

REVIEW ARTICLE

BUSINESS ANALYTICS IMPLEMENTATION: A SYSTEMATIC LITERATURE REVIEW

Arkhe Marquez Pacis^{1*} and Sydeli P. dela Cruz²¹Faculty of Business and Government, Brigham Young University-Hawaii, USA²College of Forestry and Agroforestry, Pampanga State Agricultural University, Magalang, Philippines

ABSTRACT - Business analytics (BA) has emerged as a pivotal tool for enhancing decision-making and business performance through data-driven insights. However, its implementation remains a significant challenge. This study employed a systematic literature review methodology and utilised Scopus, Web of Science, and Google Scholar as a backup database to retrieve relevant literature. The review followed a structured process comprising identification, screening, eligibility, and data collection/extraction stages. The searches initially retrieved 83 articles, of which 41 met the inclusion criteria based on peer-reviewed journal status, language, and relevance. Google Scholar was utilised to access articles unavailable in the primary databases. Following full-text assessments and accessibility checks, 25 articles were selected for analysis. The findings categorise antecedents, strategies, and consequences of BA implementation, highlighting the importance of management support, data infrastructure, and cultural readiness. Additionally, it identified several gaps in the literature, including research on skills development and adoption within small and medium enterprises. This study provides actionable insights for practitioners and future research directions to advance BA implementation.

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1. INTRODUCTION

Business analytics (BA) is a domain in business management that requires tangible direction on its implementation. Empirical studies suggest that BA improves business performance (Chatterjee et al., 2024; Chaudhuri et al., 2024). However, most organisations are still exploring ways and explanations of how to use BA in business operations (Wang et al., 2020). Past studies have proposed several frameworks, such as the Resource-Based View (RBV), to investigate organisations' capability to use business analytics (Aydinler et al., 2019; Cosic et al., 2015; Mishra et al., 2019). Pereira and Bamel (2021) also emphasised the usage of similar framework to determine business performance in trendy phenomena. Other scholars also integrated the Technological, Organisational, and Environmental (TOE) framework to expand the current understanding of the developing practice (Kumar et al., 2020; Kumar et al., 2022; Horani et al., 2023). The development of BA as a new business domain is indeed a revolution in the management field (Acito & Khatri, 2014). Delen and Ram (2018) recognised operations research and management science (OR/MS) as the origin of BA. According to Gillon et al. (2014), BA resulted from the gradual advancement of existing systems due to technological potential. Numerous practitioners and researchers have focused on the scope of business problems and integrated enabling methods to define the science and art of practising BA. At the same time, data involvement is high in the process (Delen & Ram, 2018). Technological advancements have made data easily accessible, creating the impulse to use it for decision-making, which is evident in organisations (Bayrak, 2021).

While the benefits of implementing BA are pertinent, organisations need guidance for the actual realisation. Efforts to define BA have been impacted by researchers' non-consensus insights into the field's novelty (Delen & Ram, 2018; Liu et al., 2023; Power et al., 2018). Perhaps, the challenge is simply recognising a fixed definition of this business domain. The division on the general concept of BA is evident in both research and practice. For instance, Cegielski and Jones-Farmer (2016) investigated the knowledge, skills, and abilities of BA professionals to provide further guidance on the all-around expanse of BA practice, while Verma et al. (2019) expanded the investigation to job postings. These studies highlight the efforts to reduce the gap between academia and practice. Furthermore, scholars have utilised data concepts and analytics lenses to develop the emerging field, with data analytics, business intelligence (BI), and big data (BD) are interchangeably associated with BA. Mashingaidze and Backhouse (2017) dissected the differences between BI and BD: BA is an avant-level BI while BD involves unquantifiable data and unstructured datasets, such as photos, sounds, and videos (Ajah & Nweke, 2019). Horani et al. (2023) also recognised that utilising BA comes in different dimensions based on data analytics and BD views, while Holsapple et al. (2014) accentuated that BA is a business enabler in early development.

To date, empirical studies on BA are limited, with no theoretical grounding of the practice in place (Conboy et al., 2020) and organisations are unsure of how to implement it (Wang et al., 2020). Therefore, this study aims to determine organisations' BA implementing strategies through a systemic literature review (SLR) of empirical studies exploring the prominence and implementation of BA in the business domain. The SLR procedures in this study are parallel to those of Iden and Eikebrokk (2013) involving IT implementation. BA plays a transformative role in improving organisational performance. Despite its recognised potential, many organisations face significant challenges in implementing BA due to gaps in readiness, technological capabilities, and understanding of best practices. The absence of a unified framework for the implementation of BA further exacerbates the difficulties in fully realising its potential. Hence, the motivation for this study stems from the growing reliance on BA and the need to address these challenges systematically.

The findings from this study shall present a structured guide for organisations to manoeuvre through the intricate landscape of BA integration effectively by pinpointing the essential antecedents, strategies, and outcomes. This systematic review is motivated by the escalating dependence on BA and the necessity for actionable insights that connect theoretical frameworks with practical applications. It aspires to make significant contributions to both academic theory and practical endeavours, providing valuable recommendations for scholars and practitioners in the field alike. The primary objectives of this study are to:

1. Identify and categorise existing studies on BA implementation.
2. Analyse the antecedents, strategies, and consequences of BA implementation.
3. Highlight theoretical frameworks and methodologies used in BA implementation research.
4. Propose actionable recommendations for practitioners and researchers.

