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# BIG DATA ANALYTICS CAPABILITIES AND FIRM COMPETITIVENESS IN THE DIGITAL AGE: A SOCIO-ECONOMIC PERSPECTIVE FROM EMERGING MARKETS

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***ABSTRACT***

*This article examines the role of Big Data Analytics Capabilities (BDAC) in enhancing firm competitiveness in the digital era, with a specific focus on socio-economic perspectives in emerging markets. Driven by increasing business complexity and rapid technological advancement, firms are compelled to treat data as a strategic asset for decision-making. This study adopts a literature review method, analyzing prior empirical findings, theoretical frameworks, and scholarly references to explore how BDAC influences organizational performance and competitive advantage. The findings indicate that BDAC positively contributes to innovation, operational efficiency, and the attainment of competitive advantage. Key enablers of BDAC include technological infrastructure, data analytics skills among human resources, and a data-driven organizational culture. Furthermore, dynamic capabilities serve as a critical mediator that enhances the impact of BDAC, while external environmental dynamism acts as a moderating factor influencing its effectiveness. This study offers novel insights by emphasizing the importance of integrating internal and external factors in developing data-driven business strategies. The main recommendation is the continuous strengthening of BDAC as a core component of long-term strategic planning to achieve sustainable competitiveness. This article contributes to the social sciences and humanities literature by shedding light on the implications of digital transformation for organizational dynamics and strategic development in emerging economies.*

***Keywords****: Big Data Analytics Capabilities, Digital Transformation, Emerging Markets, Firm Competitiveness, Socio-Economic Strategy*

## INTRODUCTION

Amid the rapid tide of digital transformation, companies across various sectors are being compelled to adapt to new business models that are more dynamic, data-driven, and innovation-oriented. In an increasingly competitive landscape, a company's ability to manage and leverage large volumes of data—commonly referred to as Big Data Analytics Capabilities (BDAC)—has become a key determinant of success and competitiveness. This is not merely a technological trend, but a pressing strategic necessity. A report by the International Data Corporation by G. Wang & Chen (2022) indicates that global investment in big data and analytics technologies was projected to surpass USD 274 billion in 2022, with continued growth expected. On the other

hand, companies that fail to adopt data-driven approaches often face stagnation in innovation and suffer significant market share losses (Lee et al., 2025; Mondal et al., 2023). These facts underscore the urgency of exploring how BDAC plays a role in driving competitive advantage, particularly in developing markets that face unique structural challenges.

Research on BDAC has been extensive, especially in the context of large organizations and developed countries. For instance, a study by Wamba et al. (2017) found that BDAC significantly contributes to improved operational efficiency and product innovation. Meanwhile, Gupta & George (2016) emphasized that BDAC is influenced by the quality of technological infrastructure and the analytical competencies of human resources. In another study, Akter & Wamba (2016) highlighted BDAC's role in enhancing customer value and accelerating strategic decision-making. Research by Mikalef et al. (2018, 2019) and Muchlis et al. (2021) also noted that BDAC must be accompanied by an adaptive organizational approach to yield optimal benefits. However, most of these studies remain focused on developed economies, while the socio-economic dynamics in developing countries are fundamentally different.

In other literature, as indicated by Orero-Blat et al. (2024, 2025) and Wamba et al. (2024), BDAC not only impacts technological and operational aspects but also drives organizational cultural transformation. In fact, Ariansyah et al. (2025), Ghaleb et al. (2021), and Maroufkhani et al. (2023) assert that success in big data initiatives is not solely determined by technology availability, but also by the organization's readiness to utilize insights derived from data. This is further emphasized by Al Mamun et al. (2025) and Li et al. (2024), who examined how integrating BDAC with a firm's dynamic capabilities can enhance strategic agility. Furthermore, studies by C.-H. V. Chen & Chen (2022) and L. Chen et al. (2022) suggest that BDAC can serve as a crucial bridge in aligning business strategies with market volatility. Nevertheless, these studies have yet to specifically examine the role of BDAC within the socio-economic context of developing countries, where challenges such as limited digital infrastructure, skill gaps, and non-data-driven organizational cultures are prevalent.

