



Business Intelligence and Decision Making: A Bibliometric Analysis

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HIGHLIGHTS

- Business Intelligence significantly enhances data-driven decision-making and organizational efficiency.
- Research output increased rapidly after 2013, indicating growing academic interest. Artificial intelligence, big data, and machine learning dominate research themes.
- Decision Support Systems emerged as the most influential publication source, whereas, emerging focus includes ethics, sustainability, and human-centric analytics.

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ABSTRACT

The rapid advancement of information and communication technologies fuelled the exponential growth of digitized data, creating new opportunities for research in Big Data Analytics (BDA) and Business Intelligence (BI). This study provided a bibliometric analysis of academic research on the intersection of business intelligence and decision making, drawing on data from the Scopus database between 2010 and January 2025. Using bibliometric tools such as Bibliometrix (R) and Excel, the study examined descriptive analysis and thematic developments. Results revealed that the number of publications had grown significantly since 2013, with Decision Support Systems and related journals serving as primary outlets. Key contributors in this arena included Arnott, Rouhani, and Hou, with the University of Tehran emerging as a leading institution. The United States ranked highest in total citations, while Belgium led in average annual citations. Thematic mapping indicated that data mining, decision makers, and commerce were central “motor themes,” while competitive advantage and management systems remained niche topics. Findings confirmed the strategic importance of it in enabling effective decision-making and highlighted emerging research trends in BD, AI, and knowledge management.

INTRODUCTION

Business intelligence (BI) and analytics are key enablers in the digital economy, helping organizations use large data sets for better decision-making and strategic advantage (Davenport & Harris, 2007; Chen et al., 2012; Charkaoui & Jabraoui, 2024). Advances in big data technologies improve efficiency, competitiveness, and long-term performance (McAfee & Brynjolfsson, 2012). Research shows that BI&A supports knowledge-based decisions, predictive analysis, and improved outcomes, while also enhancing organizational agility and

decision quality through data-driven insights rather than intuition (Popovic et al., 2012; Delen & Demirkan, 2013). Despite its growing importance, the BI&A field remains theoretically fragmented, overlapping with areas like knowledge management and information systems, leading to varied definitions and approaches (Power et al., 2015). Research confirms its strategic role in driving innovation and resilience, whereas, a clear understanding of its intellectual development is still limited (Popovic et al., 2012; Arnott & Pervan, 2014). To address this, the study analyses BI and decision-making

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research from 2010 to 2025, highlighting key publications and thematic trends (Zupic & Cater, 2015; Aria & Cuccurullo, 2017).

As data analytics underpins BI by converting structured and unstructured data into actionable insights through processes like cleaning, analysis, and modelling. It includes three types: descriptive (past), predictive (future), and prescriptive (actions) (Sharda et al., 2021). So, recent advances in augmented analytics, using machine learning and natural language processing, enable automated, real-time insights via dashboards and models (Shmueli & Koppius, 2011; Henke et al., 2018), making analytics a key driver of innovation and efficiency (Davenport, 2013). Consequently, the integration of advanced analytics into organizational process has reshaped decision-making in contemporary business environments. While traditional models focused on problem identification and evaluation of alternatives, modern approaches rely heavily on analytical tools and predictive techniques. This shift has improved accuracy, transparency, and accountability in organizational decisions. The emergence of decision intelligence, which integrates analytics, artificial intelligence (AI), and behavioral insights, further enhances decision outcomes in complex environments (Arulmanikandan et al., 2025).

In this context, the growing strategic importance of data-driven decision-making has accelerated the evolution of BI systems and technologies within organizations. It has evolved from basic reporting tools to integrated platforms combining data warehousing, mining, analytics, and visualization. It now serves as a strategic capability, helping organizations turn data into actionable insights and support digital transformation through technologies like AI and big data. However, research remains fragmented, often addressing technical and organizational aspects separately.

Notwithstanding its strategic importance, BI&A remains theoretically fragmented, overlapping with fields such as knowledge management and information systems (Arnott & Pervan, 2014; Power et al., 2015; Ain et al., 2019; Akter et al., 2022; Suman et al., 2025). Accordingly, this study employs bibliometric analysis to examine BI and decision-making research from 2010 to 2025. By mapping the field's conceptual structure (Donthu et al., 2021), the study provides a comprehensive view of its development and emerging directions, offering an integrated perspective on BI research (Cobo et al., 2011; Aria & Cuccurullo, 2017; Roy et al., 2024; Jiao et al., 2025; Malawani et al., 2025) over fifteen years.

