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Digital transformation in SMEs: Assessing the impact of big data capabilities on project success, business continuity, and sustainability

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A B S T R A C T

During the innovation era and in the highly competitive environment, big data capabilities (BDCs) play a pivotal role in shaping competitive dynamics; the influence of these technologies on small and medium-sized enterprises (SMEs) operating in the retail sector is critically significant. This study is specifically focused on the retail industry, with a particular emphasis on how BDCs impact the project success, business continuity, and sustainability of SMEs within this industry. Our theoretical model was tested using a survey of 300 operations managers working in SMEs in the retail sector in the Middle East. PLS-SEM was conducted to analyze our collected data. Our results reveal that BDCs enhance project success and promote sustainability practices. The findings also reveal that BDCs have no impact on business continuity. By shedding light on the nuanced impact of BDCs on SMEs in the retail sector, this study contributes valuable insights to the existing literature, offering a deeper understanding of how these technological capabilities can drive success and sustainability in a highly competitive market environment.

1. Introduction

Big data capabilities (BDCs) have garnered significant attention in academic and business environments (Alsmairat, 2023). These capabilities provide various strategies for effectively using big data (BD) analytics to create business value, including analytical capability for patterns, decision support capability, predictive capability, and traceability (Cetindamar et al., 2022). Furthermore, the significance of BDCs in business has been emphasized, particularly in SMEs, where it is seen as a tool that can create value and support decision-making processes in volatile environments (Tseng et al., 2023).

BD and business analytics are recognized as disruptive technologies and innovative solutions for enterprise development. With the support of technology, BD has emerged as a primary tool for businesses in exploitative and explorative activities (Su et al., 2022). Furthermore, BD services play a crucial role in business applications due to their potential and significant impact (Henao-García et al., 2021). This is attributed to firms' belief that data is a strategic asset that requires management and integration through information systems to enable data-driven strategies for executives and industry practitioners (Batko & Ślęzak, 2022). BD analytics has become pivotal for firms and is perceived as an enabler that enhances business effectiveness due to its high operational and strategic potential. Consequently, several scholars suggest that investment in BD analytics is a myth (Akter et al., 2016) and has become a valuable resource for enterprises (Kumar et al., 2023).

BD eliminates barriers to business instability and breakdowns by providing an integrated method for performance monitoring and customer contact through pertinent data analysis and time-sensitive decision-making circumstances (Anusha et al., 2022). BDA employs sophisticated analytics techniques to extract relevant information from vast amounts of data, enabling data-

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driven decision-making (Awan et al., 2022). Accordingly, the role of BDCs in achieving several business goals has been described in several specific cases. Research has shown that BDCs have a substantial influence on various aspects of business settings, including financial performance, decision-making quality, business model innovation, sustainability, and organizational agility (Awan et al., 2021; Mikalef et al., 2020; Mushtaha & Alsmairat, 2023; Yu et al., 2021). Furthermore, the potential of BD to revolutionize project management and quality innovation into more information-based and intelligent processes, as explored by Zhuang and Wu (2022), opens up a compelling field of investigation. Concurrently, the opportunities presented by BD technology in improving service quality and generating business value necessitate a deeper exploration of how these advancements translate into tangible project successes. Significantly, existing literature, including the works of Sheng et al. (2017), Ongena & Davids (2023), and Dai & Liang (2022), has investigated the impact of BD on diverse areas such as firm competitiveness, governmental performance, and business model innovation. However, there remains an essential gap in understanding the application of BD in identifying critical business functions, developing contingency plans, and ensuring rapid recovery post-disruptions, a concern highlighted by Păunescu et al. (2018). This study seeks to elucidate the mechanisms through which BD facilitates proactive risk management and the formation of adaptive business continuity strategies. Moreover, Rialti et al. (2020) underscored integrating BD technologies with green practices to achieve sustainable operational and environmental performance. Yet, the scalability and applicability of these practices in various organizational settings are still underexplored. This research aims to show how BD analytics can be synergized with sustainable, dynamic capabilities to promote long-term environmental and social sustainability.