2. METHOD

This study was conducted via a systematic literature review (SLR). The emerging subject of BA implementation in research must solidify a standard roadmap (Komolafe et al., 2024). Thus, this SLR intends to determine, classify, and recapitulate existing knowledge on BA implementation and recognise scopes and possibilities for prospective investigation in this fast-emerging field.

2.1 Research Questions

The following research questions were designed based on the research model of Iden and Eikebrokk (2013) and adjusted according to the BA implementation content:

RQ1: What studies have been conducted on BA implementation?

This research question identifies the articles' publication year and authors. It involves gathering existing BA research to determine the gap in the literature and the practice of BA adoption, which can lead to future research recommendations.

RQ2: What research questions have been addressed?

This research question provides specific details on BA implementations, identifying the variables as factors towards successful BA implementation.

RQ3: What theoretical frameworks have been used in BA implementation research?

This research question gathers models and theories used for BA implementation and provides references on models to use for potential research.

RQ4: What are the methodologies used in BA implementation research?

This research question gathers different methodologies used for future studies' reference. Empirical methods will be classified as qualitative, quantitative, or mixed methods and specify whether surveys, interviews, and other methods were used.

RQ5: What are the findings derived from existing BA implementation research?

2.2 The Review Process

All articles used in this review study were gathered from the Scopus and Web of Science (WoS) databases. These databases are widely used in many SLR research as they offer a vast collection of academic publications and knowledge (Bramer et al., 2017). Since the SLR method intends to remove bias from the review process (Rethlefsen et al., 2021), the use of internet search engines for the review process was avoided as they are based on a personalised algorithm (Rethlefsen et al., 2021). Meanwhile, Google Scholar served as a supporting database search if full-text accessibility was unavailable from Scopus and WoS (Mohamed Shaffril et al., 2021). The review process involved identification, screening, eligibility, and data extraction processes, which were adopted from Hamzah et al.'s (2024) SLR method.

2.2.1 Identification

The SLR method began by identifying relevant keywords, namely "Business Analytics Implementation", as well as related and similar terms to expand the article search process. It reduced the possibility of missing relevant publications

that met the research questions. “Adoption” is a related term for implementing technological tools in the organisation (Grover & Goslar, 1993; Hausman & Stock, 2003). Thus, “Business Analytics Adoption” was identified as one of the search keywords. However, terminologies like OR/MS, BI, and BD were not considered as part of the keywords as this study aims to strengthen BA as a new management field.

Table 1 shows the keywords used for queries in the academic databases. According to Mateen et al. (2013), title queries alone are more efficient for literature screening than title and abstract searches. Therefore, the title-only search strategy was applied in this study as BA is considered a new phenomenon. Putting the keywords for the title, abstract, and keyword queries provides irrelevant studies, including obsolete terms for business analytics like OR/MS and BI (Delen & Ram, 2018), and interchangeably used before BA became a buzzword in research and practice. The article search resulted in 53 publications from Scopus and 30 publications from WoS.

Table 1. Search query

Academic Database	Search Query
Scopus	TITLE (business AND analytics AND implementation) OR TITLE (business AND analytics AND adoption)
WoS	TI = (business analytics implementation) OR TI = (business analytics adoption)

2.2.2 Screening

Table 2 shows the inclusion and exclusion criteria used for the article screening process. Only journal articles written in English were selected as they contain empirical findings that answer the research questions. Meanwhile, other publication types like books, review articles, conference proceedings, and book chapters written in languages other than English were excluded. The initial screening resulted in 65 articles (28 articles from WoS and 37 articles from Scopus), which were further reduced to 41 articles after deleting duplicates. While SLR research often considers the article's timeline as part of the screening criteria, it was ignored in this study following the fact that BA has only been recently identified in practice and research. The screening process was preceded by an eligibility assessment, which involved assessing the full-text accessibility of all articles. A total of 15 articles could not be downloaded, making only 25 articles fit for the review phase.

Table 2. Screening criteria

Criterion	Eligibility	Exclusion
Literature Type	Journal Article	Review, Book, Conference Proceedings, and other than journal articles
Language	English	Other than English

2.2.3 Eligibility

Following the screening process, the authors then manually examined all 41 articles' eligibility for analysis. The process involved reading and reviewing the titles and abstracts to ensure their relevance to the scope of this study. A total of 16 articles focusing on the fields of education and BD were considered unrelated to the research objective and thus eliminated. Figure 1 shows the SLR process flow of this study.

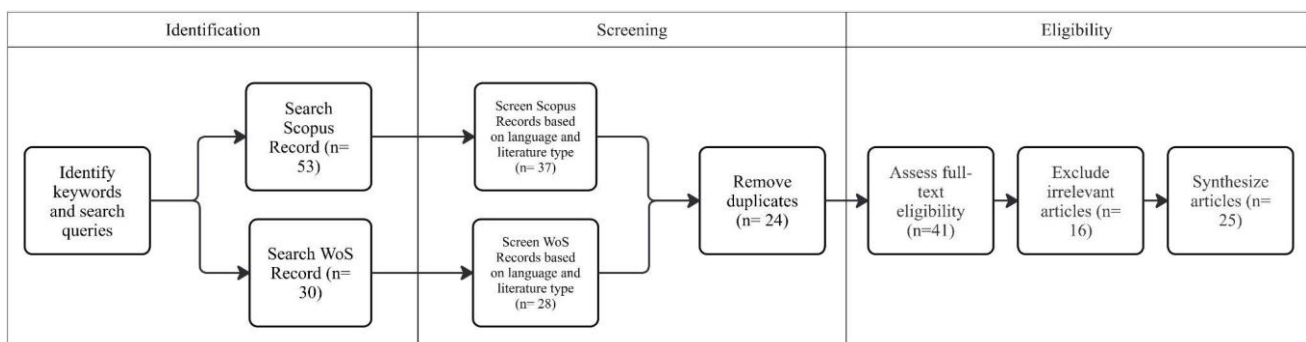


Figure 1. SLR process flow

2.2.4 Data Collection and Extraction

The methodology model for this phase mirrored Iden and Eikebrokk's (2013) process. The researchers independently extracted data from the 25 articles, checked each other's extraction, and created a consensus decision on the data to be synthesised for each article. Any differing opinions were discussed to achieve agreed data extractions.

