A COMPREHENSIVE EVALUATION OF DIGITAL TRANSFORMATION ACROSS MULTIPLE BUSINESS FUNCTIONS IN SOUTH AFRICAN SMMES: INSIGHTS POST-COVID-19

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ABSTRACT

The digital transformation of Small, Medium, and Micro Enterprises (SMMEs) is crucial for maintaining competitiveness and ensuring long-term growth in today's business environment. This systematic literature review evaluates how digital technologies have reshaped business functions within South African SMMEs, particularly following the COVID-19 pandemic. Articles published between 2019 and 2024 were sourced from Scopus and Web of Science, and the PRISMA framework was used for selecting and analysing relevant studies. The review assesses the current state of digital transformation, exploring its impact on marketing, operations, customer engagement, and decision-making processes. It identifies key challenges, such as resource limitations, digital skills gaps, and infrastructure constraints, which impede widespread digital adoption. Sector-specific insights are also provided, recognizing varying levels of digital maturity across industries. The findings offer actionable recommendations for SMME owners, policymakers, and educators, suggesting strategies to accelerate digital adoption. By providing valuable local data, this study adds to the growing body of research on entrepreneurship and digitalization in South Africa's post-pandemic landscape. The study underscores the need for targeted interventions to help SMMEs overcome barriers and fully leverage technology to drive growth and innovation.

Keywords*: Digital Transformation; SMMEs; South Africa; Post-COVID-19; Sectoral Analysis*

Received : 04-03-2025
Revised : 04-06-2025
Approved : 26-06-2025
Published : 02-07-2025

INTRODUCTION

Digital transformation refers to the integration of digital technologies into all business areas, fundamentally changing how organizations operate and deliver value to customers (Bharadwaj et al., 2013). For Small, Medium, and Micro Enterprises (SMMEs), digital transformation is essential not only for enhancing operational efficiency but also for fostering innovation and competitiveness in an increasingly digital marketplace (Ghobakhloo, 2018). As SMMEs represent a significant portion of economic activity and employment in South Africa, their ability to adapt to digital trends is crucial for the nation's overall economic resilience (Kumar & Hsiao, 2020).

The COVID-19 pandemic has dramatically altered the business landscape in South Africa, spurring accelerated adoption of digital technologies among SMMEs (Chirra et al., 2020). Faced with unprecedented challenges including disruptions to supply chains, shifts in consumer behaviour, and heightened competition, many SMMEs pivoted towards digital solutions as a means of survival and growth (Bartik et al., 2020). However, the post-pandemic environment reveals a complex tapestry of digital maturity levels across these enterprises, with significant disparities influenced by sector, size, and resource availability (Meyer & Hsiao, 2020). Despite the pressing need for SMMEs to embrace digital transformation, research specifically addressing the nuanced challenges and opportunities within the South African context is limited (Van der Merwe & Geyer, 2021). This study seeks to fill this research gap by systematically reviewing the existing literature on digital transformation in South African SMMEs, particularly focusing on the impact of the COVID-19 pandemic on various business functions such as marketing, operations, customer engagement, and decision-making processes (Engström et al., 2020).

The primary objectives of this study are to evaluate the current state of digital transformation across multiple business functions in South African SMMEs, identify key barriers to digital adoption, and provide actionable recommendations for stakeholders including SMME owners, policymakers, and educators. By illuminating the challenges and sector-specific insights related to digital transformation in the post-COVID-19 landscape, this study aims to contribute to the ongoing discourse on entrepreneurship and innovation in South Africa (Kraus & Hsiao, 2021). Ultimately, the significance of this research lies in its potential to facilitate targeted interventions, enabling SMMEs to overcome obstacles and effectively leverage technology as a driver of sustainable growth and innovation (Winkler & Jablonski, 2021). This article follows this research question: How has the COVID-19 pandemic influenced digital transformation in South African SMMEs, and what are the main barriers and opportunities for digital adoption?