Studies by El-Haddadeh et al. (2025) and Pathak et al. (2023) also propose that BDAC should be understood holistically, encompassing technological, human, and process dimensions. However, this approach has rarely been integrated into frameworks that account for specific socio-economic factors in emerging markets. Similarly, research by Y. Wang et al. (2018) shows that organizations with high analytical capabilities are better able to adapt to dynamic environments, yet does not elaborate on how external dynamics such as economic instability or regulatory uncertainty play a role in the context of developing nations. Along the same lines, Adiguzel et al. (2025), Murad et al. (2023), and Novicka & Volkova (2025) underscore the importance of sustainability in developing BDAC, but discussions on how such sustainability is built within resource-constrained organizations are still rare. Several other studies (Aziz et al., 2024; C. Chen, 2024; J. Lin et al., 2024; Sindarov et al., 2023) also fall short in deeply exploring the integrative relationship between BDAC, external environmental change, and long-term firm performance.

This is where the gap addressed by this study lies. While most previous studies have focused predominantly on the technical and operational aspects of BDAC, very few have positioned BDAC within a comprehensive socio-economic framework of developing countries—one that considers external complexities, internal limitations, as well as mediating and moderating factors that influence BDAC effectiveness. Amid the need for a more contextual understanding, this study aims to delve deeper into how BDAC can act as a driver of corporate competitiveness through a broader socio-economic lens.

This research not only offers an alternative perspective on understanding BDAC but also provides sharper insights into how companies in developing nations can maximize the potential of big data to respond to market dynamics and build sustainable competitive advantages. By emphasizing the importance of integrating internal factors (such as infrastructure, human resources, and organizational culture) with external factors (such as business environment uncertainty), this article contributes relevant and up-to-date insights to the discourse on data-driven digital transformation. The objective of this study is to explore in depth how big data analytics capabilities affect firm competitiveness within the socio-economic framework of developing countries, as well as to identify key factors that either strengthen or hinder the strategic role of BDAC. As such, this study not only enriches academic literature but also provides practical guidance for companies in crafting adaptive and sustainable data-driven strategies in the digital era.

## RESEARCH METHOD

In an effort to gain a deeper understanding of how Big Data Analytics Capabilities (BDAC) contribute to enhancing firm competitiveness in the digital era—particularly within the socio-economic context of developing countries—this study adopts a literature review approach. This approach was consciously and rationally selected, given the complexity of the issues discussed and the exploratory and conceptual nature of the research objectives. Rather than collecting primary empirical data, the researcher aims to explore accumulated knowledge from previous studies in order to build a comprehensive, critical, and evidence-based framework of understanding. This approach aligns with the assertion by Chigbu et al. (2023), who state that a literature review is highly appropriate for identifying, analyzing, and synthesizing findings from various sources to generate new insights into a particular issue or phenomenon.

The data collection process in this study was conducted systematically by reviewing relevant, credible, and up-to-date scholarly sources. The researcher accessed major academic databases such as Scopus, Web of Science, Google Scholar, and ScienceDirect. Keywords used in the search included “big data analytics capabilities,” “firm competitiveness,” “digital transformation,” “emerging markets,” and “dynamic capabilities.” The search was limited to publications from 2010 to 2025 to ensure relevance to the latest developments in the field. In the initial screening process, more than 100 academic articles and publications were gathered.

However, after applying selection criteria based on topic relevance, methodological rigor, and contextual appropriateness, a total of 45 articles were chosen as the primary sources for further analysis.

The literature was analyzed using a thematic analysis approach, which enabled the researcher to identify recurring patterns, key concepts, and relationships among variables frequently discussed in prior studies. This approach is considered effective because it allows for a deeper exploration of meaning across findings without losing contextual nuance (Popenoe et al., 2021). In addition, an interpretive approach was employed to better understand the socio-economic dynamics underlying much of the BDAC-related research, particularly in the context of developing countries. By combining thematic and interpretive methods, the resulting analysis is expected to be not only descriptive but also reflective of real-world conditions.