3. RESULTS

The following section presents the data extracted from the 25 articles to answer the research questions.

3.1 What Studies have been Conducted on BA Implementation?

Figure 2 shows the number of studies conducted on BA implementation per year. Without the inclusion of timeframe in the screening criteria, the earliest study was published in 2015, while 2023 has the most published papers on BA implementation and adoption with 8 articles. The number of published works and the oldest article publications demonstrate the emerging BA practice and research, especially when the definitions of BA are identified as missing uniform or accepted concepts in practice and research.

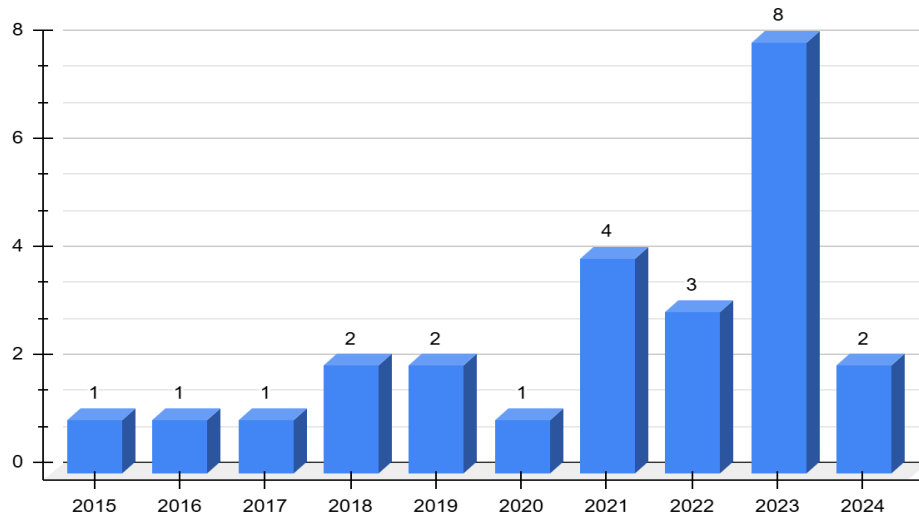


Figure 1. Number of studies per year

Table 3 shows the relevant published articles, which were synthesised for this SLR study. An article ID was assigned to each article for referential key in discussions and analysis. These studies were conducted in various business functions and industries, such as retail, accounting, operations, supply chain, service providers, and general business settings.

Table 3. Published articles on BA implementation

Articles	Article ID
Ramanathan, R., Philpott, E., Duan, Y., & Cao, G. (2017). Adoption of business analytics and impact on performance: a qualitative study in retail. <i>Production Planning & Control</i> , 28(11-12), 985-998.	A01
Araújo, L., Behr, A., & Schiavi, G. S. (2023). Adoption of business analytics in accounting. <i>Revista Contabilidade & Finanças</i> , 34(93), e1771.	A02
Chaudhuri, R., Chatterjee, S., Vrontis, D., & Thrassou, A. (2024). Adoption of robust business analytics for product innovation and organizational performance: the mediating role of organizational data-driven culture. <i>Annals of Operations Research</i> , 339(3), 1757-1791.	A03
Paulino, E. P. (2022). Amplifying organizational performance from business intelligence: Business analytics implementation in the retail industry. <i>Journal of Entrepreneurship, Management and Innovation</i> , 18(2), 69-104.	A04
AL-Shboul, M. D. A. (2023). Better understanding of technology effects in adoption of predictive supply chain business analytics among SMEs: fresh insights from developing countries. <i>Business Process Management Journal</i> , 29(1), 159-177.	A05
Bayraktar, E., Tatoglu, E., Aydinler, A. S., & Delen, D. (2023). Business analytics adoption and technological intensity: An efficiency analysis. <i>Information Systems Frontiers</i> , 1-18.	A06
Nam, D., Lee, J., & Lee, H. (2019). Business analytics adoption process: An innovation diffusion perspective. <i>International Journal of Information Management</i> , 49, 411-423.	A07
Piot-Lepetit, I., & Nzongang, J. (2021). Business analytics for managing performance of microfinance Institutions: A flexible management of the implementation process. <i>Sustainability</i> , 13(9), 4882.	A08
Min, H., & Lea, B. R. (2024). Motivators and Inhibitors for Business Analytics Adoption from the Cross-Cultural Perspectives: A Data Mining Approach. <i>Information Systems Frontiers</i> , 26(3), 1041-1062.	A09

Table 3. (cont.)