Despite extensive research on BD techniques and technologies, as indicated by Mikalef et al. (2020), the optimization of BD for creating substantial business value, particularly in the context of SMEs, remains relatively uncharted. In their quest to leverage BD to enhance supply network efficiency, SMEs often confront challenges such as inadequate understanding of BD analytics, insufficient investment in BD, and other supply chain-related issues. This underscores the need for a detailed analysis of BDC's primary implementers and their role in project success, business continuity, and sustainability – areas that are currently underrepresented in existing studies. A critical factor hindering the broader adoption of BDCs is the array of challenges, including data security concerns, limited acceptability, and the dominance of BDCs by larger firms and supply chain partners. This often disadvantages SMEs due to their limited understanding of the implementation of BDCs. To address these challenges, this study proposes guiding SME managers in implementing BDA. By quantitatively assessing the critical implementers of BDCs within their specific contexts, SMEs can develop tailored BDCs implementation plans, aided by a statistical analysis of the obstacles in BDA deployment. Therefore, the following research questions are the main emphasis of this study: **RQ1**: How do the BDCs impact project success in the SMEs context in the Middle East?; **RQ2**: How do the BDCs impact business continuity in the SMEs context in the Middle East?; **RQ3**: How do the BDCs impact sustainability in the SMEs context in the Middle East?

The remainder of this study is structured as follows: Section 2 reviews the related literature. Section 3 outlines the research methodology. Data analysis and findings are shown in Section 4. The implications, conclusion, and limitations are described in Section 5.

2. Literature Review

2.1 Project Success and Big Data Capabilities

The primary responsibility in project management entails delivering the project within the predefined temporal and budgetary constraints (Davis, 2018). Nonetheless, project success criteria encompass more than the considerations above. In addition to the prerequisites, a project manager must collaborate closely with the client, ensuring that the project outcomes align with the client's expectations. Numerous parameters influence the criteria for project success (Battistella et al., 2023). Key Performance Indicators (KPIs) represent the foremost metric in evaluating project success, rooted in business factors. KPIs serve as a quantifiable means to assess the advantages derived from a project (Gemünden et al., 2018). However, it is crucial to underscore that a project's success cannot be solely contingent on KPI-driven criteria; realistic and attainable goals should be defined to facilitate a successful project (Al-Okaily et al., 2023a). An understanding of business drivers and alignment with overarching business goals further contribute to the realization of success.

The present study employs the Resource-Based View (RBV) theory and Dynamic Capability View (DCV) to ground the interaction between BDCs and Project success. The RBV theory highlights that a firm's internal resources and capabilities are fundamental drivers of competitive advantage (Barney et al., 2001). In the context of BDCs, firms can utilize their data analytics resources to establish a sustained competitive advantage (Hao et al., 2019). This aligns with the concept that internal capabilities, such as proficient BDCs, significantly contribute to superior performance (Behl et al., 2023). Furthermore, the DCV complements the RBV theory by concentrating on how firms can adjust and reconfigure their resources to attain competitive advantage in response to changing environments (Dubey, Gunasekaran, Childe, et al., 2019). BDCs are pivotal in enhancing a firm's dynamic capabilities, enabling them to adapt to market changes and innovate effectively (Shamim et al., 2019). The capacity to process and analyze extensive data volumes can enhance decision-making and strategic agility, which are imperative for project success (Khaw & Teoh, 2023).

Furthermore, integrating BDCs can enhance incremental and radical innovation capabilities, affecting a firm's dynamic capabilities and technical and managerial skills, which are core elements for realizing BD success (Tseng et al., 2023). BDCs have the potential to significantly impact project success in SMEs. This is particularly relevant in the context of project management in SMEs, where matching processes to the nature of the firm is crucial for success, as pointed out by Turner et al. (2010). Additionally, Al-Sai et al. (2020) argue that the successful implementation of BD projects depends on their alignment with the current organizational, technological, and analytical aspects, emphasizing the importance of aligning BD initiatives with the existing capabilities of SMEs. This is supported by Ilmudeen (2021), who states that BDCs can lead to greater firm performance, creating business-relevant knowledge, adding value, enhancing performance, and providing a competitive advantage in dynamic markets. Moreover, the impact of BDCs on the effectiveness of project management processes has been highlighted, emphasizing the need for SMEs to leverage BD analytics to improve project management effectiveness (Mortati et al., 2023). In the context of SMEs, it is crucial to consider the specific challenges and opportunities related to BDCs. While BD requires a significant investment in hardware and processing power, making it initially expensive for SMEs to implement (Alsmairat, 2023), the potential benefits in terms of sustainable innovation performance and firm performance make it a worthwhile investment for SMEs (Hao et al., 2019). Additionally, the management of projects in SMEs has not been extensively studied, highlighting the need for research and guidance on how BDCs can be effectively integrated into project management processes in SMEs. Therefore, the below hypothesis is stated:

H_1: *Big data capabilities have a positive impact on project success in SMEs.*

2.2 Business Continuity and Big Data Capabilities

Business continuity is indispensable in today's volatile business landscape, ensuring organizations can withstand and navigate disruptions and the rapid pace of technological change. In line with the tenets of DCV and RBV, the fundamental elements of BDCs focus on how firms can adjust and reconfigure their resources to achieve a competitive advantage in response to changing environments (El-Kassar & Singh, 2019). BDCs play a crucial role in enhancing a firm's dynamic capabilities, enabling them to adapt to market changes and innovate effectively (Dubey, Gunasekaran, & Childe, 2019). The capacity to process and analyze large volumes of data enhances decision-making and strategic agility, which are vital for ensuring business continuity (Wang et al., 2018). The effective alignment of capabilities, such as IT-process and human-IT alignment, is crucial for extracting value from BDCs and ensuring business continuity (Zhu & Chu, 2023). By integrating BDCs with organizational processes and human capital, firms can strengthen their resilience to disruptions and ensure continuity in operations (Sawalha, 2020). Regulatory compliance is crucial in business continuity as government and industry bodies progressively enforce stringent strategies to safeguard services and comply with legal frameworks. This argument is supported by Rumman (2022), who emphasizes the significance of adhering to regulatory requirements to ensure the resilience of business operations. In parallel, increasing reliance on digital technologies places a premium on effective cybersecurity measures and robust disaster recovery protocols to uphold the continuity of essential digital operations. Additionally, organizations need to prioritize the protection of digital assets in the face of evolving technological landscapes (Frikha et al., 2021). Financial resilience during interruptions is critical, and business continuity plays a key role in minimizing financial losses and accelerating recovery (Gupta et al., 2023).

Similarly, reputation management is crucial; effective BDCs can prevent reputational damage and maintain public confidence (Westermann & Forthmann, 2021), offer a competitive advantage, as resilient organizations are more attractive to customers in a competitive marketplace (Alkhatib & Valeri, 2024). BDC's adaptability and scalability, including routine plan testing and revisions to address emerging risks, are essential for maintaining readiness in a constantly changing world(Rajendran et al., 2022). BDCs scope extends beyond contingency planning, becoming a strategic essential that ensures an organization's ability to weather disruptions, adapt to change, and ultimately thrive. Moreover, BDC's role in enterprise management efficiency and viability is crucial for business continuity(Lang, 2022) and contributing to a firm's value co-creation and sustainable business practices (Otchere et al., 2021). BDCs also improve communication and coordination, facilitating better decision-making and unity during crises and supporting the fulfillment of customer expectations (Scott et al., 2023). This convergence of BDCs and BD analytics points to a need for further investigation into their implications for business continuity in SMEs. (Al-Okaily et al., 2023b; Alsmadi et al., 2023) emphasize BDCs' role in decision-making quality and capability, highlighting the importance of robust data capabilities for effective decisions. Further, (Mikalef et al., 2018) suggest a theoretical framework explaining how BD contributes to competitive performance, signaling the need for empirical research to validate these mechanisms. These insights collectively signal research opportunities to understand better how BDCs can fortify business continuity, especially in SMEs. Therefore, the below hypothesis is stated:

H_2: *Big data capabilities have a positive impact on business continuity in SMEs.*

2.3 Sustainability and Big Data Capabilities

BD's ability to advance sustainability in SMEs is well documented in the current research, which offers insights into its role in fostering eco-responsible practices and innovation. In line with the principles of RBV and dynamic capabilities theory, these theories underscore that a firm's competitive advantage stems from its distinct resources and capabilities (Mikalef &