To ensure the validity and credibility of the findings, the researcher applied a strategy of theory and source triangulation. Theory triangulation was carried out by comparing different conceptual frameworks from various studies to assess the consistency and divergence in the interpretation of BDAC and its implications for firm competitiveness. For example, the dynamic capabilities theory, resource-based view, and institutional theory were simultaneously employed to examine the conceptual foundations of prior research. Meanwhile, source triangulation was performed by evaluating articles from a range of academic disciplines—such as strategic management, information systems, development economics, and organizational sociology—to obtain a more holistic and interdisciplinary understanding of the issue. This step is particularly important given the complexity of the relationships between technology, organizations, and the external environment in the context of digital transformation (Lim et al., 2022).

The entire analysis process was conducted in multiple stages. First, the researcher mapped the contributions of each individual study. Second, a thematic synthesis was developed to construct a strong theoretical narrative. Third, this synthesis was critically examined to identify potential gaps in the literature, which then served as the foundation for developing the scientific contributions of this study. In this way, the chosen method not only organizes dispersed information from numerous sources but also generates new thinking with both theoretical and practical value.

The choice of a literature review method in this research is not solely based on efficiency or limited access to primary data, but rather on its ability to facilitate a broad and in-depth exploration of ideas—something crucial in formulating strategic directions for the use of BDAC in the business world. Moreover, in the context of developing countries, where access to corporate data is often limited and poorly documented, the literature review becomes a logical and robust pathway for generating grounded and relevant knowledge.

## RESULTS AND DISCUSSION

### The Strategic Role of BDAC in Enhancing Firm Competitiveness

Based on the results of a literature review of various analyzed references, this study finds that the implementation of Big Data Analytics (BDA) technology has a positive impact on improving a company's financial performance. The application of BDA allows firms to process large volumes of data quickly and accurately, thereby supporting more precise and strategic decision-making.

Studies by Akter & Wamba (2016) and Côrte-Real et al. (2017) show that companies that are able to optimally utilize Big Data Analytics experience improvements in operational efficiency and the effectiveness of their business strategies. This directly contributes to increased profitability and market competitiveness. Furthermore, Ferraris et al. (2019) emphasize that big data capabilities, when integrated with a company's knowledge management, can drive long-term financial performance.

Dubey et al. (2019) add that the application of big data—particularly predictive analytics in manufacturing—can enhance productivity and reduce operational costs. This further supports the argument that big data is a key factor in driving stronger financial outcomes. In addition to the benefits of big data itself, Ghasemaghaei & Calic (2019) highlight the importance of data quality and diagnostic capabilities in decision-making processes. High-quality data that is well-analyzed supports more accurate decisions, positively influencing financial performance.

On another front, research by Dewi (2018) reveals that cultural factors also play a role in the implementation of accounting information systems within companies. A supportive work culture that facilitates the use of technology strengthens the effectiveness of information systems, including those related to big data management. In the context of financial management and its impact on firm value, studies by Susila & Prena (2019) and Yuniarti et al. (2020) find that good financial performance—supported by corporate transparency and social responsibility—can increase firm value. With big data, companies can better manage both financial and non-financial information, thereby enhancing accountability and investor trust. Additionally, research on taxation and reporting compliance by Astuti et al. (2023) is relevant in showing how digitalized reporting systems, such as technology-based e-filing, can improve tax compliance. This, in turn, has a positive impact on overall financial governance.

The development of information technology has driven the growth of data in massive and complex volumes, giving rise to the big data era—an era that presents both challenges and opportunities for businesses. One strategic way to manage this potential is through the development of Big Data Analytics Capabilities (BDAC), which refers to a firm's ability to manage, analyze, and utilize big data for better decision-making. Gupta & George (2016) state that BDAC is formed from a combination of technological, human, and process-related resources that are integrated to enable firms to turn data into valuable business insights.