Articles	Article ID
Troilo, M., Bouchet, A., Urban, T. L., & Sutton, W. A. (2016). Perception, reality, and the adoption of business analytics: Evidence from North American professional sport organizations. <i>Omega</i> , 59, 72-83.	A10
Gangotra, A., & Shankar, R. (2016). Strategies in managing risks in the adoption of business analytics practices: A case study of a telecom service provider. <i>Journal of Enterprise Information Management</i> , 29(3), 374-399.	A11
Junior, C. H., Oliveira, T., & Yanaze, M. (2019). The adoption stages (Evaluation, Adoption, and Routinisation) of ERP systems with business analytics functionality in the context of farms. <i>Computers and electronics in agriculture</i> , 156, 334-348	A12
Bonilla-Chaves, E. F., Palos-Sánchez, P. R., Folgado-Fernández, J. A., & Marino-Romero, J. A. (2024). The effect of innovation performance on the adoption of human resources analytics in business organizations. <i>Electronic Research Archive</i> , 32(2).	A13
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. <i>International Journal of Production Economics</i> , 239, 108205	A14
Hurbean, L., Militaru, F., Muntean, M., & Danaiaata, D. (2023). The Impact of business intelligence and analytics adoption on decision making effectiveness and managerial work performance. <i>Scientific Annals of Economics and Business</i> , 70(SI), 43-54	A15
Yahaya, J., Abai, N. H. Z., Deraman, A., & Jusoh, Y. Y. (2019). The implementation of business intelligence and analytics integration for organizational performance management: A case study in public sector. <i>International Journal of Advanced Computer Science and Applications</i> , 10(11), 292-299.	A16
Wee, M., Scheepers, H., & Tian, X. (2022). The role of leadership skills in the adoption of business intelligence and analytics by SMEs. <i>Information Technology & People</i> , 36(4), 1439-1458.	A17
Nacarelli, V., & Gefen, D. (2021). Trustworthiness and the adoption of business analytics. <i>Information Systems Management</i> , 38(3), 185-199.	A18
Arias-Pérez, J., Chacón-Henao, J., & López-Zapata, E. (2023). Unlocking agility: Trapped in the antagonism between co-innovation in digital platforms, business analytics capability and external pressure for AI adoption? <i>Business Process Management Journal</i> , 29(6), 1791-1809.	A19
Kumar, A., Krishnamoorthy, B., & Kamath, D. B. (2020). Key themes for multi-stage business analytics adoption in organizations. <i>Asia Pacific Journal of Information Systems</i> , 30(2), 397-419.	A20
Shbail, A. M. A., & Shbail, M. O. A. (2024). Adoption of business analytics and impact on financial reporting quality in Jordanian banks. <i>International Journal of Productivity and Quality Management</i> , 41(4), 569-582.	A21
Rane, S. B., & Mishra, N. (2018). Roadmap for business analytics implementation using DIPPS model for sustainable business excellence: case studies from the multiple fields. <i>International Journal of Business Excellence</i> , 15(3), 308-334.	A22
Horani, O. M., Khatibi, A., ALSoud, A. R., Tham, J., Al-Adwan, A. S., & Azam, S. F. (2023). Antecedents of business analytics adoption and impacts on banks' performance: The perspective of the TOE framework and resource-based view. <i>Interdisciplinary Journal of Information, Knowledge, and Management</i> , 18, 609-643.	A23
Nagpal, G., Ray, A. K., Kharkwal, N., Jasti, N. V. K., & Nagpal, A. (2022). Challenges in adoption of business analytics by small retailers: An empirical study in the Indian context. <i>International Journal of E-Adoption (IJEa)</i> , 15(2), 1-14.	A24
Atan, M., & Mahmood, R. (2023). The Role of Technology in Predicting Business Analytics Adoption in SMEs. <i>Journal of Information & Knowledge Management</i> , 22(01), 2250070.	A25

3.2 What Research Questions have been Addressed?

This study intends to index key questions answered using studies on BA implementation. Since implementing a system and process comes with requirements, the research questions were categorised based on the antecedents, implementation status, and the impact or consequences. Such categorisation was derived from Iden and Eikebrokk (2013). Table 4 shows the categorisation of subjects addressed in the articles.

Table 4. Addressed concepts in research questions

Article ID	Antecedents	Implementation Status	Consequence
A01			X
A02	X		
A03			X
A04			X
A05	X		
A06		X	
A07	X		
A08	X	X	
A09	X		
A10			X
A11	X		
A12		X	
A13	X		
A14			X
A15	X		X
A16		X	
A17	X		
A18	X		
A19			X
A20	X		
A21	X		
A22		X	
A23	X		
A24	X		
A25	X		

3.2.1 Antecedents

A total of 15 articles covers the antecedents of implementing BA, focusing on the factors that influence or enable its adoption. A02, A07, A08, A11, A13, A17, A18, A20, A21, and A23 identified the factors driving BA implementation, such as leadership, risks, skills, and organisational trust. Consequently, A05, A09, A15, A24, and A25 highlighted the reasons for implementing BA, including competitive advantage, motivation, culture, and technological influence.

3.2.2 Implementation Status

Five articles were classified under the implementation status category. A06 evaluated the efficiency of BA implementation in different firms and sectors, while A08, A12, A16, and A22 focused more on the methods to implement BA. The implementation concept explored the BA usage strategies in these articles, such as developing roadmaps, integrating frameworks, management models, and variety in applications.

