

Business Analytics Capabilities and SME Competitiveness: A Systematic Literature Review

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Abstract

There is growing pressure on small and medium sized enterprises (SMEs) to implement analytical tools to keep pace with changing market dynamics. Despite current trends, there is a lack of understanding on how business analytics can influence the SME performance. This systematic literature review aims at synthesising existing literature to identify key domains in which business analytics can impact business competitiveness of SMEs, such as digital transformation, innovation, sustainable development and market orientation. The review explores the extent to which SMEs use business intelligence and data analytics, and reveals the performance and decision making impacts. A specific process is used to locate, analyze and assess pertinent research studies and determine the trends and gaps in literature. The results reveal that business analytics has the potential to improve operational efficiency and drive innovation, but its implementation is often hindered by factors such as resource constraints and technological challenges. Moreover, the interaction between management skills and technology infrastructure becomes crucial to draw on for the successful implementation. There are certain studies that emphasize analytics' role in global growth and sustainability, and others that stress the importance of tailored solutions to meet the distinct challenges faced by SMEs. The review provides a research agenda to fill theory and practice gaps, especially in the application of analytics to the continuous competitiveness of SMEs. This review brings together a range of views, to provide a basis for further research and to provide practical guidance for SME leaders.

Keywords: Business Analytics Capabilities, SME Competitiveness, Digital Transformation, Innovation, Systematic Literature Review

Introduction

Digital technologies have revolutionized the small and medium-sized enterprises (SMEs) and they are looking to foster strategies that focus on data-driven growth, flexibility and sustainability. Business analytics, encompassing descriptive, predictive and prescriptive, are now becoming critical pillar of digital transformation, essential for converting vast amounts of unstructured data into actionable insights. The applications of these tools include operational efficiency, strategic decision-making and enabling SMEs to meet market shifts

and competition (Al-Majali et al., 2024; Žilka et al., 2024). Recognizing the role of business analytics as a capability that can be used to improve their competitiveness and not just a technological upgrade, especially for SME owners and managers. Business analytics gives SMEs a strategic plan to boost operational efficiency, better personalisation with customers, greater visibility into the supply chain, new opportunities to recognise in the market and stand out in highly competitive markets. The study is also of great importance to the policymaker and support institutions in the context of a changing business landscape. It provides useful guidance on the design of interventions that address specific areas for digital readiness enhancement, managerial skills, and SME competitiveness in resource-limited contexts. Enhancing SME competitiveness contributes to a national priority because SMEs are known to be the backbone of economic growth, innovation and resilience.

Many SMEs recognise the competitive opportunities provided by analytics however, there are several challenges for adoption including limited resources, lack of technical expertise, and organisational inertia (Pelletier & Cloutier, 2019). At the core of digital transformation and SME competitiveness is business analytics, which interconnects data with added value.. Previous studies show that analytics can encourage innovation, improve performance, and increase responsiveness to environmental changes (Motjolo pane & Chanza, 2023). For example, SMEs that incorporate analytics into their operations can refine their supply chains, personalize their customer experiences, and better identify emerging market opportunities (Souza, 2014). However, the available literature is sparse and fragmented. Research has focused on discrete successes—either with technology adoption, innovation, or performance—but not combined these into a unified framework of explaining how the use of business analytics feeds into SME competitiveness. Consequently, there is no general knowledge of how analytics creates competitive value in SMEs. A more serious gap is the lack of focus on the contextual factors of SMEs. Although previous research often identifies the value of analytics, few provide detail on how small companies with limited financial, human, and technological resources can actually build and implement analytics (Willettts et al., 2020). However, the literature is still lacking in the area of how managerial skill and organizational adaptation affect the successful use of business analytics, particularly in emerging economies, which is characterized by a high prevalence of SMEs and is characterized by more stringent institutional and resource constraints (Min, 2021). As a result, there is still a lack of understanding about whether or not analytics capability alone is sufficient or if it must be coupled with other organizational factors to be competitive.

For this reason this review explores literature on the topic of business analytics capabilities and SME competitiveness published in the last decade of the 21st century, focusing on the practical and strategic relevance of this topic. This review reviews the reasons that this field is worthy of study by laying out how business analytics can affect the decision-making, adaptability, and competitiveness of SMEs, especially in settings with limited resources. It also specifies the stakeholders who can learn from this, such as SME owners, managers and policy-makers who want to enhance their digital readiness and long term competitiveness. In addition to summarizing the existing research, the review clarifies the circumstances and contexts in which business analytics is a contributor to competitiveness and outlines the theoretical and empirical gaps that still exist. This paper is organized as follows: Section 2 presents the methodology used in the search strategy and the selection of criteria; Section 3 summarizes the results by thematic area; Section 4 discusses the synthesized results in

relation with the current theory; and Section 5 contains implications, limitations and directions for future research.

Methodology

Review Protocol

A systematic literature review was carried out, following the guidelines of PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Page et al., 2021), to guarantee methodological rigor and transparency. Seven (7) business analytics and small and medium enterprise (SME) related databases and search engines were chosen. IEEE Xplore was added for its extensive reporting of research in technology, specifically analytics applications in SMEs. The ACM Digital Library was used to access computational and data-driven solutions, whereas Web of Science and Scopus were utilized to gain interdisciplinary insights and to track citations comprehensively. High quality business and management journal articles were obtained from ScienceDirect and SpringerLink. The database was also complemented by grey literature and recent publications not included in the other publications. The search strings consisted of the terms related to Business Analytics Capabilities, SMEs, Small and Medium-sized Enterprises and Competitiveness. Reviews, surveys and meta-analysis were not included in the study. Only publications from 2015-2025 were taken into account to assure focus on recent developments. Structured queries included platform-specific syntax and were customized to each database to ensure consistency and adherence to the correct syntax for each platform, e.g., the IEEE Xplore query was ("Business Analytics Capabilities"): TITLE) AND ((SME OR "Small and Medium-sized Enterprises" OR "Small Business"):AI).

Thematic Framework for Analysis

The findings are presented in a multi-dimensional format and grouped into seven themes that are interrelated. Digital Transformation and Competitiveness in SMEs tackles the changes in structure and operations as a result of analytics. Business Intelligence and Data Analytics in SMEs is a course that emphasizes the data processing tools and techniques. The Analytics Adoption vs Growth Metrics relation is explored in Innovation and Performance in SMEs. Environmental and social effects assessed by Sustainable Development in SMEs. Market Orientation and Internationalization of SMEs is about market expansion via analytics. Technological Adoption in SMEs aims to examine barriers and facilitators to technology adoption in SMEs. Last but not least, Management and Organizational Capabilities in SMEs evaluates leadership capabilities and culture that can impact the success of analytics efforts. The framework is a thorough summary of the literature that does not leave out some interpretation.