More specifically, Mikalef et al. (2019) stress that BDAC includes technical aspects such as technological infrastructure and analytical expertise, as well as managerial aspects such as

data governance and an organizational culture that supports data-driven decision-making. Mastery of these capabilities enables firms to respond more quickly to market dynamics, understand customer behavior, and more accurately identify business opportunities and risks. Thus, BDAC is not merely an analytical tool—it becomes a strategic force that drives competitive advantage.

Furthermore, research by Mikalef et al. (2018) shows a strong link between BDAC and business innovation, with dynamic capabilities acting as a crucial mediator. With strong data analytics capabilities, companies can build organizational agility to adapt to fast and unpredictable changes in the business environment. This is supported by Wamba et al. (2017), who found that BDAC significantly improves firm performance by enhancing dynamic capabilities in terms of integration, learning, and transformation. Similarly, Seddon et al. (2017) state that business analytics, when integrated into core business processes, can generate significant business value. The optimal use of big data enhances operational efficiency, improves decision-making processes, and increases prediction accuracy in business planning. These capabilities impact not only financial performance but also product innovation, customer service, and the creation of new business models.

In the supply chain context, Nozza et al. (2021) emphasize the importance of visibility and flexibility as complements to BDAC. When companies can view the entire supply chain process in real time and respond flexibly to changes, data-driven decision-making becomes more effective. This shows that BDAC cannot stand alone; it must be supported by other organizational factors to achieve maximum impact. Meanwhile, in the healthcare sector, the application of BDAC also shows substantial positive effects. Wang et al. (2018) and Wang & Hajli (2017) reveal that big data analytics capabilities in healthcare promote more effective, efficient, and personalized services. Comprehensive processing of patient data improves diagnostic quality, accelerates medical responses, and supports more targeted health policies. Wamba et al. (2015) add that the true value of big data lies not just in its availability, but in the extent to which firms can transform data into added value. Therefore, the key to success lies in how organizations build a culture that supports data-driven decision-making.

**Internal Factors Supporting the Effectiveness of BDAC**

The success of implementing Big Data Analytics Capabilities (BDAC) in enhancing firm competitiveness is not solely determined by the technology employed, but also by internal organizational conditions that collectively shape the firm's readiness and capacity to utilize data as a strategic asset. Based on the literature reviewed in this study, three key internal factors are consistently identified as determinants of BDAC effectiveness: digital technology infrastructure, human resource competence in data analytics, and an organizational culture that supports both the exploration and exploitation of data.

First, the readiness of technological infrastructure serves as the foundational element that enables organizations to manage high volumes, velocities, and varieties of data.

Technologies such as cloud computing, the Internet of Things (IoT), artificial intelligence (AI), and large-scale data storage and processing systems (e.g., Hadoop or Apache Spark) are prerequisites for building strong BDAC. Studies by Dahiya et al. (2022) and Ghosh et al. (2022) show that firms with higher levels of digital technology adoption tend to have more structured data capabilities and are able to integrate data from various sources to generate valuable business insights. In the context of developing countries, this presents a unique challenge. Several reviewed studies indicate that infrastructure limitations remain a significant barrier, particularly for small and medium-sized enterprises (SMEs).

Second, the competence of human resources in data science, statistics, and information technology is a key element that bridges technology and its actual implementation within business processes. Without a workforce capable of interpreting, modeling, and visualizing data, even the most advanced infrastructure cannot deliver strategic value. Research by Wamba et al. (2024) emphasizes that the success of BDAC heavily depends on the presence of a data-savvy workforce—employees who not only master data analysis techniques but also understand the business context in which the data is applied. In our secondary data collection, findings from Modgil et al. (2021) and Zolfani et al. (2023) show that companies in emerging markets often face shortages of data experts, and even when such talent is available, they are frequently not fully integrated into strategic decision-making processes. This points to a skill gap between analytical needs and the internal capabilities available, which ultimately hinders the full value potential of BDAC.

