google Scholar) or online repositories related to the discipline could be missing from this analysis and affect the completeness of the intellectual map that this analysis produced. Therefore, any subsequent bibliometric studies in this subject area are encouraged to use multiple databases to reduce database source bias.

Future studies should use multiple search strings to ensure comprehensive coverage. Additionally, combining bibliometric keyword analysis with topic modelling techniques on larger, multi-database corpora would help identify latent thematic structures beyond those captured by author-supplied keywords.

The research literature analysis contained only research written in English which suggests that there might be many published papers not reviewed by this article under the title of co-occurrence cluster analysis, papers published in Arabic, Chinese, or Portuguese-speaking countries with high rates of research outputs such as Middle East, Asia-Pacific Region, and Latin America. There are some methodological guidelines

Figure 4: Treemap of keyword frequencies in BI and BDA Banking Literature.

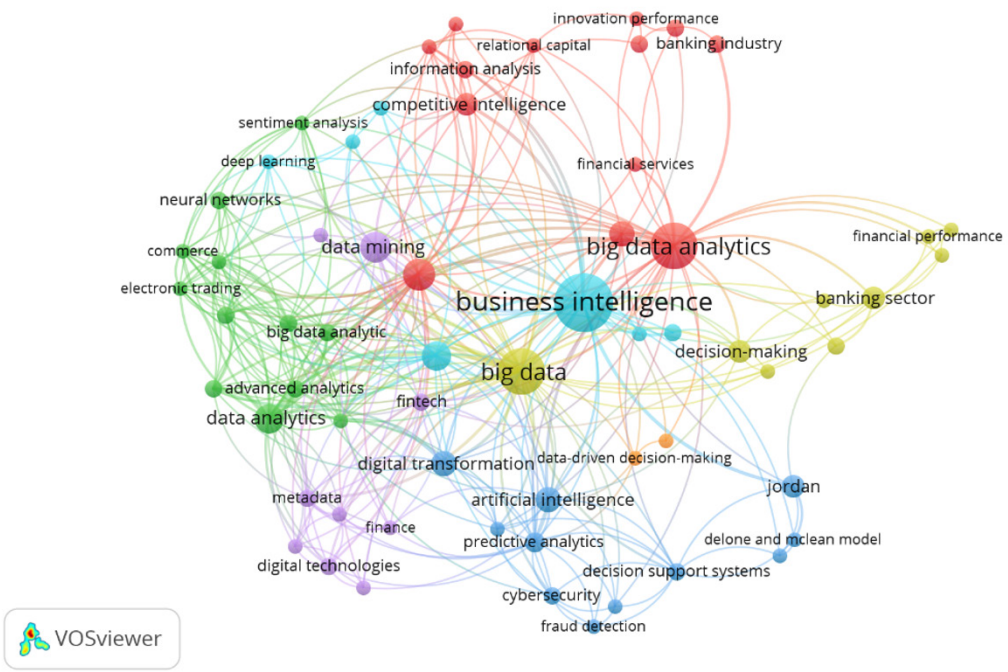

Figure 5: Keyword Co-occurrence Network in BI and BDA Research in Banking.

available to assist researchers in determining the thresholds for co-occurrence clustering algorithm in VOSviewer (Van Eck and Waltman, 2010). However, an analytical choice is involved when determining co-occurrence thresholds and clustering therefore the 'true' thematic structure may only be determined on a case-by-case basis. Therefore, if alternative criteria had been used within the analysis to create clusters the clusters produced by these analyses would differ than those produced in this study therefore, please utilize caution when relying upon conceptual maps generated by this study when making broad generalizations about the relationships reflected in terrestrial thematic map. No evidence exists to support the assessment of the methodological quality or internal validity of each research program's output as a result of the bibliometric analysis performed within the study therefore no conclusions concerning the methodological quality of each researcher's output should be drawn from the analysis conducted in this study. The citation data and dominant theme of researchers referenced in this study do not represent the methodological quality of the researcher referenced in the analysis.

CONCLUSION

The aim of this research is to provide an extensive analytical review of the existing literature related to Business Intelligence (BI) and Big Data Analytics (BDA) in banking. Through this analysis, we reviewed 92 peer-reviewed articles for BI and BDA conducted within the banking industry from 2016-2025. Additionally, *Bibliometrix*/Biblioshiny and VOSviewer were used to chart and catalogue the intellectual structure, theme development, and geographical and collaborative patterns associated with the studies in BI and BDA conducted in Banking.

The first conclusion drawn from this study was that there is a large body of research concerning BI and BDA, and while that body of research continues to grow at a rapid pace, it is still very immature from a theoretical standpoint, meaning there exist many highly cited empirical studies that have not yet been put together into a coherent theoretical framework, for example, this can be seen in all of the empirical studies regarding micro-level analytics as well as decision support systems and the exploitation of data. However, we also found that existing literature tends to be focused on the technical and operational aspects of BI/BDA and does not examine the organizational and accounting aspects very well, such as the facilitation of organizational change and the relationship between BI/BDA and strategy alignment mechanisms. Thus, because of this imbalance in the current literature, we do not have a very good understanding of how BI/BDA can provide sustained competitive advantages in the banking industry. Finally, we also found that most of the current literature is very geographically concentrated within a few countries most of which are located in either Southern/Southeast Asia or the Middle East. Future research should deliberately expand its geographic scope to include underrepresented regions with large and growing banking sectors.

The present study offers the first structured bibliometric mapping of performance-oriented BI and BDA literature in the banking sector, thereby making a meaningful contribution to the advancement of knowledge in this domain. The intellectual

maps generated in this study have four main components: (1) Trends in Publications; (2) Patterns of Citations; (3) Networks of keyword co-occurrences and (4) Thematic Clusters. The results of these four maps will help consolidate previous findings and create benchmarks for the future research of more integrated theoretical and contextual investigations in BI and BDA. The gaps identified in the literature by this study are: no integrated performance model, insufficient empirical validation using banking application metrics, and lack of geographical diversity provide multiple avenues through which future research in this area can be guided as it continues to evolve.

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ABBREVIATIONS

BI: Business Intelligence; **BDA:** Big Data Analytics; **RQs:** Research Questions; **CRM:** Customer Relationship Management; **PRISMA 2020:** Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020; **WoS:** Web of Science; **CSV:** Comma-Separated Values; **VOSviewer:** Visualization of Similarities Viewer; **TC:** Total Citations; **TC/Year:** Average Annual Citations; **TP:** Total Publications; **SA:** Single-Authored Papers; **CoA:** Co-Authored Papers; **TC/TP:** Citations per Publication; **AI:** Artificial Intelligence; **IS:** Information Systems; **RBV:** Resource-Based View.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

DATA AVAILABILITY

The bibliometric dataset extracted from Scopus is available from the corresponding author upon reasonable request.

Software Versions: R version 4.3.2; *Bibliometrix* package version 4.1.4; Biblioshiny interface version 4.1.4; VOSviewer version 1.6.20.

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