Inclusion and Exclusion Criteria

Studies were selected if they: (1) explicitly discussed business analytics capabilities in SMEs, (2) focused on outcomes related to competitiveness, (3) were peer-reviewed journal articles, (4) were published in English in a period between 2015 and 2025, and (5) provided empirical or theoretical perspectives relevant to the dimensions of research. The exclusion for non-peer reviewed works, studies with unclear methodological aspects, and for large enterprises only. The editorials and papers of conferences were also omitted to guarantee the quality and relevance of the publications, as well as those not written in English.

Study Selection Process

Results from the first search were 684 records, which were further narrowed to 531 after the removal of duplicate and irrelevant records (like non-journal publications). 246 records were excluded in title and abstract screening, and 183 records were selected for full-text screening. These are not all eligible, and 33 were excluded because of ineligibility (e.g., wrong population or context), leaving 150 eligible studies for synthesis. This process is shown in the PRISMA flowchart in figure 1.

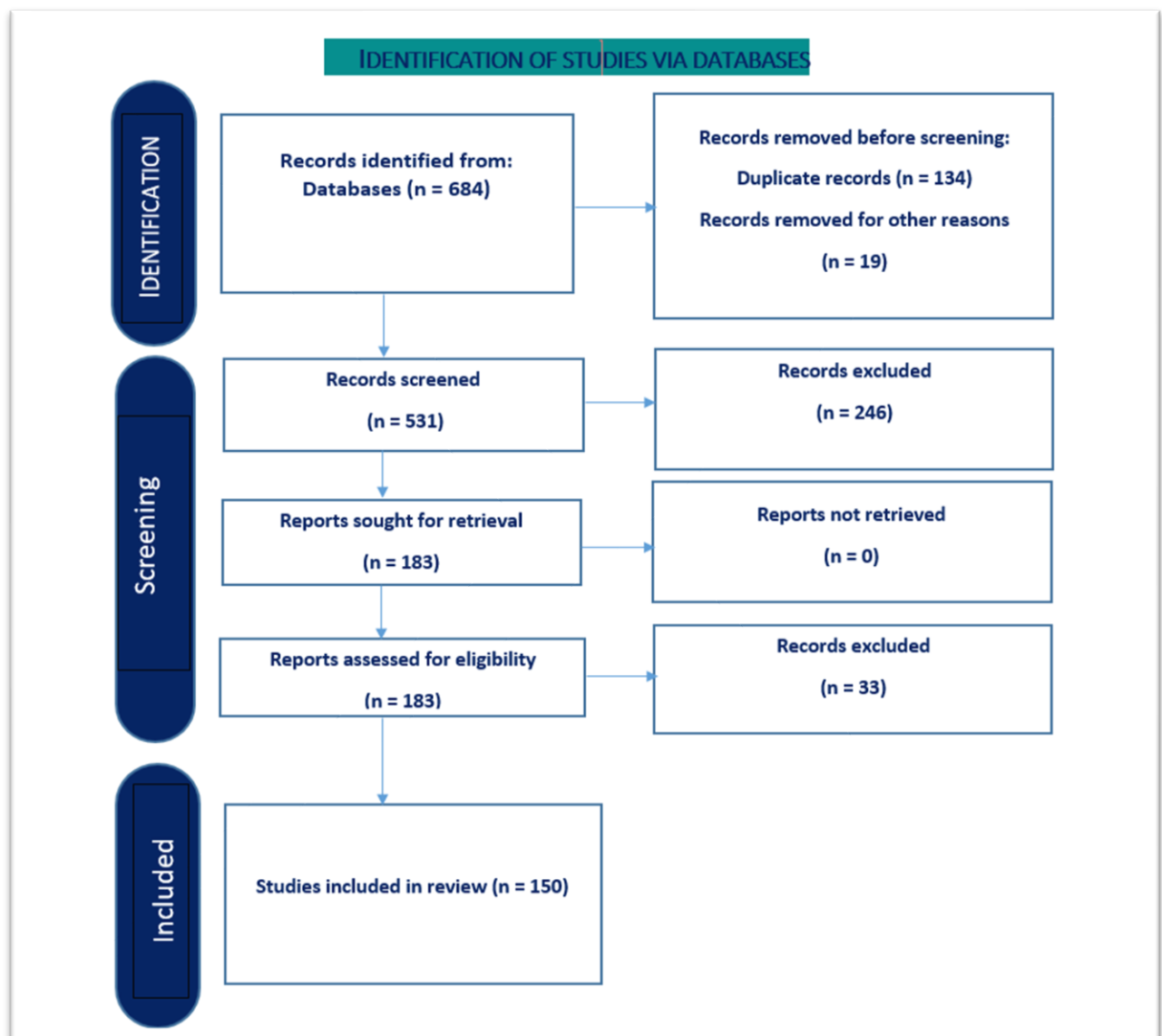


Figure 1. PRISMA flowchart of study selection

The quality validation of each study was carried out in three dimensions: theoretical foundation, methodological rigor and dimension of the research. Two reviewers independently duplicated records screened and differences were resolved by consensus. This could include, for example, a publication bias to positive results, and a lack of studies from developing regions, leading to results that are more reflective of a technologically advanced SME context. The following sections (Results, Discussion and Conclusion) will describe the synthesized results and their implications.