Third, and no less important, is the presence of an organizational culture that supports the use of data in every decision-making process. This is commonly referred to as a data-driven culture—an attitude and set of values that place data at the core of evaluating, designing, and executing strategies. Research by Gupta & George (2016) and Mikalef et al. (2019) stresses that data culture plays a critical role in reducing resistance to digital transformation and in enhancing the adoption of new technologies. This literature review finds that organizations with a culture open to experimentation, cross-functional collaboration, and transparent data usage tend to have more adaptive and innovative data analytics capabilities. Conversely, organizations that rely heavily on strict hierarchies and managerial intuition in decision-making are generally slow to fully integrate BDAC. This is evident in findings by Baryaija et al. (2022), who report that only 28% of companies in Sub-Saharan Africa have a truly data-driven organizational culture, while the rest use analytics in an ad hoc manner.

Theoretically, all these internal factors can be comprehensively explained through the Technology-Organization-Environment (TOE) Framework, which, in its updated version by C.-H. Lin & Chen (2023), emphasizes that the adoption of strategic technologies like BDAC is influenced by internal organizational conditions (technological and organizational factors) as well as external environmental dynamics. Within this framework, technology readiness and human resources represent the technological and organizational factors, while data-driven culture serves as a bridge between structural and cultural dimensions of the organization that facilitates a more

effective adoption process.

To strengthen the analysis, the table below summarizes the relationship between internal factors and BDAC dimensions based on a synthesis of 15 literature studies:

Table 1 Relationship Between Internal Factors and BDAC Dimensions

| Internal Factor | Description | Impact on BDAC | Source |
|---|---|---|---|
| Technological Infrastructure | Cloud, IoT, AI, data management systems | Supports scalability and speed of analytics | Mikalef et al. (2018, 2019) |
| Human Resource Competence | Skills in data science, statistics, programming, business insight | Enhances accuracy, relevance, and actionability of analytical outcomes | Akter et al. (2016), Akter & Wamba (2016), and Wamba et al. (2015, 2017, 2024) |
| Data-Driven Organizational Culture | Open mindset, experimentation, data-based decisions, collaboration | Improves adoption and integration of BDAC into strategic decision-making | Gupta & George (2016) |

Source: Author's Analysis, 2025

Thus, it can be concluded that BDAC effectiveness is not merely the result of technical capability, but rather the product of infrastructure readiness, human capital competence, and an organizational culture that supports data-driven decision-making. In the context of developing countries, the synergy among these three factors becomes even more crucial given the structural challenges faced by organizations. Therefore, sustainable BDAC development strategies must prioritize the simultaneous and systematic strengthening of these internal factors—not only in terms of technology but also regarding human capital and organizational culture.

**Dynamic Capabilities as a Mediator: Bridging BDAC and Competitive Advantage**

Big Data Analytics Capabilities (BDAC) are often understood as a technical strength that enables organizations to process data into strategic information. However, in practice, BDAC does not operate in a vacuum. It requires an organizational context that allows data to be utilized adaptively and responsively in relation to external dynamics. This is where dynamic capabilities come into play—the organization's ability to continuously integrate, reconfigure, and renew its competencies to remain relevant in a rapidly changing environment.

In this study, a synthesis of various literature indicates that while BDAC holds significant potential in supporting strategic decision-making, its impact on competitive advantage becomes substantial only when combined with an organization's dynamic capabilities. In other words, BDAC acts as an enabler, whereas dynamic capabilities serve as the strategic executor of the insights generated. This aligns with the integrative model proposed by Mikalef et al. (2019), which formulates the sensing–seizing–transforming framework in the context of BDAC. According to this model, sensing refers to the company's ability to detect opportunities and threats through data analysis; seizing involves the decision-making process based on that information; and transforming denotes the structural or strategic changes required to realize the value of that

data.

In developing markets, literature findings reveal that many companies possess technical BDAC, yet fail to leverage it strategically due to weak dynamic capabilities. For example, reports from Chong et al. (2024) and Turi et al. (2023) show that manufacturing firms in South Asia have adopted big data analytics systems, but most strategic decisions remain reactive and disconnected from analytical insights. This indicates a gap between "what the company knows" and "what the company does," a gap that should be bridged by dynamic capabilities.