LITERATURE REVIEW

The literature review examines the landscape of digital transformation among Small, Medium, and Micro Enterprises (SMMEs), with a focus on global perspectives and the specific context of South Africa, particularly in the dynamic post-COVID-19 business environment. It explores how digital technologies reshape organizational processes and enhance competitiveness, investigates various digital tools and their impact on key business functions, and addresses the challenges SMMEs encounter during this transition. Additionally, the review includes sector-specific studies demonstrating varying levels of digital maturity across different industries in South Africa. By evaluating existing literature, it aims to identify gaps in the understanding of digital transformation within the South African context and provide unique insights and perspectives.

Overview of Digital Transformation in Global and South African SMMEs

Digital transformation represents a fundamental shift in how businesses operate and deliver value to customers by leveraging digital technologies (Murakami et al., 2025). Globally, small, medium, and micro enterprises (SMMEs) have increasingly recognised the importance of digital transformation for maintaining competitive advantage and fostering innovation (Murakami et al., 2025). For instance, Bharadwaj et al (2013) posits that organisations can enhance their operational efficiencies and respond more dynamically to market changes through digital initiatives. Similarly, Kane (2019) emphasises that successful digital adoption enables businesses to streamline processes and enhance customer engagement, driving increased profitability and growth.

In the South African context, however, the journey toward digital transformation among SMMEs has been inconsistent. According to a study by Mabulele (2020), while certain sectors have embraced digital technologies, many SMMEs continue to grapple with barriers such as inadequate access to technology, lack of digital skills, and insufficient financial resources. Although global frameworks for digital transformation provide valuable insights, South African SMMEs must adopt a contextually relevant approach that addresses local challenges, including socio-economic disparities, infrastructure issues, and educational inequalities.

Digital Tools and Technologies: CRM, Automation, Data Analytics.

A variety of digital tools and technologies are pivotal in facilitating effective digital transformation. Customer Relationship Management (CRM) systems, such as Salesforce, enhance customer interactions and enable personalized marketing initiatives (Buttle, & Maklan, 2009). Automation technologies help SMMEs automate mundane tasks, leaving employees to focus on value-added activities. Boustan et al (2019) notes that automation can lead to significant cost savings and improved productivity. Furthermore, data analytics enables SMMEs to make informed decisions by analysing market trends and customer behaviours (Wamba et al., 2017). While these technologies offer substantial benefits, we contend that successful implementation hinges on a strong foundation in digital literacy and training. Without proper training, employees may struggle to leverage these digital tools effectively, resulting in underutilization and wasted resources.

Impact of Digitalisation on Key Business Functions: Marketing, Operations, Customer Engagement

Digitalisation fundamentally transforms key business functions such as marketing, operations, and customer engagement. Digital marketing strategies allow SMMEs to enhance visibility from a wider audience through social media and online platforms (Chaffey & Ellis-Chadwick, 2019). McKinsey and Company (2021) further indicates that digitalisation enhances operational efficiency, enabling real-time decision-making and resource allocation, which are vital for adapting to market demands. Enhancements in customer engagement led to more personalized interactions. Lemon and Verhoef (2016) underlines that utilizing digital channels can help SMMEs tailor their offerings according to customer preferences, thereby increasing satisfaction and loyalty. While capitalizing on these digital advantages, SMMEs must not overlook the significance of interpersonal communication. Over-reliance on automated systems may risk depersonalizing customer experiences, ultimately affecting brand loyalty if not managed judiciously.

Challenges and Barriers to Digital Adoption in SMMEs

Despite the apparent benefits of digital transformation, SMMEs frequently face significant barriers to its adoption. Pedron (2022) reveals that common obstacles include resource limitations, such as insufficient financial means for investment in technology, and a talent pool lacking the necessary digital skills. Cetindamar at al (2021) notes that skill gaps often hinder employees from maximizing digital tools' potential. Additionally, research from Jedynak et al (2021) illustrates that infrastructure deficiencies, particularly in rural areas, further complicate the digital adoption landscape. Addressing these challenges requires coordinated action from multiple stakeholders, including government bodies, educational institutions, and the private sector. Initiatives aimed at improving digital literacy and ensuring infrastructure development can promote an environment conducive to digital transformation for SMMEs.