METHODOLOGY

This study adopts an inductive research approach, deriving conclusions from the analysis of evidence obtained from bibliometric data. The focus is to evaluate the global research output on the impact of Business Intelligence (BI) on Decision Making by applying bibliometric and visualization techniques (Mekimah et al., 2024; Udeh et al., 2024). In doing so, the study focuses on identifying the most significant academic sources, including leading journals and publication outlets, as well as recognizing highly influential documents that have shaped the trajectory of research in this field. Data for the study were collected from major scholarly databases, primarily Scopus (Elsevier), using a structured query with the keywords "Decision Making" AND "Business Intelligence" limited to Title, Abstract, and Keywords for the period 2010 to

January 2025. The retrieved records were exported in .bibtex format for Scopus to ensure compatibility. Furthermore, the study investigates the evolution of research themes by tracing their development over time, highlighting both established and emerging directions. This temporal analysis provides insights into how the field has transitioned from foundational concepts to more advanced and integrated approaches. This Data cleaning eliminated duplicates, harmonized metadata, and prepared the dataset for analysis. Using the Biblioshiny package in R, records were converted into .xlsx format separately and merged into a consolidated dataset with the command `write.xlsx(combine, file_name = "combine.xlsx")`. R libraries such as `xlsx`, `fBasics`, and `bibliometrix` were initialized for the process. The cleaned dataset was analysed with `Bibliometrix` (R-package) and Microsoft excel, focusing on performance analysis-annual publication trends, influential document, sources, keywords and thematic developments. Visualization techniques such as tables, charts, graphs, thematic maps, and word clouds were used to present publication growth, emerging themes, and frequently used keywords with the help of `biblioshiny` and `VOSviewer`. Finally, results were evaluated for accuracy, precision, and recall, with bibliometric indicators cross-verified across databases to ensure reliability and minimize bias.

RESULTS

Evolution of the publications

The year wise publications and citation trends in the area of "Business Intelligence and Decision making" are shown separately by different colour. As shown in Figure 1. year 2024 is having highest in number of citations whereas the 2010 is leading in context to publications.

Most relevant sources

The most relevant sources in the area of "Business Intelligence and Decision making" are the Decision Support Systems with 56 publications, followed by Journal sustainability with 41 publications, followed by intelligence studies in Business with 29 publications, as shown in Table 1.

Word cloud (Keyword plus)

The frequency distribution of keywords is presented in Figure 2. The network visualization highlighted AI as the central research theme, strongly connected with areas like machine learning, big data,

Table 1. Most Relevant Sources

Sources	Articles
Decision Support Systems	56
Sustainability (Switzerland)	41
Journal of Intelligence Studies in Business	29
Journal of Decision Systems	26
Industrial Management and Data Systems	20
Technological Forecasting and Social Change	20
European Journal of Operational Research	19
International Journal of Production Research	19
International Journal of Information Management	18
Journal of Cleaner Production	16