Dynamic capabilities consist of three main components: first, sensing, which reflects an organization's ability to recognize market and technological changes through data utilization; second, seizing, or the capacity to formulate appropriate strategic responses to that information; and third, transforming, the organization's ability to reorient internally—whether in structure, business processes, or business models—to respond to those changes. When these three components function synergistically, BDAC becomes not just a detection tool but a catalyst for organizational transformation.

A deeper analysis of the literature also shows that organizations with high levels of dynamic capabilities are able to shorten their response cycles to market changes. A study by Ma et al. (2025) and Song & Liao (2024) indicates that firms with strong combinations of BDAC and dynamic capabilities are twice as likely to achieve product innovation within 12 months compared to those that only possess one of the two. In the studies analyzed here, digital startups in Southeast Asia, particularly in Indonesia and Vietnam, have demonstrated rapid competitive advantages by swiftly transforming data-driven insights into locally relevant service innovations.

The table below illustrates the functional relationship between BDAC, dynamic capabilities, and competitive advantage based on findings from the literature:

Table 2 Functional Relationship Between BDAC, Dynamic Capabilities, and Competitive Advantage

| Component | Organizational Function | Interaction | Strategic Impact | Source |
|---|---|---|---|---|
| BDAC | Provides data-driven insights | Input for dynamic capabilities | Enhances understanding of internal and external conditions | Muchlis et al. (2021) |
| Dynamic Capabilities | Manages strategic change (sensing, seizing, transforming) | Converts insights into decisions | Enables rapid adaptation to environmental changes | Orero-Blat et al. (2024, 2025), Wamba et al. (2021) |
| Competitive Advantage | Differentiation, innovation, cost efficiency | Outcome of BDAC and dynamic capability synergy | Sustains a superior and resilient market position | Ariansyah et al. (2025), Ghaleb et al. (2021), Maroufkhani et al. (2023) |

Source: Author's Analysis, 2025

Based on the integration of theory and data, it can be concluded that BDAC without the support of dynamic capabilities will merely produce a heap of information without action. Conversely, firms that can transform data insights into strategic steps through the sensing, seizing, and transforming processes will be better prepared to face market disruptions, while also enhancing their flexibility and competitive resilience. In other words, dynamic capabilities are not merely a complement to BDAC but are in fact the vital element that brings BDAC's potential to strategic reality. This represents the intersection of technological sophistication and organizational agility, turning BDAC into not just a tool, but a system of value and long-term advantage.

**External Environmental Dynamics as a Moderating Factor**

In today's business climate, possessing internal resources and technological sophistication is no longer sufficient. The external environment—rife with uncertainty and constant change—becomes the real arena in which competitive advantage is tested. This study shows that external environmental dynamics, such as market fluctuations, regulatory pressures, and economic instability, play a critical moderating role in the relationship between Big Data Analytics Capabilities (BDAC) and firm performance. In other words, the impact of BDAC on competitive advantage can be either amplified—or hindered—depending on the intensity of external pressures and the organization's readiness to respond.

This condition is highly relevant in the context of emerging markets, where systemic stability is not as robust as in developed nations. Countries such as Indonesia, the Philippines, and Nigeria, for example, face higher levels of volatility in terms of fiscal policies, uneven digital infrastructure, and sharper geopolitical and economic disruptions. A report by Cueto et al. (2022) highlights that in Southeast Asia, 63% of digital firms struggle to adjust their strategies when regulations change abruptly. Interestingly, however, companies with strong BDAC demonstrate a higher ability to adapt to these new regulations, thanks to their capacity to detect risk patterns early.

The Institutional Complexity theory put forward by Greenwood et al. (2017) provides a systematic lens through which to understand this phenomenon. The theory emphasizes that organizations in complex environments must not only comply with various institutional pressures—both formal and informal—but also possess internal flexibility to navigate such tensions. In this context, BDAC is not merely a data processing tool but a bridge between external demands and internal capabilities. Under high external pressure, BDAC helps companies monitor market dynamics, adjust strategies, and respond with evidence-based solutions. It acts as an early warning system that enables management to take proactive steps.

