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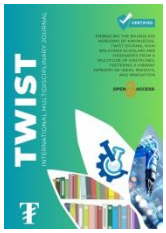

Digital Transformation Driving Small, Medium and Micro Enterprises Integration into Corporate Supply Chain in South Africa

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Abstract
Digital transformation is essential for economic development in Africa, offering significant opportunities to integrate Small, Medium, and Micro Enterprises (SMMEs) into corporate supply chains. In South Africa's financial services and Information and Communications Technology (ICT) sectors, this integration is crucial for fostering inclusive growth. However, the limited digital transformation within Enterprise and Supplier Development (ESD) frameworks hinders meaningful progress in bridging the gap between large corporations and historically marginalized SMMEs. This study examined the role of digital transformation and Fourth Industrial Revolution (4IR) technologies in integrating South African SMMEs into corporate supply chains, focusing on the challenges, opportunities, and strategies for enhancing competitiveness and inclusive economic growth. A qualitative research approach was employed, using open-ended interviews with twelve senior managers across the banking, insurance, supply chain, SMME, and ICT sectors. Thematic analysis of the data revealed that digital tools such as Software as a Service (SaaS) and Business-to-Business (B2B) platforms are vital for improving SMME connectivity, streamlining operations, and supporting flexible supply chains. However, barriers such as inadequate internet access, low technological awareness, poor infrastructure, and resistance to change impede digital adoption. Conversely, cloud computing, social media, and data analytics were identified as tools for reducing costs, expanding market access, and building resilience. The study recommends that stakeholders invest in digital platforms, automation tools, and affordable internet infrastructure. Additionally, targeted training programs and strategic partnerships should support SMME adoption of digital technologies. Collaborative initiatives must also drive policy reform and capacity building to ensure inclusive digital integration and sustainable economic growth.

Keywords
Digital transformation, SMMEs, Supply chain, 4IR, Economic development

INTRODUCTION

Africa is at a crucial stage in its economic evolution, with digital transformation emerging as a critical enabler of growth and development. According to the African Union (AU), digital technology is a transformative tool for driving socioeconomic progress across the continent (Nganda, 2023). This assertion underscores the strategic importance of harnessing digital innovation to address longstanding economic disparities and foster inclusive development. Central to this vision are small, medium, and micro enterprises (SMMEs), which play a crucial role in economic ecosystems worldwide. The International Finance Corporation emphasizes that SMMEs constitute 90% of all businesses and contribute 38% to Africa's Gross Domestic Product (GDP), highlighting their pivotal role in driving the continent's growth and transformation (Nganda, 2023).

In South Africa, integrating SMMEs into large corporate supply chains is vital for advancing inclusive economic growth and enhancing the competitiveness of the business landscape. Digital transformation and Fourth Industrial Revolution (4IR) technologies present significant opportunities for enabling such integration. As Madzimure, Mafini, and Dhurup (2020a) assert, digitalizing the Enterprise and Supplier Development (ESD) function not only facilitates SMME integration into supply chains but also reduces operational costs for large corporations and the financial services industry. This dual benefit underscores the potential of digital solutions to create synergies between corporate giants and emerging enterprises.

Despite these promising prospects, significant challenges remain. While the South African government has acknowledged the importance of e-procurement and digital integration for SMMEs, the practical application of these digital transformation practices remains underexplored (Madzimure et al., 2020a). Furthermore, literature suggests that many SMMEs face barriers such as limited access to digital infrastructure, inadequate technological expertise, and constrained financial resources, which hinder their ability to leverage 4IR technologies effectively (Nganda, 2023). These obstacles highlight the urgent need for strategic investment and ongoing research into the digitalization of ESD to ensure that SMMEs can fully participate in and benefit from supply chain ecosystems.

Moreover, as digital transformation accelerates, the stakes for SMMEs become even higher. Nganda (2023) explain that without targeted strategies to address these challenges, SMMEs risk being excluded from lucrative supply chain opportunities, perpetuating inequality and limiting the economic potential of the broader business landscape. However, when effectively integrated, SMMEs can drive innovation, create jobs, and contribute significantly to national economic growth.