Sector-Specific Studies on Digital Maturity in Different Industries

Digital maturity levels tend to differ significantly across various sectors in South Africa. Kend and Nguyen (2022) identify finance and retail as sectors exhibiting relatively high digital maturity, largely due to their substantial investments in technology and robust support systems. In contrast, sectors such as agriculture and manufacturing are observed to lag in digital adoption due to traditional operational practices and limited access to technology resources (Nicolas, 2021). This disparity highlights the necessity for sector-specific strategies that cater to the unique challenges faced by different industries. Sector-specific strategies can facilitate more effective digital transformation efforts by recognizing the distinct environments and requirements that individual industries present.

By custom-tailoring initiatives to suit the unique circumstances of various sectors, stakeholders can drive improvements where they are most needed. In conclusion, the literature indicates that digital transformation is vital for the growth and competitiveness of South African SMMEs, yet numerous challenges such as resource limitations, digital skills gaps, and inadequate infrastructure, impede progress. Strategic collaboration among government, educational institutions, and the private sector is essential to create a supportive ecosystem that facilitates digital adoption, including initiatives to enhance internet access and provide training programs. By addressing these challenges collectively, South African SMMEs can effectively navigate the complexities of digital transformation and leverage technology for sustainable growth and innovation, positioning them to thrive in the competitive global economy.

METHOD

For this systematic literature review, Scopus and Web of Science were selected as the primary databases due to their comprehensive indexing of high-quality academic journals and their relevance to the research topic. The review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework developed by Page et al., (2021), ensuring a structured and transparent process for identifying, selecting, and evaluating literature. This approach enhances transparency, reproducibility, and academic rigor.

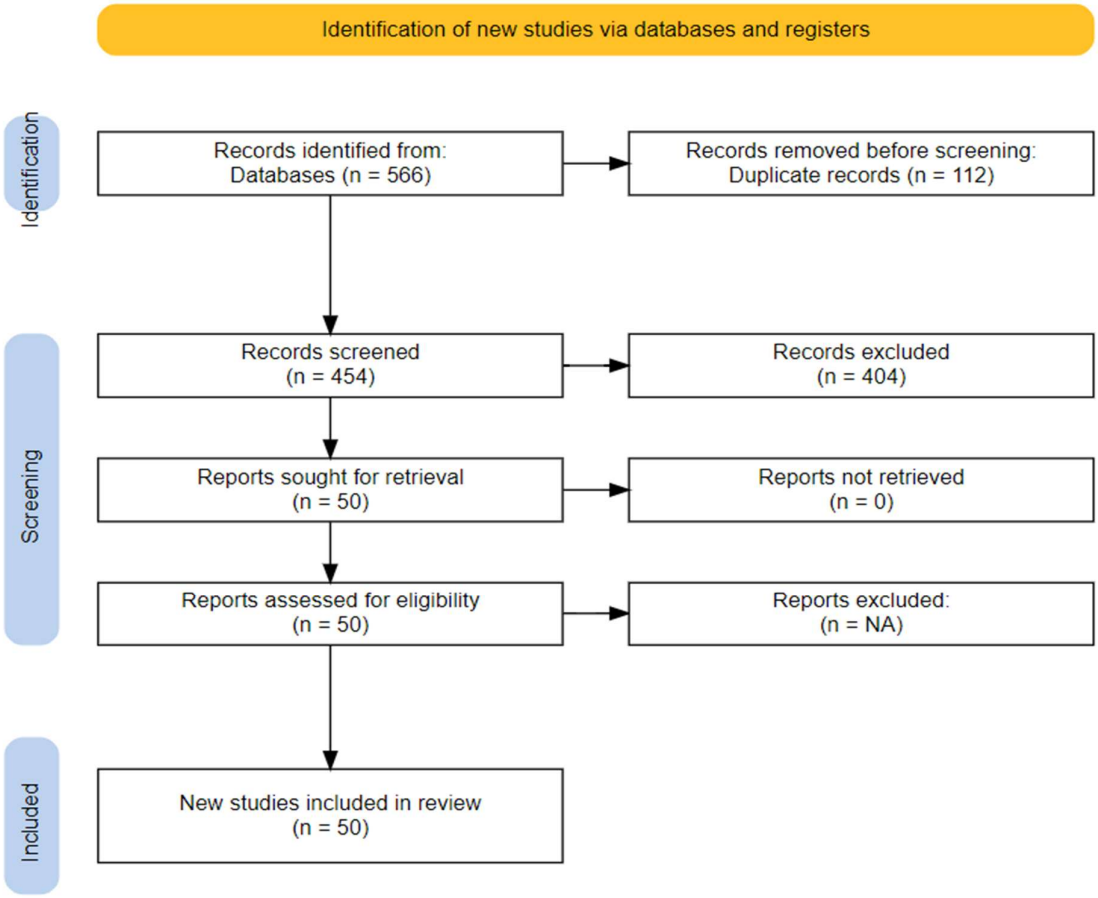
The inclusion criteria focused on articles published between 2019 and 2024, written in English, peer-reviewed, and offering empirical insights or theoretical advancements relevant to the research topic, with particular emphasis on the South African context. Studies with a direct connection to South Africa's unique socio-economic, cultural, or business environment were prioritised to ensure the findings were locally