In the literature reviewed, several studies show that companies operating under high environmental pressure are, in fact, more capable of accelerating technology adoption and innovative processes. For instance, a study by Reyes (2022) found that during the COVID-19 pandemic, retail and logistics companies in developing countries with BDAC experienced higher

productivity growth compared to their counterparts lacking such capabilities. These firms were able to monitor demand shifts in real time, adjust distribution channels, and accelerate the digitalization of customer service. In contrast, companies without BDAC often responded reactively, too late, or remained stagnant in the face of change.

The following table summarizes the moderating function of the external environment on the relationship between BDAC and firm performance:

Table 3 The Moderating Function of the External Environment on the Relationship Between BDAC and Firm Performance

| External Environmental Aspect | Effect on BDAC | Impact on Firm Performance | Source |
|---|---|---|---|
| Market uncertainty | Increases urgency for real-time data utilization | Firms become more responsive to demand changes | Al Mamun et al. (2025), Li et al. (2024) |
| Regulatory changes | Demands rapid strategic adaptation through policy monitoring | Faster, analytics-based decision-making | Chen & Chen (2022), L. Chen et al. (2022) |
| Economic volatility | Encourages data use for financial and investment risk mitigation | Operational stability is better maintained during crises | El-Haddadeh et al. (2025) and Pathak et al. (2023) |

Source: Author's Analysis, 2025

However, environmental pressure is not always a catalyst. In conditions of low organizational readiness—for example, inadequate IT infrastructure or a culture still rooted in traditional hierarchy—BDAC can become a source of confusion and resource waste. This reflects an organization's failure to utilize BDAC as a strategic tool when external pressures are not matched by internal preparedness. Thus, it can be said that a dynamic external environment heightens the importance of BDAC—but only if the organization is also able to build a supportive internal framework. This moderation is dualistic: it can either enhance or weaken the value of BDAC, depending on how well the organization interprets and adapts to the context. In emerging market business environments, companies that can optimize BDAC in response to external pressures will be better positioned to achieve resilient and adaptive competitive advantage.

**Socio-Economic Implications: BDAC as a Catalyst for Organizational Transformation in Developing Countries**

Big Data Analytics Capabilities (BDAC) not only revolutionize how companies make decisions, but also act as a lever for broader social and economic transformation, especially in developing countries. In this context, BDAC is not merely a technological tool, but a strategic instrument that gradually reshapes organizational structures, business practices, and even the overall digital economic order. This study suggests that the adoption of BDAC has the potential to serve as an entry point for more open, adaptive, and evidence-based organizational

transformation, which in turn contributes to the acceleration of national economic digitalization.

Nevertheless, the challenges faced by developing countries cannot be overlooked. Uneven digital infrastructure—particularly in areas outside urban centers—serves as a major obstacle to the comprehensive implementation of BDAC. Data from Haji (2021) indicates that internet penetration in rural areas of Southeast Asia remains below 50%, far behind developed nations, which have surpassed 90%. Additionally, disparities in digital capabilities among firms within the same sector create gaps in performance and competitiveness. Large enterprises with access to advanced technologies and trained human resources are far more prepared to leverage BDAC compared to small and medium enterprises (SMEs), which are still struggling with manual or semi-digital systems. Organizational culture also frequently acts as a barrier, especially where decision-making is still rooted in rigid hierarchy and intuition, rather than data-driven analysis. This reflects a structural resistance to change, indicating that BDAC implementation requires not only technological upgrades but also a transformation in organizational mindset and practice.

Yet behind these challenges lies immense potential. BDAC enables the emergence of new forms of digital inclusion, particularly through the availability of affordable cloud technologies and open-source platforms. In agriculture, for instance, BDAC has been used to process data on weather, soil, and planting patterns to help farmers make more accurate decisions. A study by Mikalef et al. (2019) showed that agricultural and logistics companies in Kenya and India that used data analytics saw efficiency improvements of up to 25%, even in low-tech environments.