Results

Research Trends

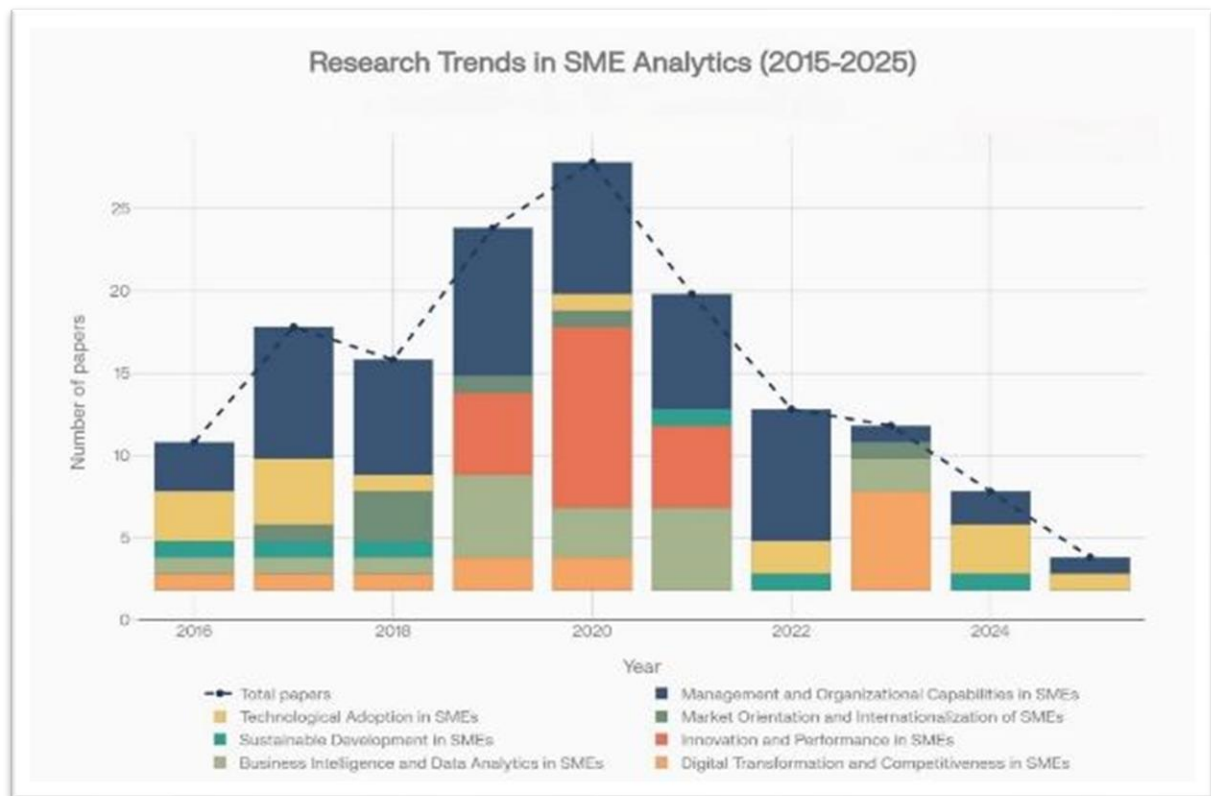


Figure 2. Emerging research trends in business analytics capabilities for enhancing SME competitiveness

While a systematic review of 150 papers shows clear patterns of temporal and thematic literature in business analytics and SME competitiveness. Publication numbers increased steadily from 2016 to 2020, peaking at 29 in 2020, and then decreased in the following years. This pattern is consistent with growing academic interest in an era of increased digital transformation projects followed by stabilization as the field matured. The range of publication subjects shows how academic interest has adapted to new technologies and evolving business issues.

The highest number of studies (42) are in the management and organizational capabilities and its representation is consistent for the whole observed period. This continuing emphasis suggests the importance of leadership and structural factors in facilitating analytics adoption, especially in resource-constrained SMEs. Secondly, there is the focus on innovation and performance with a number of studies in this area in 2020. It reflects the presence of global disruption that needs agile and innovative business responses. The spiky nature of the adoption research research over time, with peaks in 2017 and 2019, aligns with the key moments when cloud computing and democratization of AI lowered the entry barriers for SMEs.

Digital Transformation and Competitiveness in SMEs

For SMEs, digital transformation is becoming a key factor for competitiveness and Business Analytics is one of the pillars of the digital transformation process. Previous research has

shown that SMEs use digital technologies for more than just efficiency, but to redefine their business models and value propositions. Research in (Islam et al., 2023; Ulas, 2019) shows that business intelligence and data analytical tools provide SMEs with competitive advantages that enable them to turn raw data into strategic insights. This ability is useful especially in a dynamic market where agility and data-based decision making will set the successful business apart from the rest.

Digitalization has improved the production capacities and competitiveness, as already mentioned in (Ghobakhloo & Iranmanesh, 2021; Telukdarie et al., 2023), through the application of Industry 4.0 technologies. The use of these technologies by SMEs brings a number of benefits, including enhanced supply chain visibility, predictive maintenance, and customer personalization, all of which help to differentiate the business. But it isn't easy. However, as mentioned in (Brandy, 2023; Omrani et al., 2022), there are numerous obstacles to full scale implementation, including organizational resistance, skill deficits, and resource limitations. These barriers require individual solutions that are appropriate for SMEs and according to their operational size and financial resources. Table 1 contains a taxonomy of digital transformation themes in SMEs based on the main themes and outcomes of the studies.

Table 1
Taxonomy of Digital Transformation Themes in SMEs

Focus Area	Sub-theme	Sub-theme Specific Aspect	Sources
Adoption & Implementation	Business Analytics & Intelligence	Competitive advantage through adoption	(Brandy, 2023; Islam et al., 2023; Ulas, 2019)
	Digital Technologies & Industry 4.0	Opportunities and challenges	(Telukdarie et al., 2023),(Ghobakhloo & Iranmanesh, 2021),(Khin & Ho, 2019)
	Digital Platform & Capability	Role in innovation and performance	(Sohu et al., 2023),(H. Li et al., 2023),(Khin & Ho, 2019)
Organizational Impact	Performance & Competitiveness	SME performance enhancement	(Chen et al., 2016),(L. Li et al., 2018),(Khin & Ho, 2019)
	Resilience & Crisis Management	Antifragility and adaptability	(Corvello et al., 2023),(Trieu et al., 2024)
Strategic Enablers	Strategic Enablers Leadership & Flexibility	Agile leadership and strategic flexibility	(Fachrunnisa et al., 2020),(Trieu et al., 2024)
	Policy & IT Competencies	Policy & IT Competencies Digital transformation policies	(Trieu et al., 2024)
Sustainability & Innovation	Digital Innovation	Mediating role in performance	(Sohu et al., 2023),(Khin & Ho, 2019)
	Sustainability in Transformation	PLS approach and outcomes	(El Hilali et al., 2020)
Drivers & Guidelines	Drivers of Transformation	Key factors for adoption	(Omrani et al., 2022)
	Strategic Guidelines	Manufacturing SME success	(Ghobakhloo & Iranmanesh, 2021)

While (Corvello et al., 2023) focuses on the role of agile leadership in the context of digital shifts, the benefits of digital tools in promoting antifragility in times of crisis are explored. In fact, embedding sustainability in digital strategies, such as in (El Hilali et al., 2020) further reinforces the growing extent of transformation beyond improving efficiency. One of the key areas of interest that remained unexplored in the literature is the scalability of digital solutions for SMEs in emerging markets. Some research work, such as (L. Li et al., 2018) suggests industrial internet platforms as enablers, but not many consider the infrastructural or regulatory differences which might hinder the applicability of this approach. Further studies can be conducted to understand how digital transformation frameworks can be adapted to make them more relevant in different SME contexts.