3.2.3 Consequences

This category pertains to the outcome and impacts of implementing BA and how performance is measured. The IT governance concept from Iden and Eikebrokk (2013) appeared irrelevant to this study. Thus, the consequences category in this study refers to outcome, benefits, and performance measurement concepts. A10 was classified under both subcategories of benefits and measurement, where growth revenue was used to quantify BA's benefits and performance. A15 measures managerial work performance following the implementation of BA in an organisation. Finally, A01, A03, A04, A14, and A19 fall under the outcomes and benefits category as the research questions focused on the impact of BA implementation, such as product innovation and organisational agility.

3.3 What Theoretical Frameworks have been used in BA Implementation Research?

Past studies on the implementation of BA have used several theoretical frameworks. Table 5 shows a total of 25 theories discovered from the articles, with 72% were only used in a single article. The seven most common theoretical frameworks are Technology Organisation Environment (TOE), Diffusion of Innovation (DOI), Resource-Based View (RBV), Dynamic Capability View (DCV), Innovation Diffusion Theory (IDT), Technology Acceptance Model (TAM), and Institutional Theory. TOE was referenced by 10 articles as a factor for implementing BA, followed by DOI with 7 articles and RBV with 5 articles. The remaining theories were referred to by either 2 or 1 article. Additionally, one article (A15) discussed the research model but no theoretical framework was explicitly mentioned.

Table 5. Theoretical frameworks used in the articles

Theoretical framework	Article ID
Technology Organisation Environment (TOE)	A01, A02, A05, A07, A09, A12, A20, A21, A23, A25
Task Technology Fit (TTF)	A02
Resource Based View (RBV)	A03, A14, A19, A20, A23
Dynamic Capability View (DCV)	A03, A20
Absorptive Capacity Theory (ACT)	A03
Knowledge-Based View (KBV)	A04
Innovation Diffusion Theory (IDT)	A05, A07
Decomposed Theory of Planned Behaviour (DTPB)	A05
Diffusion of Innovation (DOI)	A05, A09, A12, A20, A23, A24, A25
Data Envelopment Analysis (DEA)	A06
Theory of Performance Frontiers	A08
Technology Acceptance Model (TAM)	A09, A18
Institutional Theory	A09, A18
Economic Rationality	A10
Sociological Rationality	A10
Situation Actor Process-Learning Action Performance (SAP-LAP)	A11
Interactive Ranking Process (IRP)	A11
Inter-organisational Relations	A12
Unified Theory of the Acceptance and Use of Technology	A13
Resource Orchestration View	A14
Gartner Business Analytics Framework	A16
Business Intelligence and Data Analytics for Organisational Performance Management	A16
Leadership Skill Development Model	A17
Leadership Development Principles	A17
DIPPS Model	A22

3.4 What are the Methodologies used in BA Implementation Research?

The articles reviewed in this study can be classified into two general categories: empirical and conceptual. Iden and Eikebrokk (2013) subcategorised empirical articles into different groups, namely surveys, interviews, and mixed methods. Two articles used conceptual research methods. Table 6 summarises the tabulation of research methods by article ID. Specifically, A8 reported a literature review of concepts regarding BA implementation in microfinance institutions, while A20 involved a content analysis of academic papers. The remaining 22 articles used an empirical approach, either qualitative or quantitative. Finally, 64% of the empirical studies employed a survey questionnaire as the data collection instrument.

Table 6. Research methods applied by the articles

Research Methods	No. of Articles	Article ID
Conceptual	2	A08, A20
Empirical		
Mixed methods	3	A01, A04, A12
Interviews	2	A02, A17
Survey	16	A3, A5, A6, A7, A9, A10, A13, A14, A15, A18, A19, A21, A22, A23, A24, A25
Case Study	2	A11, A16

3.5 What are the Findings Derived from Existing BA Implementation Research?

This section discusses the findings and conclusions of previous studies based on the antecedents, implementation, and impact of BA implementation.

3.5.1 Findings on BA Implementation Antecedents

Most BA implementation requirements start with the organisation's culture of accepting BA as part of the operations (A07, A08, A11, A13, A15, A20, and A21). Both leaders and managers are believed to be the most significant factors in implementing BA. Specifically, A07 and A08 advocated managerial and organisational support as important factors for successful BA implementation, respectively. The top management's involvement is crucial in developing the organisational culture using their leadership skills and influence. Finally, A20 narrated the importance of managers' role in different stages of BA implementation, while A21 highlighted the influence of top management to support the implementation of BA and competitive pressure to facilitate the adoption process. It is also important to consider data availability using technological factors, such as data infrastructures and data management, before implementing BA practices. A02 emphasised that data accessibility is essential for BA implementation. Similarly, A07 concluded that developing organisational data infrastructure and management initiates the process of implementing BA in an organisation.

The remaining three articles specified possible barriers to BA implementation. A05 concluded that relative advantage (i.e., specific innovation in an organisation's current system) can lead to BA implementation. In contrast, A25 found that compatibility (i.e., using innovation based on the organisation's values and experience) cannot predict whether organisations will use BA, particularly among Malaysian SMEs. Additionally, A09 determined that organisation size is not a barrier to BA implementation and security risks are not a factor in the adoption process. However, A24 reported that BA knowledge is essential and falls under organisational support and technology.