This study aimed to investigate the role of digital transformation and 4IR technologies in integrating South African SMMEs into large corporate supply chains. It focused on identifying challenges, exploring opportunities, and proposing strategies to enhance competitiveness and inclusive economic growth. By addressing these critical issues, this research sought to provide actionable insights for policymakers, industry stakeholders, and SMME leaders, thereby fostering a more inclusive and resilient economic ecosystem.

BACKGROUND OF THE STUDY

Digital transformation is a cornerstone of economic development in Africa, offering unprecedented opportunities to integrate SMMEs into corporate supply chains. As Nganda (2023) asserts, the AU identifies digital technology as a critical driver for fostering socioeconomic progress across the continent. This recognition is especially significant in South Africa, where SMMEs are pivotal to economic inclusivity and growth. According to the International Finance Corporation, SMMEs represent 90% of businesses and contribute 38% to Africa's GDP, emphasizing their essential role in driving economic transformation (Nganda, 2023).

The integration of SMMEs into large corporate supply chains through digital transformation is particularly crucial in South Africa’s financial services and Information and Communications Technology (ICT) sectors. Digitalizing the ESD function has been identified as a vital mechanism for achieving this integration. Madzimure, Mafini, and Dhurup (2020b) explain that ESD digitization can enhance operational efficiencies, reduce costs for large corporations, and create pathways for SMMEs to access sustainable business opportunities. However, as Mkhungo (2021) argues, the focus of many large enterprises remains on meeting Broad-Based Black Economic Empowerment (B-BBEE) compliance targets, often overshadowing the broader potential of digital integration to foster long-term SMME development.

Financial service providers, including banks, face significant regulatory obligations, such as the requirement to allocate 30% of their measurable procurement spend to qualifying small enterprises and exempted micro enterprises (B-BBEE Commission, 2013). While this policy aims to boost SMME participation, its implementation is fraught with challenges. According to Mkhungo (2021), insufficient financial support and limited business opportunities for black- and women-owned SMMEs hinder meaningful progress. These challenges are compounded by the lack of a cohesive strategy to leverage digital transformation and 4IR technologies for ESD optimization.

Despite government recognition of the importance of e-procurement and digital integration, there remains a limited understanding of how digital tools and practices can advance SMME competitiveness. Nganda (2023) explains that addressing this gap requires not only technological investments but also a strategic alignment of corporate and policy objectives. Furthermore, Madzimure et al. (2020b) assert that digitalizing ESD functions can serve as a catalyst for integrating SMMEs into supply chains, enhancing their capacity to contribute to the broader economic landscape.

This background sets the stage for investigating the role of digital transformation and 4IR technologies in integrating South African SMMEs into large corporate supply chains. This approach aligns with the necessity to move beyond regulatory compliance and unlock the transformative potential of digitalization in achieving sustainable development.

PROBLEM STATEMENT

The integration of SMMEs into large corporate supply chains remains a critical challenge in South Africa, particularly within the financial services and ICT sectors. Despite the significant role of ESD as a mechanism to bridge the gap between large enterprises and historically marginalized SMMEs, the lack of digital transformation in ESD processes continues to hinder meaningful progress. As Mkhungo (2021) assert, while many corporations prioritize compliance with B-BBEE regulations, this focus often neglects the broader potential of digital integration to drive inclusive economic growth and competitiveness.

One of the primary issues is the persistent disparity in shifting Total Measured Procurement Spend toward black- and women-owned SMMEs with annual turnovers of less than R50 million. According to the B-BBEE Commission (2013), financial service providers are required to allocate 30% of their procurement spend to qualifying small enterprises and exempted micro enterprises. However, Nganda (2023) explains that insufficient financial support and limited access to business opportunities continue to restrict the participation of these enterprises in corporate supply chains.

Furthermore, the lack of digitalization within ESD functions exacerbates this problem. As Madzimure et al., (2020a) highlight, digital tools and technologies have the potential to streamline procurement processes, enhance operational efficiencies, and provide SMMEs with critical resources for growth. However, there is limited scholarly work on how digital transformation and 4IR technologies can be leveraged to advance ESD practices, creating a gap in both academic and practical understanding of this emerging phenomenon.