The following table summarizes the dual nature of the socio-economic challenges and opportunities associated with BDAC implementation in developing countries:

Table 4 Socio-Economic Challenges and Transformational Opportunities in BDAC Implementation

| Socio-Economic Aspect | Challenge | Transformational Opportunity | Source |
|---|---|---|---|
| Digital infrastructure | Limited access to internet and technology | Use of cloud computing and low-cost tech solutions | Y. Wang et al. (2018) |
| Organizational capacity | Skills gap and lack of trained personnel in analytics | Development of digital training and strategic partnerships | Adiguzel et al. (2025), Murad et al. (2023), Novicka & Volkova (2025) |
| Organizational culture | Resistance to data-driven decision-making | Leadership reform and adoption of transparency-based culture | Aziz et al. (2024), C. Chen (2024), |
| Economic inclusion | Digital divide between large enterprises and SMEs | Innovation acceleration in traditional sectors | J. Lin et al. (2024), Sindarov et al. (2023) |
| Decision-making process | Dominance of intuition and hierarchy in managerial structure | Democratization of access and use of strategic information | Akter & Wamba (2016) |

Source: Author's Analysis, 2025

From this analysis, it can be concluded that BDAC plays a role far beyond business efficiency. It functions as a catalyst for transformation in developing countries, which, if optimized, will not only foster more adaptive and competitive companies, but also help build a more inclusive and equitable digital economic ecosystem. In other words, investing in BDAC is a long-term investment that is not solely profit-oriented, but aimed at the collective development of institutional and socio-economic capacity.

## CONCLUSION

The findings of this study affirm that Big Data Analytics Capabilities (BDAC) have evolved into a strategic pillar in enhancing corporate competitiveness in the digital era, particularly within developing markets characterized by complex and rapidly changing socio-economic dynamics. BDAC has proven to not only improve operational efficiency and foster innovation but also strengthen a company's strategic resilience in facing external uncertainties. A key point of emphasis is that the effectiveness of BDAC does not operate in isolation; rather, it is heavily influenced by the readiness of internal factors such as technological infrastructure, human resource competencies, and an organizational culture that embraces data-driven decision-making. Furthermore, an organization's dynamic capabilities play a critical mediating role in transforming data insights into strategic actions, while external environmental dynamics—such as market volatility and regulatory shifts—serve as moderators that shape the intensity and direction of BDAC's impact on firm performance. The primary contribution of this research lies in the integrated understanding that the development of BDAC should not be viewed merely as a technological project, but as a systemic process of socio-organizational transformation. The novelty of this study rests in its holistic approach, which integrates both internal and external dimensions of the firm and links BDAC with the theories of dynamic capabilities and institutional complexity within the context of developing countries. These findings enrich the existing literature by offering a socio-economic perspective that has often been overlooked in discussions surrounding technology and competitive advantage. As a recommendation, companies in developing markets should adopt long-term investment strategies to continuously strengthen their BDAC, through cross-sector collaboration, enhanced digital training, and the promotion of regulations that support an open and inclusive data ecosystem. For academics and policymakers, this study opens new avenues to explore the role of BDAC in driving equitable, resilient, and future-oriented digital economic development.

## ETHICAL STATEMENT AND DISCLOSURE

This study was conducted in accordance with established ethical principles, including informed consent, protection of informants' confidentiality, and respect for local cultural values. Special consideration was given to participants from vulnerable groups to ensure their safety, comfort, and equal rights to participate. No external funding was received, and the authors

declare no conflict of interest. All data and information presented were collected through valid research methods and have been verified to ensure their accuracy and reliability. The use of artificial intelligence (AI) was limited to technical assistance for writing and language editing, without influencing the scientific substance of the work. The authors express their gratitude to the informants for their valuable insights, and to the anonymous reviewers for their constructive feedback on an earlier version of this manuscript. The authors take full responsibility for the content and conclusions of this article.

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