relevant. Exclusion criteria were applied to filter out grey literature, conference proceedings, and studies that lacked relevance to South Africa or the research objectives. Duplicate records and articles outside the defined scope were also excluded.

The initial search yielded 566 documents from Scopus and Web of Science, retrieved using a predefined search strategy. During the screening process, 112 duplicate records were removed, leaving 454 unique documents. These were assessed for relevance to South Africa and adherence to the inclusion criteria. Following this detailed evaluation, 404 articles were excluded, primarily due to a lack of alignment with the South African context, absence of peer review, or falling outside the specified publication time frame. This rigorous process resulted in a final sample of 50 articles.

The 57 selected articles, published between 2019 and 2024, reflect the latest advancements and trends within the field, specifically contextualised to South Africa. These articles were subjected to qualitative content analysis to identify key themes, patterns, and theoretical contributions relevant to the local context. Quantitative analysis was also conducted where applicable, revealing trends and concept frequency.

By adhering to the PRISMA framework and applying stringent inclusion and exclusion criteria, this review offers a comprehensive and contextually relevant assessment of the topic, contributing valuable insights to South African academic discourse and practice.



Source: Adopted from Page et al., (2021)

Figure 1
PRISMA analysis

RESULTS AND DISCUSSION

Bibliometric Analyses

Initial data statistics

The data analysis spans the period from 2019 to 2024, encompassing 38 sources, including journals and books, and yielding insights from 50 documents. The annual growth rate of publications during this period is 6.58%, reflecting steady scholarly engagement. The documents have an average age of 2.08 years, demonstrating the timeliness of the research. Each document receives an average of 6.36 citations, indicating a significant level of academic impact. The dataset includes 196 unique Keywords Plus and 221 author-specific keywords, highlighting a broad range of research themes and focus areas. A total of 151 authors contributed to this body of work, with only six documents being single-authored, suggesting a high degree of collaboration. On average, each document has 3.18 co-authors, and 46% of the co-authorships involve international collaboration, underlining the global nature of the research efforts.

Regarding document types, articles dominate the dataset (36), with additional contributions including early access articles (3), book chapters (1), proceedings papers (1), and reviews (5). Other types such as editorial material (2) and corrections (1) are also present, contributing to the diversity of scholarly outputs. Overall, these findings illustrate a dynamic research landscape characterised by international collaboration, robust academic impact, and a wide array of research topics see Table 1.