Business Intelligence and Data Analytics in SMEs

The adoption of business intelligence (BI) and data analytics within small and medium enterprises (SMEs) has significantly enhanced the ability of these organizations to make data-driven decisions and achieve competitive differentiation. Studies such as (Islam et al., 2023) and (Ragazou et al., 2023) demonstrate that BI tools can transform raw data into actionable insights, thereby improving the strategic agility of SMEs. In rapidly evolving markets, real-time analytics enable organizations to respond swiftly to customer demands and supply chain disruptions. Nevertheless, the use of advanced analytics is not uniform in SMEs as resource constraints and skill gaps will affect the full scale adoption of the application, as mentioned in (Park & Kim, 2021). As can be seen from the literature, there are clear patterns of how SMEs use BI and analytics in functional areas. Table 2 classifies the studies included into three major focus areas to show the contributions of the studies to the understanding of BI/analytics adoption and impact in SMEs.

Table 2

Taxonomy of Business Intelligence and Data Analytics Studies in SMEs

Focus Area	Sub-Theme	Key Aspects	Sources
Adoption & Implementation	Drivers & Challenges	Factors influencing BI/analytics adoption in SMEs	(Islam et al., 2023), (Park & Kim, 2021)
	Success Factors & Models	Key success factors, implementation frameworks, and measurement models	(Aws et al., 2021), (Villamarín & Diaz Pinzon, 2017)
Capabilities & Impact	Competitive Advantage & Performance	BI/analytics enhancing competitiveness, profitability, and firm performance	(Islam et al., 2023), (Ragazou et al., 2023), (Yiu et al., 2021), (Dong & Yang, 2020)
	Knowledge Management & Innovation	Role of BI/analytics in knowledge management and process innovation	(Ferraris et al., 2019), (Abusweilem & Abualoush, 2019), (Shabbir & Gardezi, 2020), (Mikalef & Krogstie, 2020)
	Operational Agility & Productivity	BI/analytics improving supply chain agility, productivity, and	(Tutar et al., 2015), (Dubey et al.,

		project performance	2019),(Mangla et al., 2021)
Applications & Domains	Industry-Specific Use Cases	Industry-Specific Use Cases Retail, finance, and other sector-specific applications of BI/analytics	(Santoro, Fiano, et al., 2019),(Song et al., 2021)
	Functional Integration	BI/analytics in accounting, controllers' roles, and decision-making	(Oesterreich & Teuteberg, 2019)

The taxonomy highlights the "multi-dimensionality" of BI/analytics (its technology use and its strategic and operational outcomes). As an example, (Ragazou et al., 2023) and (Yiu et al., 2021) show that BI systems can contribute to profitability by optimizing pricing strategies and risk management, and (Dubey et al., 2019) offers insights into the contribution of BI systems to increasing supply chain agility, thanks to their big data analytics capabilities. Organizational learning mechanisms as discussed in (Shabbir & Gardezi, 2020) further emphasize the mediation role played by knowledge management in the organizational learning process in which analytics plays a role in the improvement of organizational performance. Applications are found to be more varied in different sectors. For retail SMEs (Santoro, Fiano, et al., 2019), identifies how BI tools fit into the context of a high-competition environment where analytics is used to help forecast demand and segment customers. As discussed in (Song et al., 2021) financial service providers use analytics to adjust supply chain finance arrangements to meet customer needs, demonstrating the versatility of these technologies. However, the literature omits the issues of scalability of micro-enterprises, most studies are related to the established SMEs. There may be interesting possibilities for further research in lightweight analytics solutions for smaller operational scales. The relationship of technology infrastructure and managerial skills becomes a pivotal theme. (Oesterreich & Teuteberg, 2019) points out the changing skills sets of controllers and accountants in BI environments and (Villamarín & Diaz Pinzon, 2017) notes that leadership commitment is essential to the successful implementation of BI. The congruence between tools and organizational readiness implies that SMEs need to build up technical and strategic skills to have the potential of analytics to the full.

Innovation Capability and SME Performance

The connection between innovation capability and the performance of SMEs has already been studied in detail and the literature is rich with a variety of technological, organizational and strategic factors that interact. Research has always proven that innovation is vital to competitiveness, allowing SMEs to grow and stand out from the crowd and to react to market shifts. Focusing on agri-food SMEs, for example, (O'Connor & Kelly, 2017) identifies how knowledge management based on filtered big data can improve competitiveness in these businesses, but only if they can develop their analytical skills. Likewise, (Saunila, 2016) identifies innovation capability as a dynamic capability that helps the SMEs reach high competitive levels, especially in terms of performance indicators developed on a size-specific basis. The intermediary effect of innovation between strategic orientations and performance indicators has been observed across the numerous studies (Ferreira & Coelho, 2020) examines how the dynamic capabilities of a firm (exploration and exploitation) help its

competitiveness, with innovation being the mechanism by which the firm turns its capabilities into market advantages. This is consistent with (Tutar et al., 2015) where the innovation capability is considered as pivotal factor in market performance in SME settings. An illustration of these is the moderation of financial performance by the combined effects of innovation capability and strategic goals in Ghanaian SMEs as shown in (Donkor et al., 2018).

Table 3

Innovation-Performance Linkages in SMEs

Innovation Type	Performance Outcome	Key Moderators/Mediators	Sources
Technological Innovation	Competitive advantage in manufacturing	Resource allocation, skill development	(Kiveu et al., 2019),(Indrawati et al., 2020)
Process Innovation	Operational efficiency & cost reduction	Lean practices, sustainability focus	(De et al., 2020),(Sahoo, 2019)
Business Model Innovation	Growth & market expansion	Dynamic capabilities, digital readiness	(Cosenz & Bivona, 2021),(Omar et al., 2020)
Open Innovation	Industry 4.0 readiness & collaboration	External partnerships, absorptive capacity	(Anshari & Almunawar, 2022),(Ju et al., 2020)
Green Innovation	Sustainable business performance	Regulatory pressure, eco-conscious culture	(Baeshen et al., 2021)

Table 3 presents the taxonomy and how various types of innovation result in various performance outcomes, contingent on organizational and environmental conditions. Technological innovation, as studied in (Kiveu et al., 2019) and (Indrawati et al., 2020) can help increase the competitiveness of manufacturing SMEs but needs to be accompanied by investments in skill development. Innovation in the process is a showcase of dual benefits (De et al., 2020) which illustrates the synergy between process lean and the enhancement of sustainability performance and (Sahoo, 2019) connects process innovation, driven by quality, with both cost reduction and market responsiveness. Business model innovation is found to be particularly transformative, for instance, as (Cosenz & Bivona, 2021) shows it can drive SME growth by using custom-made dynamic business model approaches. The study by (Omar et al., 2020) is also evidence of the dimensions of innovation that are faced by the customer through co-creation strategies in service delivery, providing evidence of the positive impact of co-creation on brand equity. As described in (Anshari & Almunawar, 2022) and (Ju et al., 2020), open innovation is another key factor in the knowledge flows and agile project management of high tech SMEs, a type of organization in which closed innovation systems may not be sufficient.