Figure 1. Year Wise Publication and Citation 2010-2025

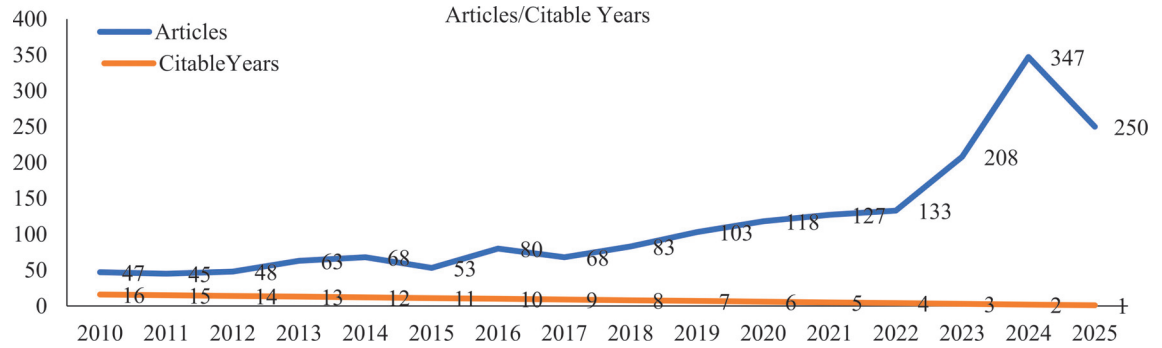


Table 2. Most Global Cited Documents

Paper	Journal	DOI	TC	TC per Year	Normalized TC
G, 2011	Annual Review of Psychology	10.1146/annurev-psych-120709-145346	2639	175.93	30.40
YK, 2021	International Journal of Information Management	10.1016/j.ijinfomgt.2019.08.002	2521	504.20	37.25
MM, 2015	Journal of Big Data	10.1186/s40537-014-0007-7	2011	182.82	29.38
T, 2021	Journal of Cleaner Production	10.1016/j.jclepro.2021.125834	788	157.60	11.64
W, 2013	International Journal of Information Management	10.1016/j.ijinfomgt.2013.01.001	707	54.38	14.12
NA, 2022	The International Journal of Human Resource Management	10.1080/09585192.2020.1871398	658	164.50	20.75
BP, 2012	User Modeling and User-Adapted Interaction	10.1007/s11257-011-9118-4	656	46.86	11.97
SL, 2020	Business Process Management Journal	10.1108/BPMJ-10-2019-0411	642	107.00	19.20
ADFS, 2021	International Journal of Information Management	10.1016/j.ijinfomgt.2020.102225	528	105.60	7.80
H, 2010	Computers & Operations Research	10.1016/j.cor.2009.11.009	429	26.81	8.76

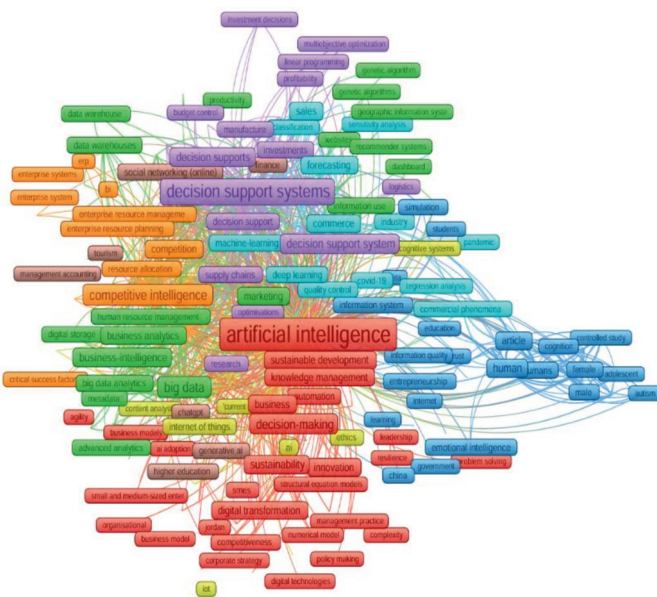


Figure 2. Word Cloud (Keyword Plus)

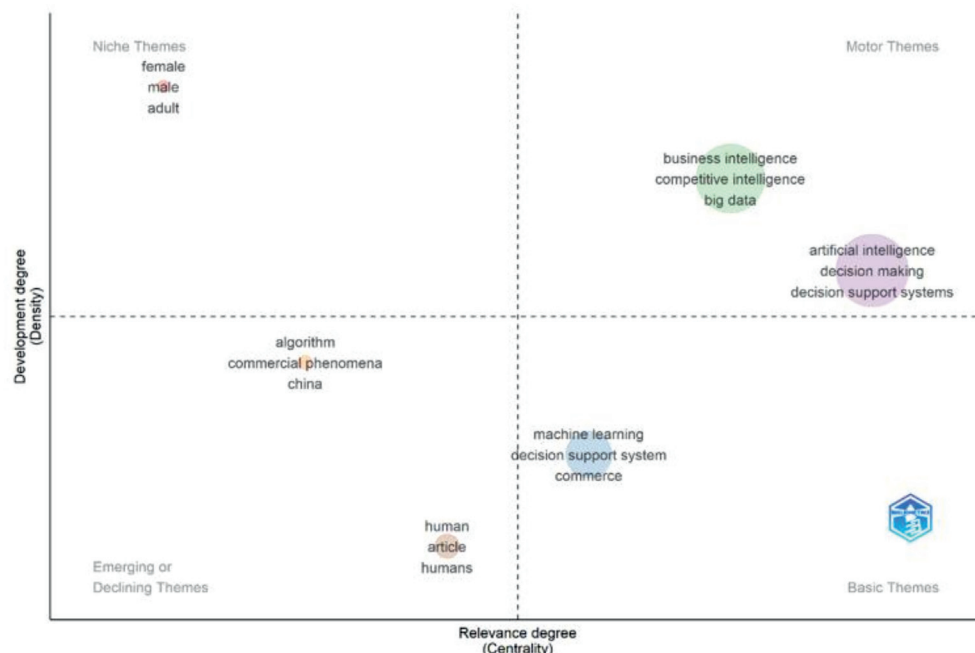
decision support systems, and competitive intelligence. The clusters reveal that AI research extends beyond technology to applications in business strategy, sustainability, healthcare, and data analytics. A significant stream also emphasized the human and psychological aspects such as cognition, trust, motivation, and emotional intelligence, indicating a shift toward human-centered AI. Emerging themes like ethics, transparency, and sustainable AI suggest growing attention to responsible use of AI. Overall, the map illustrated AI’s