Table 1
Descriptive statistics of the papers

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2019:2024
Documents	38
Sources (journals, Books, etc)	50
Annual Growth Rate %	6.58
Document Average Age	2.08
Average citations per doc	6.36
References	3156
DOCUMENT CONTENTS	
Keywords Plus (ID)	196
Author's Keywords (DE)	221
AUTHORS	
Authors	151
Authors of single-authored docs	6
AUTHORS COLLABORATION	
Single-authored Docs	6
Co-Authors per Doc	3.18
International co-authorships %	46
DOCUMENT TYPES	
article	36
article; book chapter	1
article; early access	3
article; proceedings paper	1
correction; early access	1
editorial material	2

Source: Author's own analysis using Biblioshiny (2025), developed by Aria and Cuccurullo (2017)

Most cited affiliation

The analysis of affiliations, as detailed in Table 2, highlights the significant contributions of North-West University (NWU) and Stellenbosch University (SU) to the study of digital transformation in South African Small, Medium, and Micro Enterprises (SMMEs), particularly in a post-COVID-19 context. North-West University leads in the number of publications, with a steady increase over the years, starting with four articles in 2019, consistently publishing six articles annually from 2020 to 2023, and reaching seven articles in 2024. Most of NWU's contributions originate from departments specialising in *Business Management* and *Information Systems*, with research themes focused on *digital adoption strategies*, *integration of technology into business functions*, and *collaborative ecosystems for innovation* within SMMEs.

Stellenbosch University, while producing fewer articles overall, has shown an increase in output, contributing one article annually from 2019 to 2021 and four articles in 2022. SU's research is primarily driven by the *Department of Industrial Engineering* and the *Centre for Innovation and Entrepreneurship*, with a focus on *operational efficiency of SMMEs*, *the impact of digital tools on supply chain management*, and *scalability of digital transformation initiatives*. Together, these institutions, as reflected in Table 2, provide critical insights into the digital transformation landscape of South African SMMEs, addressing key dimensions such as *strategic management*, *operational efficiency*, and *post-pandemic recovery*.

Table 2
Most cited affiliation

Affiliation	Year	Articles
NORTH WEST UNIV	2019	4
NORTH WEST UNIV	2020	6
NORTH WEST UNIV	2021	6
NORTH WEST UNIV	2022	6
NORTH WEST UNIV	2023	6
NORTH WEST UNIV	2024	7
STELLENBOSCH UNIV	2019	1
STELLENBOSCH UNIV	2020	1
STELLENBOSCH UNIV	2021	1
STELLENBOSCH UNIV	2022	4

Source: Author's own analysis using Biblioshiny (2025), developed by Aria and Cuccurullo (2017)

Co-word occurrence

Co-word occurrence analysis involves identifying and examining the relationships between frequently used terms within a collection of documents to map the intellectual structure of a research field. The articles were imported into VOS viewer by (Kirby, 2023) for an in-depth bibliometric analysis. Using the co-occurrence functionality, the analysis yielded *11 terms, 3 clusters, 33 links*, and a total link strength of *45***,** providing a clear research outlook on entrepreneurship within the context of Africa's informal economy (see Fig. 2). The largest cluster *(5 terms*) focuses on *entrepreneurship* and its interplay with broader concepts such as *Africa* and the *informal economy*, reflecting the significance of informal entrepreneurial activities in developing regions. This cluster highlights discussions on *employment generation*, the dynamics of the *South African economy*, and the role of *entrepreneurial adoption* in addressing socio-economic challenges. The second cluster (*4 terms*) explores themes related to *business performance*, including the *impact* of informal entrepreneurship on economic growth and the challenges faced by entrepreneurs in transitioning towards formalisation. Key terms such as *challenges,*

adoption, and *performance* illustrate the focus on operational and strategic issues within informal businesses.

The third cluster (*2 terms*) examines the broader implications of *employment* and *impact* within the informal economy, focusing on their interconnectedness and the opportunities they present for socio-economic development. From Fig. 2, the most frequently occurring terms include *entrepreneurship (10 occurrences), Africa (7), impact (7), business (6), and informal economy (5)*. These terms form the intellectual backbone of the analysed research, shedding light on the central themes and their interrelations. The clustering mechanism effectively organises terms with similar characteristics, enabling a structured analysis of thematic trends and patterns. Each cluster, marked by distinct colours, represents a group of closely related concepts and thematic arguments. This diverse clustering reflects the multifaceted nature of entrepreneurship research in Africa, spanning topics such as *economic performance, informal sector dynamics, and adoption of business strategies.* These themes are further explored in subsequent sections to expand the discourse on entrepreneurship and its role in addressing socio-economic challenges within informal economies.