Significantly, there are persistent constraints that limit the innovation potential identified in the literature (Indrawati et al., 2020) which highlights the importance of balancing service improvements with skill upgrading for the SMEs. As with the other findings above, (Bodlaj & Čater, 2019) it was observed that environmental turbulence is associated with increased perceived importance of innovation, but SMEs often lack the resources to act upon these priorities. The above results indicate that the relationship between innovation and

performance is context dependent and that there is a gap between SME's capabilities and the market conditions.

In a few studies, the role of analytics in supporting innovation has not been explored. Although a number of papers focus on enablers of knowledge sharing and innovation culture, (Arsawan et al., 2022) few papers specifically consider how business analytics tools support ideation or prototyping within SMEs. Future research opportunities can be identified in this gap to explore data-driven innovation processes relevant to the constraints and opportunities of SMEs.

Sustainable Development in SMEs

The topic of sustainability and competitiveness for SMEs has become more and more relevant and research has emphasized the relevance of environmental and social projects for the long-term competitiveness of SMEs. Sustainability initiatives have been proven to not only solve ecological issues but also improve market positioning and streamline operations. In this case, (Lopez-Torres, 2023) presents a direct link between sustainability indicators and competitiveness, highlighting that there is a relationship between the use of sustainable processes in SMEs and the cost benefits they generate and the improvement of stakeholder relations. This is consistent with (Agyabeng-Mensah & Tang, 2021) who sees green human capital and green logistics practices as factors affecting both environmental and economic performance of manufacturing SMEs.

Empirical studies in the literature uncover two different ways in which sustainability can enhance the competitiveness of SMEs. The principles of circular economy, explored in (Chaudhuri et al., 2022) can help to add value to SMEs through digital tools and the optimization of resource use and waste reduction. In the same vein, (Khorram Niaki & Nonino, 2017) shows how the adoption of additive manufacturing technologies can increase competitiveness and decrease material waste, highlighting the double benefit of the technologies. The results indicated that sustainability and digital transformation are gaining momentum and that analytics is a key enabler in measuring and optimizing sustainable practices.

Table 4

Sustainability Dimensions and Competitive Outcomes in SMEs

Sustainability Focus	Key Mechanisms	Competitive Outcomes	Sources
Environmental Sustainability	Digital & technological adoption	Resource efficiency, cost reduction	(Chaudhuri et al., 2022), (Khorram Niaki & Nonino, 2017), (Al-Sharafi et al., 2023)
	Circular economy practices	Value creation, waste minimization	(Chaudhuri et al., 2022), (Bag, 2024)
Green Competitiveness	Green human capital & logistics	Regulatory compliance, brand equity	(Agyabeng-Mensah & Tang, 2021)
General Sustainability	Innovation & intellectual capital	Long-term market differentiation	(Todericiu & Stăniț, 2015)
	Net zero economy implementation	Economic resilience, carbon footprint reduction	(Bag, 2024)

Table 4 provides a taxonomy which classifies sustainability initiatives according to their focus areas and competitiveness. The dimension of environmental sustainability becomes the most widely studied, especially in the research that relates digital tools with resource optimization. (Al-Sharafi et al., 2023) focuses on the benefits of the integration of cloud computing to sustainable performance in terms of operational flexibility and energy efficiency. In the interim, it takes a practice approach to examining how the implementation of the net zero economy can be carried out, highlighting the need for big data analytics to connect sustainability with business rules and economic competitiveness. Another key enabler of sustainable competitiveness is Intellectual Capital, as discussed in (Todericiu & Stăniț, 2015). The study adds knowledge resources and innovation capacity as critical components for SMEs to remain competitive in dynamic market. The research also uncovers the obstacles, including the lack of financial resources for green technologies and managerial lack of awareness regarding the significance of sustainability in the strategic context. It is especially difficult for SMEs in developing economies to overcome these obstacles, as they tend to focus on survival priorities rather than long-term investments for sustainability.

The synthesis highlights the importance of applying integrated approaches combining sustainability with main business approaches. There are some studies that have tried to demonstrate the competitive advantages of sustainability from an empirical perspective, such as in the case of [(Lopez-Torres, 2023) and (Agyabeng-Mensah & Tang, 2021), but few have explored the question of how SMEs can systematically introduce sustainability into their day-to-day activities. Further studies might investigate the impact of sustainability analytics on decision-making processes, especially in resource-limited contexts with the highest levels of conflict between profitability and environmental concerns.

There is a significant lack of studies in the field of sustainability in sectors, especially in SMEs. The interpretation of the findings for service-based and creative industries is not clear which indicates that there is a potential need for further tests in those industries. Secondly, the role of policy incentives to boost SMEs' sustainability adoption needs to be investigated, as the literature on the subject has mainly focused on internal drivers.

Market Orientation and Internationalization of SMEs

The literature shows that there is a strong relationship between orientation towards markets, entrepreneurial ability and SME's performance in international markets. Research has shown that market-oriented SMEs have a better level of internationalization success when they adopt a customer-oriented approach and have dynamic capabilities. For example, (Miocevic & Morgan, 2018) argues that the export of SME growth is the result of the simultaneous consideration of operational capacity and entrepreneurial opportunities, thereby moving beyond a focus on either of these two groups independently. This dual view is consistent with [64] who argue that entrepreneurial and technological capacities are key to the international performance of Latin American SMEs from a resource-based perspective.

In this regard, the use of network capabilities is a recurring theme in the literature that supports the process of internationalization of SMEs, as highlighted by the study of Network capabilities and internationalization: how relational assets break foreign market entry barriers. In this sense, the study Network capabilities and internationalization: how relational assets break foreign market entry barriers by (Acosta et al., 2018) is presented as a recurring

theme in the literature that supports the process of internationalization of SMEs, since it highlights the relationship between international market orientation and network capabilities and how they are able to enhance export performance together. Likewise, (Kim & Hemmert, 2016) underscores customer networks and managerial skills as key for Korean subcontracting SMEs, for which the managerial proficiency of executives is directly related to export success. It seems that the focus towards the market is not just a matter of domestic customer orientation but also of building international relationships and adapting to the market.