interdisciplinary nature, bridging technology, management, and social sciences.

Conceptual structure

The thematic map categorized research themes based on their relevance (centrality) and development (density). The motor themes quadrant highlights *business intelligence*, *competitive intelligence*, and *big data* along with AI, *decision making*, and *decision support systems*, showing them as well-developed and highly relevant to the field. The cluster “business intelligence, competitive intelligence and big data” suggests a well-established research program where the relationship between organizational intelligence practices and large-scale data analytics has been thoroughly explored. The high density indicates strong theoretical and methodological coherence among these concepts; the high centrality reveals that this cluster influences and connects with numerous other topics in the field. In the same quadrant the cluster “AI, decision making and decision support systems” occupies a position that is central but slightly closer to the quadrant boundary, suggesting it is a consolidated motor theme with strong relevance. The tight internal linkage among AI, decision-making processes, and support systems reflects a long-standing and productive research tradition. Its centrality confirms that this cluster acts as a backbone topic from which many other research lines branch out. Finally, the strategic significance of the motor themes is that it should be sustained and further expanded, as they represent the field’s identity and vitality. They are the themes that attract the most attention, generate the most impact, and provide conceptual scaffolding for the entire domain of the current research.

Figure 3. Thematic Map



Basic themes such as *machine learning*, *commerce*, and *decision support systems* have high centrality but are less developed, indicating their foundational role. The combination of above-mentioned themes suggests a broad and transversal research front concerned with the application of ML techniques to support commercial and business decisions. The high centrality confirms that this topic underpins and connects many other research areas like, linking to AI, big data, business intelligence. However, the low density indicates that this research front is still consolidating its theoretical frameworks, methodological standards, or conceptual boundaries.

Niche themes like *female*, *male*, and *adult* are specialized but less connected to the broader domain. This cluster points toward a demographic framing likely studies examining gender and age-related dimensions within the broader field e.g., gender differences in decision-making supported by AI, or demographic segmentation in business intelligence applications. The niche positioning suggests that while this line of research has developed its own internal

consistency and scholarly community, it has not yet been integrated into the mainstream discourse of the field. It remains a specialized subfield with limited dialogue with other thematic clusters. Therefore, it is concluded from this quadrant that efforts to build bridges between this demographic/human-factors perspective and core themes (e.g., decision-making, machine learning) could elevate its relevance and centrality.

Meanwhile, emerging or declining themes highlights the line of inquiry concerning algorithmic applications in commercial contexts with a geographic focus on China. The low density suggests that the conceptual relationships among these keywords have not yet crystallized into a coherent research program. The low centrality indicates that this topic has not yet established meaningful connections with the field’s core themes. In addition to it the cluster consisting of keywords human, article and humans appears to be a residual cluster, possibly resulting from generic indexing terms rather than substantive thematic content. The inclusion of terms like article and the redundancy of human/humans suggest that this cluster may