3.5.2 Findings on BA Implementation Status

The implementation section refers to the strategies, methods, and status of the organisations investigated in the reviewed articles. Four articles presented conclusions and findings on the status of BA implementation strategies. A06 concluded that low-tech industries use BA with the highest efficiency compared to the medium and high-tech sectors, and the difference that occurs across industries in BA implementation is the acquisition of data and processing. A12 used the BA lens to determine the implementation of organisations' Enterprise Resource Planning (ERP). Information sharing using BA functionality is the strategy used to adopt BA practices. Aside from the conclusion on antecedents, A08 highlighted several implementation strategies, such as staff training and research centres, that must be integrated into the management's commitments. The case study by A16 concluded that integrating skills, documentation, and work culture should be strategised in BA implementation. Finally, A22 presented a roadmap that integrates several processes from the discovery phase to innovation, which leads to performance and ensures that organisations achieve sustainable BA implementation initiatives.

3.5.3 Findings on BA Implementation Consequences

Improved business performance was the key finding for many organisations that implemented BA (A1, A3, A4, A10, and A14). A3 identified that product innovation and process improvement due to BA practice created business value. Performance improved because of BA's decision support system; A4 concluded that BA improves the management of business processes, which directly impacts business performance. A10 found that revenue increased by 7.2% after adopting BA, while A14 concluded that a competitive advantage is sustained if BA is implemented. Meanwhile, the research question in A15 was categorised under antecedents but incorporated impact, concluding that the manager's work performance improved by implementing BA. Lastly, A19 concluded that organisations demonstrate agility in reacting to opportunities and threats.

4. DISCUSSION

The article published in 2015 is indeed the earliest published work on BA implementation, confirming the newness of this business domain. BA is an emerging business enabler that must be implemented by organisations. The research questions addressed in past BA implementation research include the antecedents of using BA. Preparing the correct factors for successful BA implementation is the most sought-after across all articles, with TOE being widely used to measure these antecedent factors in BA implementation. This indicates the use of the TOE framework in many BA studies in combination with RBV, suggesting that all resources needed before implementation are set up correctly. Advancements in technological resources enable organisations to implement BA practices as it allows data to be accessed and managed effectively to perform the expected BA practices. These findings are aligned with the expectation that BA is an evolved system because of technological advancements (Gillian et al., 2014). The implementation should start from the management; the environment for implementation must be set, which allows the organisation to embrace the benefits of BA. TOE explicitly demonstrates the need for technological factors and support to implement BA successfully in each phase.

With the organisation's preparation for the BA environment to exist, clear definitions of skills and knowledge must be set. This literary gap stands as a direction for future research to bridge the nexus between the antecedents for BA implementation and the actual adoption of the practice. Figure 3 shows the cycle of BA implementation derived from the SLR. The antecedent of the articles analysed is that TOE has either been used implicitly or explicitly for BA implementation studies. Cegilski and Jones-Farmer (2016) examined the knowledge, skills, and abilities of entry-level BA positions and found that technological changes must occur in how platforms conduct BA practice expectations. Another study by Johnson et al. (2020) used web scrapping to explore the jobs posted on indeed.com and reported that the skills and analytics seemed to involve programming language expectations.

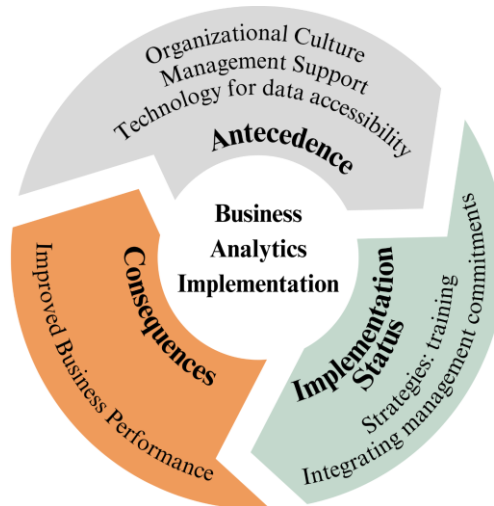


Figure 3. BA implementation

A confusion involving BA implementation is the impression that BA needs to be significant. Bayraktar et al. (2023) concluded that low-tech companies are more efficient in BA implementation, suggesting that organisations of any size can implement BA. It was also determined that implementation initiations are based on management support and culture.

Despite the growing body of research on BA, several gaps remain evident:

BA Implementation in Small and Medium Enterprises (SMEs): Most studies focus on large organisations with substantial resources, leaving a significant gap in understanding how SMEs can adopt and benefit from BA. SMEs often face unique challenges, such as limited budgets, less access to advanced technology, and insufficient skilled personnel, which warrant targeted research. **Cultural and Skill Readiness:** There is a limited exploration of how organisational culture and workforce readiness impact BA implementation. Questions remain about the specific skills and mindset required for effective BA adoption and how organisations can foster a culture that embraces data-driven decision-making. **Longitudinal Studies on the Impact of Business Analytics:** Current research predominantly focuses on the short-term results following the adoption of BA. However, the long-term implications for organisational agility, competitive advantage, and sustained performance enhancements remain insufficiently examined. Conducting longitudinal studies could yield significant insights into the lasting benefits and potential drawbacks of implementing BA. **Sector-Specific Research:** Although extensive research has been conducted on BA implementation in certain industries like retail and banking, there is a notable dearth of studies investigating its application in vital sectors, such as healthcare, education, and agriculture. These sectors pose distinct challenges and opportunities that necessitate customised approaches to BA. **Integration with Emerging Technologies:** The relationship between business analytics and emerging technologies—including artificial intelligence (AI), machine learning, and blockchain—represents an area that is not fully developed. Future research should consider how these technologies can augment BA capabilities and inform implementation strategies.