Gupta, 2021), denote an organization's capacity to adjust, integrate, and reconfigure internal and external competencies to tackle swiftly evolving environments (Barile et al., 2020). This integration can profoundly influence sustainability endeavors within organizations. BD analytics can furnish valuable insights into environmental performance, operational efficiencies, and sustainable practices (Saini et al., 2021). Organizations can attain sustainable operational and environmental performances by consistently reconfiguring BD technologies alongside green human resource management practices, green supply chain management, and corporate commitment (El-Kassar & Singh, 2019). Moreover, when cultivated with a sustainability-centric approach, dynamic capabilities can propel corporate sustainability and culminate in sustained competitive advantage. Furthermore, Malik et al. (2023) investigate how Industry 4.0 promotes sustainability by allowing firms to manage resources more effectively, showcasing the positive influence of technology on sustainable manufacturing and the circular economy. This underscores BD's capacity to enhance resource management and environmental stewardship within SMEs. Furthermore, Upadhyay and Kumar (2020) pointed out that organizational learning, facilitated by BD, can mediate improvements in firm performance, spotlighting knowledge acquisition's role in enhancing sustainable practices. Similarly, Jum'a et al. (2023) explored the association between BD analytics sustainability performance, reinforcing the synergy between BD and sustainable value creation. Baig et al. (2023) support this argument by addressing BDC's impact on sustainable marketing and operations of SMEs, pointing to its potential in augmenting sustainable business practices and fostering innovation. Collectively, these studies assert the significance of BD in resource optimization and value creation for SMEs. In the context of environmental sustainability, Wang et al. (2022) provide critical evidence of how BDC might drive green economic development and contribute to sustainable economic growth and environmental stewardship. Similarly, Garrigós-Simón et al. (2021) pointed out that firms in different sectors can benefit from BDC in enhancing financial, natural, human, and social sustainability. Additionally, Zhang and Lv (2021) investigated the impact of BDCs on the government's intelligent service performance, providing a critical recommendation to explore the role of BDCs in driving social and economic sustainability.

The literature acknowledges the promise of BD in elevating sustainable innovation performance and competitive edge (Hao et al., 2019). However, the mechanisms by which SMEs can harness BDCs for sustainable innovation and a competitive advantage in a dynamic market warrant further investigation. This research empirically examines the direct relationship between BDCs and sustainable practices in SMEs, delving into the role of dynamic capabilities and resource orchestration in promoting sustainable business practices via BD utilization. It aims to fill the existing knowledge gap by exploring how these capabilities contribute to sustainability in SMEs, thereby advancing our understanding of BD's role in the sustainable transformation of smaller enterprises. Therefore, the below hypothesis is stated:

H_3: *Big data capabilities have a positive impact on sustainability in SMEs.*

3. Research Methods

3.1 Research Settings

We surveyed SMEs in the Middle East based in the retail industry. We collected data from Jordan (100), Qatar (50), United Arab Emirates (50), and Saudi Arabia (100). The selection of SMEs in each country was based on official statistics to ensure a representative sample. SMEs were identified and contacted via email, allowing for direct and efficient communication with the targeted companies. We ensured that the SMEs were selected because they had recent experience with innovation tools and a strong reliance on information systems. Moreover, additional efforts were made to enhance the data collection process in Saudi Arabia and Qatar. Information on SMEs in these countries was gathered from personal networks, friends, and industry professionals. This approach not only facilitated access to a wider pool of SMEs but also ensured a more in-depth understanding of the specific contexts in these countries. In contrast, data collection in the United Arab Emirates and Jordan was conducted through on-site visits. This method allowed researchers to interact directly with SMEs, observe their operations, and gather first-hand information. The research team collected a comprehensive dataset that reflected the diverse landscape of SMEs in the Middle East retail industry by employing a mix of email surveys, personal networks, and on-site visits. Furthermore, the selection criteria for SMEs were stringent to ensure that the companies had recent experience with innovation tools and a strong reliance on information systems. This focus on SMEs with a demonstrated commitment to innovation and technology allowed for a more nuanced analysis of the role of BDCs in enhancing key performance indicators and fostering relationships with partners.

As for the research measures, BDCs scales were measured using 4-items adopted from (Al-Khatib 2022a), project success scales were measured using 4-items adopted from (Aga et al., 2016), business continuity scales were measured using 4-items adopted from (Kato & Charoenrat, 2018; Ji et al., 2022), and sustainability scales were measured using 4-items adopted from(Das, 2017). All scales were designed based on the five-point Likert scale.