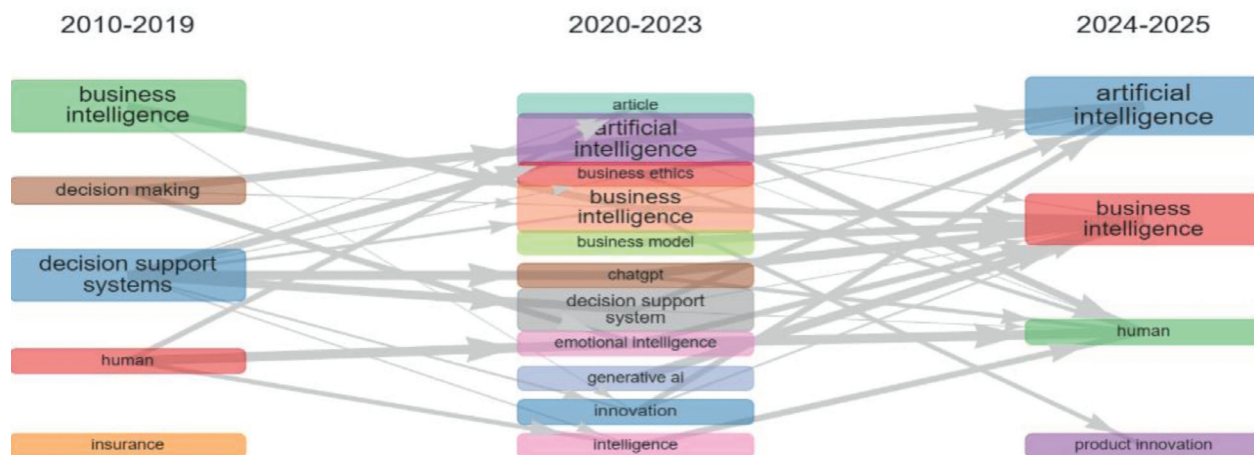


Figure 4. Thematic Evolution Map

reflect bibliographic objects rather than a genuine intellectual theme. Alternatively, it could represent a loosely defined humanistic or human-centered perspective that has not achieved sufficient conceptual articulation. So, these themes require careful monitoring. Overall, the map reveals that AI and business intelligence dominate the research landscape, while human-focused and regional themes remain peripheral. In the next section following the thematic map analysis, the thematic evolution map has been examined across three time slices to understand the progression and transformation of research themes over time.

Thematic evolution

The thematic evolution map showed a clear shift in research focus over time. During 2010–2019, themes such as *business intelligence*, *decision making*, *decision support systems*, and *human* dominated. In 2020–2023, the field expanded with the emergence of AI, *business ethics*, *business models*, *emotional intelligence*, *generative AI*, and *innovation*, reflecting a diversification of themes. Moving into 2024–2025, research has consolidated around AI, *business intelligence*, *human*, and *product innovation*, highlighting the growing emphasis on AI-driven applications, ethical and human-centered approaches, and innovation in business. This evolution indicates a transition from traditional decision-support research to more advanced, AI-driven, and innovation-oriented themes. Further, the themes have been analyzed on the basis of three time slices.

The thematic map for Time Slice 1 showed four quadrants based on the relevance (centrality) and development (density) of themes. “Decision support systems,” “AI,” and “decision support system” are motor themes highly developed and essential to the discipline. “Business intelligence” and “competitive intelligence” are basic themes relevant but less developed. “Female,” “male,” and “priority journal” appear as niche themes well-developed but less central. Themes like “decision-making” and “risk assessment” fall into the emerging or declining category, suggesting limited current development or relevance. The presence of “human” and “article” also indicates marginal and less-developed focus areas. The thematic map for Time Slice 2 revealed a more evolved and diversified research landscape. “Business intelligence,” “big data,” and “decision makings” emerge as motor themes, indicating strong centrality and development. “AI,” “decision making,” and “decision support systems” are basic themes still highly relevant but needing further development. Niche themes like “business ethics,” “COVID-19,” and “fintech” show focused yet less central research. Emerging or declining themes include “ChatGPT,” “sentiment analysis,” and “neural network,” indicating new or fading interests. Topics like “digital transformation” and “sustainability” also highlight growing interdisciplinary interest in technological integration.

The thematic map for Time Slice 3 indicated a consolidation of research themes. “Business intelligence,” “decisions makings,” and “big data” stand out as motor themes, representing well-developed and highly relevant areas. “AI,” “decision making,” and “machine learning” remain basic themes, central to the field but requiring deeper development. “Sustainable development” appears as a niche theme, showing high specialization but limited centrality. Meanwhile, themes like “product innovation” and “data-driven culture” fall into the emerging or declining quadrant, suggesting either

new, underdeveloped topics or waning research interest. Overall, the focus is shifting toward applied intelligence and data-centric strategies.

DISCUSSION

This section presents and critically discusses the results of the bibliometric analysis based on publication trends, keyword clusters, thematic evolution, and thematic analysis.