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study conducted a systematic review of the available literature on BA implementation. The analysis focused specifically on the research questions. The findings contribute to the current body of knowledge on BA. First, it identified 25 existing articles on BA implementation, with the oldest article was published in 2015. This provided insight into the emerging trend of BA in practice and research. Second, the systematic review identified three aspects of BA implementation: antecedents, implementation status, and consequences. Antecedent is the most addressed issue in BA implementation. Thus, future studies can be directed towards identifying the factors for successful BA implementation. Additionally, a direction for implementation is provided to practitioners on how to initiate BA adoption, as the findings stated that the antecedence for BA implementation is obtaining managerial support and creating the appropriate environment for implementation.

This study underscores the critical role of management support, technological readiness, and organisational culture for successful BA adoption. By analysing 25 empirical studies, this review highlights that while BA can drive significant performance improvements, its implementation requires careful planning and alignment with organisational goals. It contributes to the body of knowledge by identifying gaps in existing research, particularly in BA adoption within SMEs, and the need for longitudinal studies to evaluate long-term impacts. Additionally, it emphasises the importance of developing a comprehensive understanding of the skills and cultural readiness required for effective BA adoption. The findings provide actionable recommendations for practitioners, such as investing in data infrastructure, fostering a supportive leadership environment, and implementing phased approaches to adoption. These insights serve as a roadmap for organisations aiming to navigate the complexities of BA implementation. The methodology for this study followed established processes that provided a basis for the review thoroughness (Iden & Eikebrokk, 2013). A limitation of this study is the researchers' judgment on identifying, screening, checking eligibility, and extracting current literature for analysis.

In conclusion, this SLR synthesises existing research and sets the stage for future studies to explore uncharted aspects of BA implementation. By addressing identified gaps, researchers can further refine theoretical frameworks and methodologies, thereby advancing the field of business analytics and its transformative potential in organisational contexts.

5.2 Recommendations for Future Studies

Future studies can focus on the appropriate culture and support needed to initiate BA implementations and adoptions in the organisation's operations. Identifying the specific skills and knowledge can guide the TOE framework's organisational context. Tool identification can also be a topic for future studies and the use of appropriate methods and strategies as the antecedence requirement for BA implementation. The findings can contribute to the definition of BA and clarify what BA means in academia and practice. Future research and practice should address several critical areas to advance BA implementation. For researchers, it is essential to investigate the role of leadership in fostering BA adoption, focusing on how leaders can cultivate a data-driven culture and support analytics-driven decision-making. Another significant avenue is exploring how SMEs can overcome their unique challenges, such as limited resources and technological constraints, to implement BA effectively.

Longitudinal studies are necessary to assess the sustained impacts of BA on organisational performance, competitive advantage, and agility over time. Furthermore, sector-specific research can provide tailored insights for industries like healthcare, education, and agriculture, which remain underrepresented in literature. Additionally, exploring integrating emerging technologies, such as artificial intelligence, machine learning, and blockchain, with BA can enhance its capabilities and reveal new implementation strategies. For practitioners, the focus should be on prioritising management support and investing in robust data infrastructure as foundational elements for BA success. Organisations should develop targeted training programs to equip their workforce with the necessary skills and knowledge for BA adoption. A phased implementation approach is recommended to align BA with organisational goals while minimising disruption. To foster a data-driven culture, practitioners must engage all organisational levels and emphasise the value of analytics in decision-making. Collaboration with technology providers can also help organisations explore innovative solutions and stay ahead in a rapidly evolving technological landscape. By addressing these areas, researchers can advance theoretical frameworks, while practitioners can enhance their strategies, enabling a more comprehensive and impactful adoption of BA across various contexts.

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AVAILABILITY OF DATA AND MATERIALS

The data supporting this study are available from the corresponding author upon reasonable request.

AUTHORS CONTRIBUTION

Arkhe M. Pacis (Conceptualisation; Methodology; Formal analysis; Writing - original draft; Supervision).

Sydela P. dela Cruz (Data curation; Investigation; Eligibility checks; Review of keywords and extracted data to ensure unbiased processes for the SLR; Writing - review & editing).

The contributions of both authors have been clearly outlined and agreed upon. The corresponding author, Arkhe M. Pacis, confirms that all authors have reviewed and approved the content and descriptions provided.

CONFLICTS OF INTEREST

The authors, Arkhe M. Pacis and Sydeli P. dela Cruz, are siblings. However, this personal relationship did not influence the work's objectivity, accuracy, or integrity, including the data analysis, research processes, and results. The authors strictly adhered to academic and ethical standards throughout the study. Additionally, there are no financial, political, or other professional conflicts of interest to disclose.

ETHICS STATEMENT

This study did not involve human or animal participants nor did it require ethical approval.