For the demographic sample profile, 82.3%. Of the sample were male and 17.7% were females. Regarding firm size, 80 firms fall under the bracket of having less than 50 employees, 160 firms are classified as having 51 to 100 employees, and the remaining 60 firms are classified as entities with more than 200 employees.

3.2 Data analysis

We used Smart PLS software to analyze our research data. PLS-SEM has garnered considerable interest within the management research community as an effective approach to theory development (Sarstedt et al., 2022). The analysis was conducted in two stages: the initial stage involved assessing the construct validity and scale composite reliability of the proposed research model, followed by the testing of the research hypotheses following the recommendations of leading scholars (Hair et al., 2019a).

4. Data analysis

4.1 Measurement model

The validity measures in scientific studies ensure the ability of the scale to measure what it is expected to measure. Table 1 provides values of measurement model indicators that exceed the threshold values, including Cronbach alpha (α>0.7), scale composite reliability (CR>0.7), and average variance extracted (AVE>0.5) (Hair et al., 2019b) which indicate that our constructs possess validity and reliability.

Table 1
The measurement Model Assessment

Constructs	Alpha Cronbach's	Composite Reliability (CR)	AVE
Big Data Capabilities	0.863	0.875	0.567
Project Success	0.823	0.786	0.532
Business Continuity	0.845	0.896	0.515
Sustainability	0.812	0.802	0.545

Further, the discriminant validity of research constructs was assessed using (Fornell & Larcker, 1981) criteria as reported in Table 2. Overall, the validity and reliability results enable further structural model analysis.

Table 2
Discriminant validity

Constructs	1	2	3	4
1-Big Data Capabilities	0.665			
2-Project Success	0.501	0.704		
3-Business Continuity	0.487	0.532	0.634	
4-Sustainability	0.424	0.514	0.533	0.618

4.2 Structural Model

Evaluating the structural model is a critical phase in assessing its quality and predictive accuracy, often involving established indicators such as effect size (f^2), R^2 coefficient, and standardized root mean squared residual (SRMR) score (Hair et al., 2019a; Sarstedt et al., 2022). Regarding R^2, we found that BDCs can explain almost 0.24% of the variation in business continuity, 19% % in project success, and 10% in sustainability. According to (Sarstedt et al., 2022), the effect size (f^2) assesses the capacity of the predictor constructs to elucidate the dependent variables, where values of 0.02, 0.15, and 0.35 signify weak, moderate, and substantial effect sizes, respectively. Our results reveal significant effect sizes (0.336 – 0.586), supporting the fit of the structural model. Further, the SRMR score should ideally be less than 0.08 to validate the fit between the hypothesized model and the data(Hair et al., 2019a). Our findings reveal a satisfactory SRMR score of 0.049. However, these findings indicate that our model possesses the measurement and structural criteria and can pass further to hypothesis testing.

4.3 Hypotheses Testing

Hypotheses testing was conducted using the Bootstrapping approach in PLS-SEM. Specifically, the 5000 resamples method was employed to determine the significance levels of the proposed hypotheses following the suggestions of leading scholars (Hair et al., 2019b). This method was selected due to the valuable insight it enables the estimation of standard errors and confidence intervals for model parameters, including coefficient values and t-values (Sarstedt et al., 2022). The results of the hypothesis testing are presented in Table 3 and Fig. 1.

Table 3
Results of Hypotheses Testing

No.	Path	Original sample	Sample mean	Standard deviation	T statistics	P values	Remark
H1.	BDCs → Project Success	0.432	0.407	0.156	2.775	0.006	Accepted
H2.	BDCs → Business Continuity	0.488	0.401	0.285	1.712	0.087	Rejected
H3.	BDCs → Sustainability	0.308	0.313	0.041	7.428	0.000	Accepted