Table 2
Word cloud

Terms	Frequency
entrepreneurship	10
africa	7
impact	7
business	6
informal economy	5
performance	5
employment	4
south-africa	4
adoption	3
challenges	3

Source: Author's own analysis using Biblioshiny (2025), developed by Aria and Cuccurullo (2017)

Source: Author's own analysis using Biblioshiny (2025), developed by Aria and Cuccurullo (2017)

Figure 2
Word cloud

Key Findings

The literature on digital transformation among South African SMMEs reveals varying degrees of adoption, with some sectors advancing rapidly while others face persistent barriers. Studies indicate that digital transformation is essential for operational efficiency, competitive advantage, and customer engagement. However, the impact of digitalisation remains uneven, reflecting sector-specific challenges and diverse levels of digital maturity.

The Current State of Digital Transformation in South African SMMEs

Digital transformation within South African SMMEs exhibits a spectrum of advancement, influenced by factors such as organisational size, resource availability, and sectoral focus. A significant portion of SMMEs, particularly those in technology-intensive sectors, has embraced digital tools, integrating them across business functions (Meyer & Hsiao, 2020). Nonetheless, many SMMEs continue to encounter constraints, including limited access to resources and technology, which hinders comprehensive digital adoption (Mabulele, 2020).

Sectoral Analysis: Industries with Varying Degrees of Digital Maturity

The review highlights a clear divide in digital maturity across different industries. The finance and retail sectors stand out for their relatively high levels of digital adoption, driven by the need for customer engagement and data analytics capabilities (Kend & Nguyen, 2022). In contrast, sectors such as agriculture and manufacturing remain less digitised, often due to traditional practices and limited technology investments (Nicolas, 2021). These findings underscore the need for tailored strategies that address specific challenges within each sector.

Impact on Marketing, Operations, and Customer Engagement

Digital transformation has enabled SMMEs to leverage digital marketing tools, enhance operational efficiency, and improve customer engagement. Digital marketing platforms have expanded the reach of many SMMEs, facilitating access to new markets through targeted online campaigns (Chaffey & Ellis-Chadwick, 2019). Operational improvements, particularly in inventory and resource management, have enhanced responsiveness to market demands. Customer engagement has also benefited, with digital tools allowing more personalised interactions, fostering loyalty, and improving customer satisfaction (Lemon & Verhoef, 2016). However, these gains are tempered by skill limitations and infrastructure inadequacies that limit broader application.

Common Barriers: Resource Limitations, Skills Gaps, and Infrastructure Issues

SMMEs encounter significant barriers that impede digital transformation. Resource constraints are prevalent, as limited financial means restrict access to essential digital tools (Pedron, 2022). Additionally, a widespread digital skills gap hinders the effective use of available technologies, often resulting in underutilisation of investments (Cetindamar et al., 2021). Infrastructure challenges, especially in rural areas, exacerbate these issues, impeding internet access and digital connectivity, which are critical for effective digital transformation (Jedynak et al., 2021).

Discussion

Academic Context and Contributions

This study contributes to the academic discourse on digital transformation by providing a nuanced understanding of the varied levels of digital adoption among South African SMMEs. While extensive research has been conducted on the transformative potential of digital tools in fostering business growth and innovation globally (Bharadwaj et al., 2013; Vial, 2019), there is limited focus on how these concepts apply within the unique constraints and opportunities of South Africa's SMME landscape. By focusing on this context, the study builds on foundational research by exploring how sectoral characteristics, resource limitations, and socio-economic factors interplay to shape digitalisation pathways in an emerging economy setting. This research enriches the academic dialogue by situating South Africa's digital transformation challenges within global conversations, offering region-specific insights that broaden the understanding of digitalisation in diverse economic landscapes.