REFERENCES

- Acito, F., & Khatri, V. (2014). Business analytics: Why now and what next? *Business Horizons*, 57(5), 565-570.
- Ajah, I. A., & Nweke, H. F. (2019). Big data and business analytics: Trends, platforms, success factors and applications. *Big Data and Cognitive Computing*, 3(2), 32-42.
- 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*, 96, 228-237.
- Bayrak, T. (2021). A framework for decision makers to design a business analytics platform for distributed organizations. *Technology in Society*, 67, 101747.
- Bramer, W. M., Rethlefsen, M. L., Kleijnen, J., & Franco, O. H. (2017). Optimal database combinations for literature searches in systematic reviews: a prospective exploratory study. *Systematic Reviews*, 6, 1-12.
- Chatterjee, S., Rana, N. P., & Dwivedi, Y. K. (2024). How does business analytics contribute to organisational performance and business value? A resource-based view. *Information Technology & People*, 37(2), 874-894.
- Chaudhuri, R., Chatterjee, S., Vrontis, D., & Thrassou, A. (2024). Adoption of robust business analytics for product innovation and organizational performance: the mediating role of organizational data-driven culture. *Annals of Operations Research*, 339(3), 1757-1791.
- Conboy, K., Mikalef, P., Dennehy, D., & Krogstie, J. (2020). Using business analytics to enhance dynamic capabilities in operations research: A case analysis and research agenda. *European Journal of Operational Research*, 281(3), 656-672.
- Cosic, R., Shanks, G., & Maynard, S. B. (2015). A business analytics capability framework. *Australasian Journal of Information Systems*, 19, 5-19.
- Delen, D., & Ram, S. (2018). Research challenges and opportunities in business analytics. *Journal of Business Analytics*, 1(1), 2-12.
- Gillon, K., Aral, S., Lin, C. Y., Mithas, S., & Zozulia, M. (2014). Business analytics: radical shift or incremental change? *Communications of the Association for Information Systems*, 34(1), 13-21.
- Grover, V., & Goslar, M. D. (1993). The initiation, adoption, and implementation of telecommunications technologies in US organizations. *Journal of Management Information Systems*, 10(1), 141-164.
- Hamzah, A. I. N., Lee, C. K., Bujna, M., & Chai, C. (2024). Team Performance in The Construction Industry: A Systematic Literature Review. *International Journal of Industrial Management*, 18(1), 1-10.
- Hausman, A., & Stock, J. R. (2003). Adoption and implementation of technological innovations within long-term relationships. *Journal of Business Research*, 56(8), 681-686.
- Holsapple, C., Lee-Post, A., & Pakath, R. (2014). A unified foundation for business analytics. *Decision Support Systems*, 64, 130-141.
- Horani, O. M., Khatibi, A., ALSoud, A. R., Tham, J., Al-Adwan, A. S., & Azam, S. F. (2023). Antecedents of business analytics adoption and impacts on banks' performance: The perspective of the TOE framework and resource-based view. *Interdisciplinary Journal of Information, Knowledge, and Management*, 18, 609-643.
- Iden, J., & Eikebrokk, T. R. (2013). Implementing IT Service Management: A systematic literature review. *International Journal of Information Management*, 33(3), 512-523.
- Johnson, M. E., Albizri, A., & Jain, R. (2020). Exploratory analysis to identify concepts, skills, knowledge, and tools to educate business analytics practitioners. *Decision Sciences Journal of Innovative Education*, 18(1), 90-118.
- Komolafe, A. M., Aderotoye, I. A., Abiona, O. O., Adewusi, A. O., Obijuru, A., Modupe, O. T., & Oyeniran, O. C. (2024). Harnessing business analytics for gaining competitive advantage in emerging markets: A systematic review of approaches and outcomes. *International Journal of Management & Entrepreneurship Research*, 6(3), 838-862.

- Kumar, A., Krishnamoorthy, B., & Kamath, D. B. (2020). Key themes for multi-stage business analytics adoption in organizations. *Asia Pacific Journal of Information Systems*, 30(2), 397-419.
- Kumar, A., Krishnamoorthy, B., Kamath, D., & D'Lima, C. (2022). Business analytics adoption in firms. *International Journal of Business Information Systems*, 40(4), 464-492.
- Liu, S., Liu, O., & Chen, J. (2023). A review on business analytics: definitions, techniques, applications, and challenges. *Mathematics*, 11(4), 899-912.
- Mashingaidze, K., & Backhouse, J. (2017). The relationships between definitions of big data, business intelligence and business analytics: a literature review. *International Journal of Business Information Systems*, 26(4), 488-505.
- Mateen, F. J., Oh, J., Tergas, A. I., Bhayani, N. H., & Kamdar, B. B. (2013). Titles versus titles and abstracts for initial screening of articles for systematic reviews. *Clinical Epidemiology*, 89-95.
- Mishra, D., Luo, Z., Hazen, B., Hassini, E., & Foropon, C. (2019). Organizational capabilities that enable big data and predictive analytics diffusion and organizational performance: A resource-based perspective. *Management Decision*, 57(8), 1734-1755.
- Mohamed Shaffril, H. A., Samsuddin, S. F., & Abu Samah, A. (2021). The ABC of systematic literature review: the basic methodological guidance for beginners. *Quality & Quantity*, 55, 1319-1346.
- Pereira, V., & Bamel, U. (2021). Extending the resource and knowledge-based view: A critical analysis into its theoretical evolution and future research directions. *Journal of Business Research*, 132, 557-570.
- Power, D. J., Heavin, C., McDermott, J., & Daly, M. (2018). Defining business analytics: an empirical approach. *Journal of Business Analytics*, 1(1), 40-53.
- Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., & Koffel, J. B. (2021). PRISMA-S: an extension to the PRISMA statement for reporting literature searches in systematic reviews. *Systematic Reviews*, 10, 1-19.
- Verma, A., Yurov, K. M., Lane, P. L., & Yurova, Y. V. (2019). An investigation of skill requirements for business and data analytics positions: A content analysis of job advertisements. *Journal of Education for Business*, 94(4), 243-250.
- Wang, Z., Wang, N., Su, X., & Ge, S. (2020). An empirical study on business analytics affordances enhancing the management of cloud computing data security. *International Journal of Information Management*, 50, 387-394.