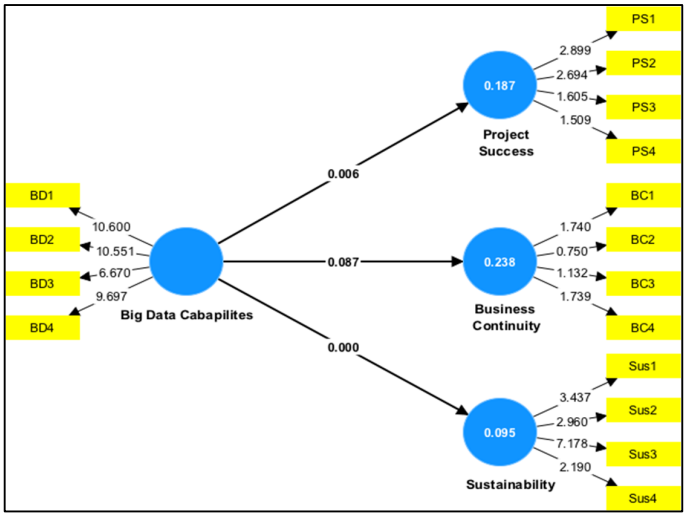

Fig. 1. Results of Hypotheses Testing

Our research provides empirical evidence to support the hypothesized relationships between BDCs, project success, and sustainability. Specifically, our results reveal that BDCs are significantly and positively related to project success ($\beta = 0.432$, $p < 0.05$), which shows evidence in favor of hypothesis H1, indicating that BDCs can lead to promote project success in SMEs operating in the retail industry in the Middle East. These findings corroborate the results of previous studies that have explored the role of BDCs indirectly, such as (Mortati et al., 2023), who figured out that innovation tools such as AI and BD can enhance creating project plans, phases and controlling successfully. Additionally, this is supported by Turner et al. (2010), who clarified the implementation of the process of projects in SMEs through innovation tools that indirectly support our findings. Our study further reinforces the conclusions that BDCs can significantly enhance project success and mitigate the probability of failure by leveraging these capabilities, extracting and analyzing massive data, and responding effectively to market conditions when adequately utilized.

Unexpectedly, our findings fail to confirm the impact of BDCs on business continuity ($\beta = 0.488$, $p > 0.05$), providing evidence against hypothesis H2. Finally, our findings support the hypothesized relationships between BDCs and sustainability ($\beta = 0.308$, $p < 0.01$), showing evidence favoring hypothesis H3. The findings confirm previous findings that figured out that BDCs are a key driver of achieving green economic development (Wang et al., 2022), enhancing sustainability performance (Jum'a et al., 2023), supporting green practices in different sectors (Ali & Johl, 2023).

5. Discussion

The study's findings confirmed that BDCs significantly impact the achievement of project success and sustainability in the SMEs in the Middle East's retail industry. Prior research has established the role of BDCs highlights the positive influence of BD analytics on project performance in SMEs, particularly in the manufacturing sector (Mangla et al., 2020), which supports the beneficial impact of BDCs on project success within SMEs. The study's results agree with many previous researche (Al-Khatib, 2022b; Awan et al., 2021; Brinch et al., 2020; Karaboga et al., 2023) which address the role of BDCs in leveraging BD analytics tools and techniques exhibit higher levels of innovation, which can lead to improved project outcomes and long-term sustainability in the SMEs context. The findings support the tenets of RBV and Dynamic Capability theory and show that BDCs can boost organizational performance (Akter et al., 2016). This supports the notion that BDCs can contribute to project success and sustainability through dynamic capabilities. This conclusion aligns with past findings that have also linked the BDCs with support firms in adapting to changing environments, which can positively influence project success and sustainability (Singh & El-Kassar, 2019).

Our findings provide valuable theoretical and practical implications. Overall, we provide robust evidence to support the contention that "as the scope of business bases innovation, the integration of BD tools and its capabilities will become essential to ensure success in a highly competitive era" (Alsmairat, 2023). We demonstrate a statistically significant association between BSCs, project success, and sustainability, which support SMEs in successfully adopting BDCs to achieve several goals.

5.1 Theoretical Implications

SMEs in the retail sector should assess their business needs and technical capabilities to leverage innovative tools and enhance their success in the dynamic environment. This can improve overall organizational performance(Awan et al., 2021; Ilmudeen, 2021). To digitally transform and implement BDCs, it is crucial to foster data-driven decision culture(Liu et al., 2022), develop

an integrated information process(Yu et al., 2021), and cultivate a great level of business resilience (Rialti et al., 2020). Our research addresses the research questions and gaps identified by Păunescu et al. (2018) and Alsmadi et al., 2023). By analyzing the collected data, we endeavor to offer insights that will contribute to future research and enrich the current knowledge base in this domain. Our findings suggest that BDCs can support SMEs in managing the process of their projects successfully, enabling them to adopt more sustainability practices and align their operations to be highly responsive to market signals.