Alignment with Sustainable Development Goals (SDGs)

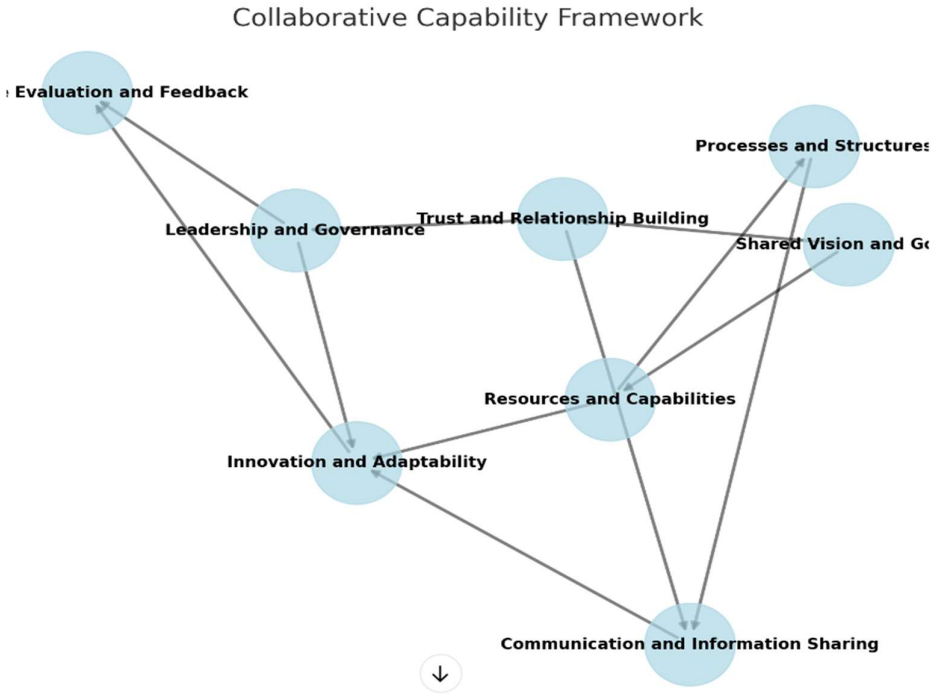
This study's findings have significant implications for advancing the United Nations Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure). Digital transformation within SMMEs is not only a route to economic growth but also a means to create sustainable business practices that can support inclusive employment. Addressing digital skill gaps aligns with SDG 4 (Quality Education), as enhancing digital literacy within SMMEs can build a more resilient and capable workforce. Furthermore, the push for digital inclusion through infrastructure development supports SDG 9 by enhancing connectivity, which is particularly vital in rural and underserved areas. These SDG alignments underscore the potential of digitalisation to foster sustainable, inclusive economic development within South Africa's SMME sector, provided that targeted support and policies are in place.

Theoretical Contributions and Advancement of the Debate

The findings of this study extend existing theories on digital transformation, particularly the Resource-Based View (RBV) and Dynamic Capabilities Theory, by demonstrating how these theories manifest in the unique conditions of South African SMMEs. While RBV posits that a firm's resources (such as digital tools and skills) create competitive advantage (Barney, 1991), this study reveals that resource availability alone is insufficient without structural support, such as training and infrastructure, to enable effective digital use. Additionally, Dynamic Capabilities Theory, which emphasises a firm's ability to adapt and innovate in changing environments (Teece et al., 1997), is limited by structural constraints like infrastructure deficits in rural areas, which restrict adaptation to digitalisation demands. This study suggests that existing theories may require adaptation or expansion to fully capture the realities of SMMEs in emerging economies, where external conditions often impede the effective leveraging of internal resources.

The study thus invites a re-evaluation of digital transformation theories within under-resourced contexts, proposing that digitalisation in SMMEs may depend less on competitive resource advantages and more on access to supportive networks and collaborative ecosystems. This contextual insight suggests a shift toward a "Collaborative Capability" framework, where partnerships with government, academia, and private sectors play a central role in supporting digital transformation. Such a framework could

offer a theoretical foundation for digital adoption in settings where firms alone may lack the resources or capacity to navigate digital shifts independently.