Table 5

Capability Configurations for SME Internationalization

Capability Dimension	key Mechanisms	performance Outcomes	Sources
Entrepreneurial Orientation	Opportunity recognition & risk-taking	Market expansion, export intensity	(Miocevic & Morgan, 2018),(Bianchi et al., 2017)
Network Capability	Cross-border partnerships & alliances	Market entry facilitation, risk mitigation	(Acosta et al., 2018),(Kim & Hemmert, 2016)
Technological Readiness	Digital tools for market analysis	Competitive positioning, customization	(Bianchi et al., 2017),(Safari & Saleh, 2020)
Market Orientation	Customer-centric intelligence systems	Responsiveness to international demand	(Puspaningrum, 2020),(Acosta et al., 2018)
Managerial Competencies	International experience & strategic agility	Export growth, subsidiary performance	(Kim & Hemmert, 2016),(Safari & Saleh, 2020)

Table 5 categorizes the different capability sets into the areas that help in achieving internationalization success. Studies of entrepreneurial orientation, like (Miocevic & Morgan, 2018) focus on proactive opportunity seeking behaviours, and network capability research focuses on the structural benefits of embedded relationships. Technological readiness comes up as a distinguishing factor, especially in (Safari & Saleh, 2020) where the link between domestic competition pressures and capacitybuilding of emerging market SMEs is explored. In (Puspaningrum, 2020) the contingent nature of the relationships is apparent since the impact of market orientation on competitive advantage is dependent on the size of SMEs and the specific context of the industry.

It is also found in the literature that there are critical barriers to internationalization of SMEs (Ribau et al., 2018). However, market-seeking activities are often constrained by lack of resources, with smaller companies having trouble finding the budgets to carry out in-depth market research or to send representatives overseas. This paper presents a systematic mapping of these barriers, which is based on 1733 subcontracting SMEs and outlines the impact of size and sector characteristics of SMEs on internationalization paths. A gap in existing literature is a study of the use of Analytics for international market orientation. Although there are numerous research projects that talk about the concept of data driven decision making, very few research projects that explore ways in which SMEs identify and assess foreign market opportunities with the help of business intelligence tools. For further

studies, predictive analytics in internationalization, particularly for predicting market potential and the best time to enter the market, could be examined. A comparative study to understand the impact of the institutional environment on capability configurations can help explain the effectiveness gap between developed and developing countries. International success of SMEs appears to necessitate a balance of capability portfolios, and not just on strength alone. Strategic orientation is defined by market orientation, entrepreneurial orientation is by proactive market engagement, network capability is by market access and technological readiness is by operational execution. This all-encompassing approach brings in a new light on internationalisation for the SMEs beyond the stage theory.

Technological Adoption in SMEs

There are opportunities and obstacles for implementing advanced technologies in SMEs. Research shows that the path to technological adoption is highly variable across firms due to differing resource levels, firm size and industry sector, with some technological innovations standing out more than others, such as cloud computing and artificial intelligence. The study by (Maroufkhani et al., 2020) introduces an adoption model for big data analytics (BDA) in SMEs, which illustrates how the resource-based views and capability building frameworks can be used to explain the differential adoption rates. The findings in this study clearly indicated that the SME would gain most from BDA if they matched their technological investments with complementary organisational capabilities, but many SMEs faced difficulties with the technical complexity and skills needed to implement BDA.

AI adoption has come to the fore especially in the wake of pandemic disruptions. (Drydakis, 2022) explores how AI capabilities supported SMEs in response to the business risks of COVID-19, with a focus on the dynamic capabilities as a key determinant in successful technology assimilation. TOE (Technology-Organization-Environment) is a model that is often used in adoptability studies, such as in (Schwaeke et al., 2025) which examines the status of AI adoption in SMEs. Three important factors that impact successful implementation are identified in this research: technological readiness, organizational support and competitive pressure. New technologies, such as generative AI, offer opportunities, but also pose ethical and operational challenges, as outlined in (Rajaram & Tinguely, 2024) and as SMEs consider ways to capitalize on the innovation potential of such technologies.

Table 6

Taxonomy of Technological Adoption Studies in SMEs

Technology Focus	Adoption Factors	Business Impact	Sources
Big Data Analytics	Resource-based view, Capability building	Business value, Competitiveness	(Maroufkhani et al., 2020)
Artificial Intelligence	TOE model, Dynamic capabilities	Risk reduction, Marketing automation	(Drydakis, 2022),(Schwaeke et al., 2025),(Rajaram & Tinguely, 2024),(Kedi et al., 2024),(Basri, 2020)
Cloud Computing	Cost optimization, Government support	Business agility, Performance improvement	(Pasham, 2017),(Assante et al., 2016),(Dincă et al., 2019),(Attaran & Woods, 2019),(Vasiljeva et al., 2017),(Amini & Bakri, 2015),(Kumar et al., 2017)
E-commerce & ICT	Skills, Perceived benefits	Market competitiveness	(Awiagah et al., 2016),(Sunday & Vera, 2018),(Chatzoglou & Chatzoudes, 2016),(Nair et al., 2019)
Social Media & Digitalization	Organizational agility, Customer engagement	Performance benefits	(Odoom et al., 2017),(Rozak et al., 2021),(Eze et al., 2019)
Open Innovation	Knowledge sharing, Collaboration	Innovation capacity	(Santoro, Ferraris, et al., 2019)

Table 6 classifies adoption studies by their focus on technology, factors that affect their adoption, and the resulting impact to the business. Cloud computing is emerging as one of the most widely used technologies and research such as (Attaran & Woods, 2019) shows that cloud computing can assist a business to increase its performance with built-in DR features and integration with big data analytics. In (Dincă et al., 2019) and (Amini & Bakri, 2015) it was found that government support and competitive pressures have a significant effect on the cloud adoption patterns, especially in emerging markets where there are infrastructure limitations for SMEs. The adoption of e-commerce and ICT reveals specific challenges in terms of skills and perceived benefits. Analyzes the adoption of e-commerce in Ghanaian SMEs and concludes that technical skills and perception of competitive advantages of owner-managers are important predictors of e-commerce adoption success. Likewise, (Sunday & Vera, 2018) introduces an ICT adoption in UK SMEs based on a dynamic capabilities perspective that focuses on the capability of the technological assimilation and its contribution to the competitive resilience of SMEs. Adopting social media brings new challenges for customers' engagement and cost-effective market segmentation opportunities, as discussed in (Odoom et al., 2017) and (Rozak et al., 2021) but many SMEs do not have a strategy on how to leverage these opportunities.

The study by (Akpan et al., 2022) is worthy of special mention in this context as it focuses on SME awareness of cutting-edge technologies within emerging markets, highlighting significant differences between the availability of these technologies and the ability of the SMEs to put them into practice. The findings of this research underline the fact that many

SMEs are not aware of the latest solutions, or they do not have the technical capability to effectively implement them, especially for business intelligence and data mining applications. The adoption studies have many barriers to implementation in common. Frequently, lack of finances, skills and security concerns prevent technology assimilation, especially with smaller SMEs. The readiness model for Indian SMEs is developed by (Nair et al., 2019) which highlights the critical success factors as the attitude of the owner manager and the competencies of the employees. Likewise, (Eze et al., 2019) investigates the adoption of mobile marketing technology in service SMEs and concludes that customers' expectations and competitive pressures are likely to be the primary motivators for adopting the mobile marketing technology over strategic planning. The literature indicates that more than just implementing a tool is needed for successful technology adoption, but the need for organizational realignment. Examples of such studies include (Kedi et al., 2024) on AI-driven marketing automation and (Wong et al., 2024) on AI-enhancing supply chain risk management, which show that process change and employee reskilling are key to the effectiveness of AI technology. Future studies could further address the relationship between technological adoption and business model innovation, especially the potential of SMEs to take advantage of new technologies for developing new value propositions and to overcome resource limitations.