Additionally, the findings provide theoretical support for the role of BDCs in achieving the Triple Bottom Line—economic, environmental, and social sustainability. This aligns with the broader literature on sustainability and organizational success, highlighting the multifaceted impact of BDCs on project outcomes and sustainability .Furthermore, the empirical evidence underscores the theoretical underpinnings of BDCs as enablers of sustainable practices within projects. This extends the traditional understanding of project success beyond economic measures to include social and environmental outcomes, aligning with the broader literature on sustainable project management and integrating sustainability principles into project practices (Shenhar et al., 2017).

5.2 Practical Implications

The empirical evidence supporting the hypothesized relationships between BDCs, project success, and sustainability has significant practical implications for organizations. Firstly, it highlights the importance of investing in and leveraging BDCs to enhance project success and sustainability outcomes. Organizations can use this evidence to justify and guide their investments in BD infrastructure, analytics, and talent to drive project success and sustainability initiatives. Additionally, the findings suggest that organizations should prioritize the development of BDCs to adapt to rapidly changing environments and achieve sustainable project outcomes. This may involve investing in training programs, technology infrastructure, and data-driven decision-making processes to harness the potential of BD for project management and sustainability initiatives. Furthermore, the empirical evidence underscores the need for organizations to consider the broader impact of project success beyond traditional economic measures. By integrating sustainability considerations into project management practices and leveraging BDCs, organizations can enhance their ability to achieve economic, environmental, and social sustainability goals.

Managers are encouraged to enhance BDCs by proactively improving coordination and fostering inter-organizational learning. In the contemporary high-tech landscape, regular stakeholder meetings are pivotal in mitigating behavioral uncertainties and curtailing opportunistic behaviors among partners. These gatherings are more than just administrative routines; they are instrumental in cultivating mutual trust and promoting a collaborative culture that prioritizes information sharing. Furthermore, the agility of SMEs in responding to innovative changes and adapting their structures and processes is significantly bolstered by inter-organizational learning. Managers are urged to advocate using BD analytics tools to derive insights from past experiences, refine processes, and enhance efficiency. Establishing a culture that values mutual respect is equally crucial, as it fosters open communication and collective learning. A tailored approach is indispensable for SMEs in the retail industry, aiming to harness digital technologies to enhance their performance. This necessitates a comprehensive assessment of their business needs BDCs, encompassing an evaluation of their infrastructure, human resources, organizational structure, and financial resources. The success of digital transformation initiatives hinges on this critical appraisal.

Additionally, SMES must have leaders who are not only well-versed in digital technology but are also deeply committed to and believe in the potential of digital transformation. Such leadership is magnetic, attracting and retaining top digital talent, investing in the workforce's capabilities, and instilling a sense of empowerment among team members to make informed decisions. This leadership approach is fundamental to a digitally transformed, data-savvy enterprise.

6. Conclusion, Limitations, and future scope of work

Our research provides empirical evidence to support the hypothesized relationships between BDCs, project success, and sustainability. The findings underscore the significance of BDCs in achieving economic, environmental, and social sustainability. The study has contributed to understanding how BDCs enable organizations to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. The research has also highlighted the importance of inter-organizational learning and the role of BD analytics tools in refining processes and boosting efficiency. Despite the valuable insights gained from the study, certain limitations should be acknowledged. The research was conducted within a specific context, and the findings may not be generalizable to other industries or regions. Additionally, the study relied on self-reported data, which may introduce response bias. Furthermore, the research was limited to a specific time frame, and the long-term impact of BDCs on sustainability and project success warrants further investigation.

The study opens avenues for future research in several areas. Firstly, longitudinal studies could assess the long-term impact of BDCs on project success and sustainability. Additionally, comparative studies across different industries and regions could provide valuable insights into the generalizability of the findings. Furthermore, research focusing on developing a conceptual framework for assessing the success of BD projects and identifying critical success factors for BD initiatives could contribute to advancing knowledge in this field. Lastly, exploring the role of BDCs in addressing emerging challenges, such as data security and privacy, could be a promising area for future research.

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