The challenges are further compounded by the complexity of integrating digital tools with existing ESD strategies. Mkhungo (2021) argue that while compliance with B-BBEE scorecards is important, it is insufficient to address the systemic barriers faced by SMMEs. These include limited access to funding, a lack of digital infrastructure, and inadequate business development support. This underscores the need for a more integrated approach that leverages digital transformation to create sustainable and inclusive economic opportunities for SMMEs. This study seeks to address these gaps by investigating the role of digital transformation and 4IR technologies in integrating South African SMMEs into large corporate supply chains.

PURPOSE OF THE STUDY

The purpose of this study was to investigate the role of digital transformation and 4IR technologies in integrating South African SMMEs into corporate supply chains, with a specific focus on understanding the challenges, opportunities, and strategies needed to enhance their competitiveness and foster inclusive economic growth. By delving into the barriers hindering digital adoption, identifying enablers of transformation, and proposing actionable strategies, the study sought to bridge the gap between policy intentions and practical outcomes in the ESD framework.

This research holds significant implications for a range of stakeholders. Policymakers stand to benefit by gaining a comprehensive understanding of the systemic challenges, such as infrastructure gaps and skill deficiencies, that inhibit SMMEs' digital integration. These insights can inform more targeted and inclusive policies, such as improved spectrum allocation, enhanced training initiatives, and support for digital infrastructure development, which are essential for achieving national development goals.

Corporate entities, particularly those in the financial services and ICT sectors, can leverage the findings to design more effective ESD programs that address the specific needs of SMMEs. By adopting digital tools and fostering collaborative partnerships, these corporations can enhance supply chain efficiency, drive innovation, and improve compliance with South Africa's B-BBEE regulations. This does not only strengthen their competitive positioning but also aligns their operations with broader social and economic necessities.

SMMEs are primary beneficiaries of this study, as it provides actionable recommendations for overcoming barriers to digital adoption and unlocking growth opportunities. By embracing the proposed strategies, such as accessing cloud services, leveraging digital platforms, and participating in targeted training programs, SMMEs can improve their operational efficiency, expand their market reach, and integrate seamlessly into corporate supply chains. This empowerment is crucial for fostering entrepreneurial resilience and creating pathways for sustainable economic participation.

Additionally, the study offers value to training institutions and capacity-building organizations by highlighting key areas where digital skills development is urgently needed. These entities can use the insights to design curricula and programs that equip supply chain practitioners and business stakeholders with the competencies necessary to thrive in a digitalized economy.

Consumers and society at large benefit indirectly, as a more inclusive and digitally integrated economy fosters job creation, reduces income inequalities, and enhances the overall competitiveness of the South African economy. By advancing the integration of SMMEs into corporate supply chains, this study contributes to building a more equitable and resilient economic landscape, ensuring that the benefits of digital transformation extend to all segments of society.

OBJECTIVE OF THE STUDY

To investigate the role of digital transformation and 4IR technologies in integrating South African SMMEs into large corporate supply chains, focusing on challenges, opportunities, and strategies for enhancing competitiveness and inclusive economic growth.

LITERATURE REVIEW

The Contextual Framework of Digitalisation for SMME Integration into Large Corporations

Integrating SMMEs into the supply chains of South Africa's financial services and ICT sectors has proven to be a formidable challenge. According to Barnard and Sibiya (2020), one of the key enablers of this process is the B-BBEE policy, which seeks to drive transformation by encouraging the participation of historically disadvantaged groups, thereby reducing inequality and poverty. The B-BBEE Act 53 of 2003, amended by Act 46 of 2013, mandates that large corporations must allocate a minimum of 2% of their net profit after tax to supplier development and 1% to enterprise

development to comply with scorecard requirements. This policy aims to foster economic transition by supporting black-owned businesses (Jacobs, 2019), but a critical question arises: How significant is the 4IR in enabling the digital integration of SMMEs into large corporations, especially from an ESD perspective?