Management and Organizational Capabilities in SMEs

The systematic review shows that the ability of the management and organization, are one of the key enablers of SMEs to benefit from business analytics. They include leadership skills, knowledge management and the organizational structures that are capable of adapting to create competitive moves, and all three of these are vital to the SMEs' ability to turn analytical information into competitive action. Research like (Alkhatib & Valeri, 2024) illustrates that when intellectual capital elements (human capital, structural capital and relational capital) combine with service innovation and big data analytics capabilities, they create a competitive advantage. The findings of this research indicate that service innovation is a mediator between intellectual capital and performance as SMEs need to develop both analytical and creative capacities at the same time.

Agility comes up repeatedly in several studies including ones in dynamic markets. Analyzes (Arbussa et al., 2017) the way that SMEs change their business models by strategic agility and highlights three "meta-capabilities" (strategic sensitivity, leadership unity, resource fluidity) which allow for quick adaptation. The case study shows that smaller organizations tend to do better in agility-driven transformation, because of their flatter organizational structures and quicker decision making processes. Likewise, (Hernández-Linares et al., 2021) explores the moderating role of market orientation on the link between dynamic capabilities and SME performance and concludes that the adaptive capability of SMEs with a customer orientation is more beneficial for SMEs than that of SMEs with an internal orientation.

Table 7

Taxonomy of Management and Organizational Capability Studies in SMEs

Capability Dimension	Key Constructs	Performance Outcomes	Sources
Intellectual Capital	Human, structural, relational, capital	Competitive advantage through innovation	(Alkhatib & Valeri, 2024),(Dabić et al., 2019)
Strategic Agility	Business model renewal, meta-capabilities	Market responsiveness, transformation success	(Arbussa et al., 2017).(Wanasida et al., 2021)
Dynamic Capabilities	Sensing, seizing, transforming	Performance under market turbulence	(Hernández-Linares et al., 2021),(Rashidirad & Salimian, 2020)
Knowledge Management	Absorptive capacity, learning systems	Innovation flexibility, product development	(Soto-Acosta et al., 2018),(Liao & Barnes, 2015)
Managerial Competencies	Entrepreneurial skills, decision-making	Business success, export performance	(Tehseen & Ramayah, 2015),(Ng & Kee, 2018)
Network Capabilities	Alliance formation, value co-creation	Resource optimization, market expansion	(Zacca et al., 2015),(O'Dwyer & Gilmore, 2018)
Technological Capacity	IT governance, digital infrastructure	Organizational ambidexterity	(Andrade et al., 2021),(Khalil & Belitski, 2020)

Table 7 shows the taxonomy of key findings, which classifies them into seven interrelated capability dimensions that affect the competitiveness of SMEs. Dynamic capabilities are also very much highlighted with the example of how they are used to mediate competitive strategies and reconfigure resources in the case of SMEs (Rashidirad & Salimian, 2020). In a particular study on business analytics capabilities in the context of COVID-19 by (Wanasida et al., 2021) highlights the use of business analytics for improving organizational agility and performance in times of crisis. Overall, these results imply that analytical skills can be most effective when integrated in the overall scope of organization learning systems. Another key enabler is KM systems, especially for innovation-driven SMEs. Studies by (Soto-Acosta et al., 2018) show that knowledge management capability enhances innovation ambidexterity, a combination of exploratory and exploitative innovation, particularly when dealing with dynamic environments. This is consistent with the results of (Liao & Barnes, 2015) on knowledge acquisition flexibility, whereby SMEs with well-developed learning systems that are able to acquire knowledge flexibly have higher levels of capacity to innovate their products, even when facing resource limitations. The learning capability along with technological and relational capability is a contingent value and is illustrated in (Salisu & Abu Bakar, 2020) where the firms' performance depends on the technological and relational capability in addition to the learning capability.

A persistent set of competency deficiencies that affect the competitiveness of manufacturing SMEs are identified in the literature examined in this work (Tehseen & Ramayah, 2015) which

are lack of global market awareness and lack of technology adoption skills that affect international competitiveness. In a similar vein, (Street et al., 2017) investigates strategic alignment issues and discovered that many SMEs face difficulties in aligning their IT strategy with their overall business strategy because of limited business manager time and business technical skills. Particularly in developing economies, as discussed in (Asamoah et al., 2020), social network relationships will be crucial to supply chain resilience, where the formal capability might be lacking. This research is now underway to investigate how structured approaches can enable SMEs to build these capabilities. The authors of (Mittal et al., 2020) present a 4-phase framework for the smart manufacturing adoption, moving from the basic data analytics skills to the more advanced levels of predictive analytics, and the authors of (Ganzarain & Errasti, 2016) propose a three-stage maturity model for Industry 4.0 transformation. Such studies highlight incremental capabilities development, given that SMEs may not have the capacity to make wholesale adjustments to the organization. The research conducted by (Jatmiko et al., 2021) also supports the use of SWOT analysis as a tool for SMEs in determining areas of capability development that are important to obtain their sustainable competitive advantage.

The measurement and benchmarking of organizational capabilities across contexts of SMEs is a significant area of research missing. There are a few studies that focus on capability dimensions of individual units, and even fewer that offer a comprehensive way to measure readiness across all capabilities within an organization as a whole. A next step would be to analyze how the capability to analyze could be linked to other organisational functions, e.g. performance management and/or corporate governance, to create synergies. Comparative studies by industry and region can be of value in determining contextual factors that affect the effectiveness of capabilities. The synthesis shows that the competitiveness of small and medium-sized enterprises (SMEs) has become more and more dependent on the combinative capabilities, which combine analytical, strategic and operational abilities in unified action systems. This integrative view is reinforced by the studies of knowledge management process capability (Bamel & Bamel, 2018) and business model design (Pucci et al., 2017), which reveal that as a result of combinations of diverse capabilities, there are different competitive positions. This changing perspective goes a step further than the traditional resource based approach and acknowledges that organizational capabilities are dynamic and system-based in SME environments.