Source: Created by the authors from data analysis, 2025

Figure 3
Collaborative Capability

Moving Towards a Contextualised Theory

This research positions itself within a larger debate on digital inclusivity and the need for digital transformation frameworks that consider localised economic, infrastructural, and social factors. By highlighting the specific challenges of South African SMMEs, this study advocates for a more context-sensitive approach to digital transformation theories. The findings challenge the universality of established frameworks by showing that theories derived from resource-abundant contexts may fall short when applied to emerging economies with significant socio-economic constraints. Thus, this study moves the conversation towards developing a theoretical model that acknowledges the limitations of traditional digital transformation models and proposes new perspectives grounded in contextual realities.

Implications for SMMEs and Potential Growth Opportunities

The study reveals that South African SMMEs face structural challenges that limit their capacity to benefit from digital transformation fully. However, it also identifies growth opportunities that can arise from addressing these challenges through supportive measures. Bridging digital skills gaps could unlock the latent potential of underutilised digital tools, enabling SMMEs to improve efficiency, expand market reach, and drive customer engagement. As Cetindamar et al (2021) highlight, digital transformation is as much about human capital as technology. Building digital literacy through targeted training and education initiatives will be crucial to supporting the sustainable digitalisation of SMMEs.

Moreover, the findings underscore the importance of a collaborative ecosystem in mitigating resource constraints. Partnerships with government bodies, educational institutions, and private organisations can facilitate access to digital resources and training for SMMEs, particularly in underserved areas. Collaborative networks can provide infrastructure, skills training, and financial support, transforming digital barriers into inclusive growth opportunities. This approach aligns with the principles of inclusive development, suggesting that SMMEs in resource-limited contexts can thrive when empowered by a supportive digital ecosystem.

In essence, the study suggests that digital transformation for South African SMMEs is not simply a matter of individual organisational readiness. Instead, it requires a holistic, ecosystem-based approach that integrates policy support, collaborative efforts, and skills development, all tailored to the unique needs of different industries and communities. The creation of a "Collaborative Capability" framework could thus provide a new direction for theoretical development and practical application, offering SMMEs a pathway to thrive in the digital economy by emphasising the power of interconnected support systems.

CONCLUSION AND SUGGESTION

In conclusion, this literature review emphasizes the vital role of digital transformation for Small, Medium, and Micro Enterprises (SMMEs) in South Africa, especially in the post-COVID-19 context. While the global picture shows significant advantages tied to the adoption of digital technologies such as increased operational efficiency and better customer engagement the South African landscape faces unique challenges, including resource limitations, a lack of digital skills, and infrastructural deficits that impede effective digital integration. To overcome these obstacles, there is an urgent need for targeted interventions that empower SMMEs to navigate the digital landscape effectively. The significance of this study is underscored by the recognition of the collaborative efforts required among policymakers, educational institutions, and industry stakeholders to create a conducive environment for digital adoption. Initiatives such as digital literacy training and financial incentives for technology implementation could be pivotal in addressing current barriers. Furthermore, the existing literature reveals limitations, particularly the shortage of sector-specific case studies and recent empirical data. Future research should focus on longitudinal studies examining the long-term impact of digital adoption on SMMEs and comparative analyses with similar enterprises in other developing regions. Ultimately, embracing digital transformation is not just a strategic advantage, but a necessary pathway for fostering innovation and ensuring economic resilience within South Africa's SMME sector.

Future research should build on the insights from this study by further exploring the role of collaborative ecosystems in facilitating digital transformation among SMMEs, particularly in emerging economies. Investigating how partnerships between government, academia, and private sectors can be effectively leveraged to overcome infrastructure and resource limitations would provide valuable guidance for policymakers and business leaders. Additionally, longitudinal studies could examine the long-term impact of digital skills training on the sustainability and competitiveness of SMMEs, offering insights into the efficacy of different training models and their scalability. Further research could also explore sector-specific digital transformation strategies, identifying best practices that could be tailored to the unique needs of various industries within South Africa. Finally, comparative studies between South Africa and

other emerging markets could highlight cross-contextual factors influencing digital adoption, contributing to the development of more universally applicable frameworks for digital transformation in resource-constrained environments.

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