In the contemporary business environment, data is a critical organizational asset (Yeoh & Koronios, 2010), and the integration of BI and Big Data (BD) enhances strategic decision-making and competitive advantage. This integration improves organizational agility and supports long-term sustainability (Adewusi et al., 2024). BI is increasingly converging with AI and advanced analytics, reflecting a shift toward predictive and prescriptive decision-making (Baesens et al., 2016; Mariani & Wamba, 2020). Overall, this evolution highlights a transformation in how organizations leverage data, while also revealing nuanced gaps and areas for further exploration.

The convergence of BI with AI and advanced analytics, as noted by George et al. (2022), reflects a shift toward predictive and prescriptive decision-making. While this improves agility and responsiveness, it also raises concerns related to data privacy, algorithmic bias, and over-reliance on automated insights. Despite rapid technological progress, ethical and interpretability issues remain underexplored (Mariani & Wamba, 2020). Although transparency, accountability, and fairness are widely emphasized (Nwaimo et al., 2023), stronger implementation frameworks are required to effectively apply these principles.

The emergence of ethics, sustainability, trust, and emotional intelligence in BI research reflects a shift toward human-centric and socially responsible approaches. While this aligns with broader corporate social responsibility trends, their practical integration into BI applications and organizational policies remains limited. The key challenge is translating these insights into actionable guidelines that balance innovation with ethical responsibility. The shift from infrastructure-focused research to innovation and digital transformation, as noted by Divatia et al. (2021) and Shehzad & Rozan (2024), reflects the maturity of BI and its alignment with dynamic business environments. It highlights BI’s evolution beyond data warehousing and decision support toward value creation and agility. However, this transition may overlook the importance of data quality, governance, and organizational culture, which are essential for sustaining competitive advantage.

The rise in BI publications after 2013, driven by technological advancements and expanding digital data environments (Delen & Demirkan, 2013; Liang & Liu, 2018; Ain et al., 2019; López-Robles et al., 2019), reflects growing scholarly interest. Although thematic mapping into motor, emerging, basic, and niche themes provides a structured understanding of the field, it may oversimplify BI’s interdisciplinary nature. The diversity of research approaches and publication types (Gaardboe & Svarre, 2018; Wyskarski, 2019) suggests that a single thematic framework may not fully capture its complexity. The move toward stronger collaboration in recent BI research, contrasting earlier single-author dominance (Rahman et al., 2021), reflects its increasingly collaborative nature. Analysis

across 2010–2019, 2020–2023, and 2024–2025 shows a progression from infrastructure to innovation and value creation. However, strict temporal categorization may overlook overlapping trends and developments that extend across periods.

The integration of BDA and decision intelligence, highlighted by highly cited studies (Riipa et al., 2025), reinforces their role in improving organizational performance and decision accuracy (Nweke & Owusu-Berko, 2025). AI-driven solutions further enhance BI by enabling real-time insights and supporting proactive decision-making (Ganesan & Gopalsamy, 2019; Eboigbe et al., 2023; Kumari et al., 2024; Rostamzadeh et al., 2025; Barman et al., 2026). However, these advancements also raise concerns around data governance, security, and interpretability. Organizations must address these challenges to fully leverage BI while maintaining ethical and operational integrity. The BI landscape reflects rapid technological growth, rising scholarly interest, and increasing attention to ethical and strategic issues. The shift toward predictive, prescriptive, and socially responsible BI is promising but requires balancing innovation with ethical governance, organizational culture, and interdisciplinary collaboration (Marshall et al., 2015). Addressing these challenges will demand adaptive and responsible approaches to sustain progress in BI (Corte-Real et al., 2017; Liang & Liu, 2018; López-Robles et al., 2019; Di Vaio et al., 2022; Alzghoul et al., 2024).

CONCLUSION

The study establishes that Business Intelligence has evolved into a strategic enabler of data-driven decision-making and organizational performance during 2010–2025. The findings highlight the dominant role of AI, big data, and analytics in shaping modern decision processes, while also emphasizing the growing importance of ethical and human-centric approaches. Although the research landscape shows significant expansion, variations in thematic development indicate the need for balanced attention to emerging and foundational areas. The study suggests that future research should adopt interdisciplinary approaches and integrate technological advancements with organizational and social considerations. The results provide valuable insights for researchers and practitioners to understand the evolving role of BI in enhancing decision-making effectiveness and strategic outcomes.

DECLARATIONS

Ethics approval and informed consent: Informed consent was sought from the respondents and their organisations regarding the study during the course of the data collection.

Conflict of interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The authors declare that during the preparation of this work, thoroughly reviewed, revised, and edited the content as needed. The authors take full responsibility for the final content of this publication.

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