Discussion

The analysis of each study revealed several themes that provide important insights into the influence of business analytics capabilities on SME competitiveness. The benefits derived from analytics are diverse and may include operational efficiency, support for innovation, and enhanced responsiveness to market changes. However, these advances generally depend on organizational readiness and strategic alignment. Few SMEs have successfully translated technology investments into measurable performance improvements without also addressing managerial factors. The literature consistently finds that dynamic capabilities are essential for linking analytics capabilities to organizational competitiveness. Studies such as (Rashidirad & Salimian, 2020) and (Arbussa et al., 2017) show that small and medium-sized enterprises (SMEs) perform better when analytics are integrated into organizational learning systems that help firms sense, seize, and transform market opportunities. This view aligns with the intellectual capital framework in (Alkhatib & Valeri, 2024), which emphasizes the

role of human, structural, and relational capital in enabling SMEs to extract value from data. Analytics tools alone are insufficient; SMEs also require skilled employees, effective knowledge management, and strong networks to translate insights into action. Research indicates that analytics solutions do not scale uniformly across all SMEs. While some studies, such as (Hernández-Linares et al., 2021)(Maroufkhani et al., 2020) and , highlight the benefits of cloud-based analytics platforms, others, including (Akpan et al., 2022), note that SMEs in different economies vary in technology awareness, infrastructure, and readiness to adopt new tools. Therefore, a single analytics approach is not universally effective, particularly in resource-constrained environments. The literature highlights the need for modular, scalable analytics solutions that allow SMEs to incrementally build analytics maturity while addressing specific operational challenges. Theoretically, this review refines the resource-based view (RBV) by showing how analytics capabilities can become valuable, rare, inimitable, and non-substitutable (VRIN) resources within SMEs. Analytics tools gain these VRIN attributes not simply through ownership, but through integration into organizational routines and strategic processes. This perspective advances traditional RBV thinking and aligns with the dynamic capabilities framework. Studies such as (Hernández-Linares et al., 2021) and (Wanasida et al., 2021) demonstrate that market-oriented SMEs use analytics to continuously reconfigure resources in response to changing environments. Future research should consider integrating RBV and dynamic capabilities perspectives to better explain how analytics-driven competitiveness develops within SME ecosystems. The findings provide practical guidance for SME managers considering the adoption of analytics. The review recommends a phased development of skills, beginning with foundational data literacy and progressing to advanced predictive analytics. Studies such as (Mittal et al., 2020) and (Ganzarain & Errasti, 2016) demonstrate that this incremental approach is effective, particularly when initial efforts focus on operational analytics to secure early outcomes before addressing more complex strategic applications. The results further emphasize the significant role of middle managers in integrating analytics into routine decision-making. This is especially relevant in SMEs, where ownership, management, and daily operations are often closely linked. Additionally, the review identifies partnerships, including analytics-as-a-service and collaborations with universities, as valuable strategies for SMEs to address resource constraints, as evidenced in (Zacca et al., 2015) and (O'Dwyer & Gilmore, 2018).

The reviewed studies have several methodological limitations. Most use the cross-sectional design, which restricts conclusions on the long-term effects of analytics on the competitiveness of SMEs. While numerous studies have noted correlations between use of analytics and performance, few have looked at these over time and few have considered the time lag associated with implementation and learning. There is also a geographic bias in that most research has been conducted in North America and Europe, and studies from Africa and South Asia are small. This imbalance could limit the generalizability of the results. Self-reported data is used in many studies and may lead to common method bias, particularly when assessing subjective constructs lacking objective standards. The limitations of the review also are worth noting. This does not include non-English publications and grey literature and may have missed useful practical information. Peer-reviewed journal articles may focus on academic rigor and not necessarily be relevant to practice. Also, the technologies used for analysis undergo rapid changes and some publications might be obsolete due to delays. Hence, this review does not necessarily reflect the latest industry practices, technological developments or innovations in the neighborhood.

The gaps found in the literature suggest several future studies. More longitudinal research is needed to further understand the evolution of analytics capabilities within small and medium-sized enterprises (SMEs) over time and the differing impacts the capabilities have at varying stages of business development. A second area of research that shows potential is the use of analytics to improve SME resilience during major external shocks like a pandemic, economic turbulence, and/or supply chain disruptions. From a methodological perspective, future research could be improved through a combination of quantitative performance measures and qualitative process-based measure, using a mixed methods approach. These designs would not only provide evidence of the impact of analytics on SME outcomes, but also informational understanding about how it impacts SME outcomes. In addition, future research should focus on building and testing analytics maturity models specifically for SMEs with consideration to sectorial, firm size, regional and adoption pathway differences.

An important direction for future research concerns how small and medium-sized enterprises (SMEs) can effectively leverage emerging technologies, such as generative artificial intelligence, while managing associated risks. Although studies such as (Rajaram & Tinguely, 2024) and (Basri, 2020) offer preliminary insights into AI adoption, there remains limited understanding of the ethical, governance, and workforce implications of these technologies for SMEs. Comparative analyses across industries may further elucidate how the value of analytics varies among manufacturing, service, and creative sectors, given the substantial differences in SME structures, resources, and objectives. Additionally, the escalating challenge of climate change underscores the need for research on how analytics can enhance SME competitiveness and promote sustainability. Building on studies such as (Chaudhuri et al., 2022) and (Bag, 2024), future research could develop frameworks to assist SMEs in advancing the net-zero transition and reinforcing their market positions.

It's at a pivotal moment, with evidence showing that SMEs are under a spotlight. Analytics used to be a competitive advantage and now it's a requirement to survive and grow. The more businesses go ahead and adopt analytics, the more they fall behind other businesses that do not, highlighting the need for focused support for SMEs to enable data-driven decision making. That should also maintain their flexibility, creativity and innovation which leads to their success. Researchers, policy makers and industry leaders should work together to create context-specific solutions that can help SMEs become more competitive.

Conclusion

This literature review brings together recent studies on the effects of business analytics capabilities on the competitiveness of SMEs to tackle a gap in the research literature on data-driven decision making and small business performance. The results have shown that the use of analytics can positively impact the competitiveness of SMEs through better operation efficiency, innovation, and better market change adaptation. But getting these benefits involves more than technology investment. Additionally, SMEs need to be organizationally ready, strategically aligned, have robust management systems, effective knowledge management, and flexible structure for leveraging analytics. The review provides theoretical and practical insights. Theoretically, it adds value to the resource-based view by showing that analytics add value when used in combination with dynamic capabilities and intellectual capital. SME managers can practically use it to build up their skills in a gradual manner and to make use of strategic alliances to overcome challenges due to resource limitations.

Longitudinal studies on analytics adoption, comparisons across economic and regional settings and a closer examination of new technologies like generative AI should be undertaken in future research. This synthesis serves as a basis for academic discussion as well as for action to promote data-driven competitiveness for SMEs.

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