Ndung'u and Signe (2020) define the 4IR as the convergence of digital, biological, and physical worlds through advanced technologies like Artificial Intelligence (AI), cloud computing, robotics, 3D printing, Internet of Things (IoT), and advanced wireless systems. Mkhungo (2021) highlights that while these digital tools have enabled smarter integration in emerging markets like South Africa, the digital divide remains a significant barrier, limiting access for many small businesses. The ongoing digital transformation, particularly post-Covid-19, suggests a permanent shift away from offline operations. Nevertheless, it remains unclear how effectively 4IR can support the integration of SMMEs into the broader corporate ecosystem under the constraints of limited access to digital infrastructure and resources.

Digitalisation Support to SMMEs - A European Framework

In a study conducted by five business and innovation development centres in Belgium, Denmark, Estonia, Germany, and Sweden, the European Union (EU) (2020) emphasizes the strong commitment of these nations to collaborate on projects that aim to address the digitalization challenges faced by SMMEs. While this model provides useful insights, Fafunwa and Odufuwa (2022) note that African SMMEs, particularly in South Africa, face a different set of challenges. The growing adoption of digital tools is evident, driven by factors such as increased mobile network penetration and the rising popularity of digital platforms (Partnership for Finance in a Digital Africa, 2019). However, despite these advancements, the level of digitalization among South African SMMEs is still insufficient to create substantial economic benefits, particularly in the context of the African Continental Free Trade Area.

Digital Supply Chain Management as a Key Enabler of ESD

Biazzin (2019) asserts that a global supply chain is essential for maintaining competitiveness, as it relies on coordinated relationships to ensure flexibility, agility, quality, and cost-effectiveness. Strategic sourcing is particularly crucial in the financial services sector for integrating SMMEs into supply chain ecosystems. However, according to de Bolle (2020), SMMEs face substantial challenges in accessing the financial and resource-based support necessary for successful integration. Digital supply chain finance mechanisms are critical for strengthening supply chains and improving financial accessibility, particularly for sub-suppliers and retailers. De Bolle (2020) further emphasize that digital integration not only supports SMME growth but also creates employment opportunities, thereby enhancing financial viability and supporting initiatives like mobile money and agent banking.

While digital integration offers clear advantages, Mkhungo (2021) argue that many small businesses in South Africa have not fully leveraged available technologies, despite significant investments. Moreover, a global small business platform found that 97% of South African businesses invested in new technologies in 2019, with over half reporting increased profitability (Mkhungo, 2021). Despite this progress, it is critical to assess whether digital tools are being utilized effectively to integrate SMMEs into larger corporate supply chains.

Digital Transformation as a Value-add to ESD Strategy

Ulas (2019) provides a detailed explanation of digital transformation, asserting that it involves reorganizing business models and processes through technological advancements to create new value in a dynamic digital economy. Louw (2020) highlights that South African corporations struggle to maintain competitive supply chains, and as they transition to digitalization, the quality of their suppliers and their digital integration become central to their success. Jeza and Lekhanya (2022) also emphasize the need for SMMEs to adapt to digital transformation in order to remain competitive in a rapidly changing global market. This argument is further supported by Suleman (2021), who contends that digital enablement is essential for SMMEs to survive and thrive in the "new normal," enabling them to reduce costs, enhance productivity, and improve customer outreach through technology.

Suleman (2021) elaborate that digital transformation is not merely about technology adoption but also about utilizing data to optimize operations and better serve customers. Therefore, SMMEs must consider digital transformation as an essential strategy for long-term success and growth.

The Importance of Digital Transformation in the Digital Integration of SMMEs

Riemer and Schellhammer (2019) state that organizational collaboration is crucial for digital supply chain performance. The process of digital transformation, driven by automation, data collection, and information sharing, presents both opportunities and challenges for collaboration. However, many SMMEs lack the digital capabilities and resources necessary to fully benefit from this transformation. Chen, Lin, Chen, Chao and Pandia (2021) assert that SMMEs will struggle to achieve successful digital transformation without support from large corporations. Through embracing third-party digital platforms, SMMEs can enhance their performance and productivity while benefiting from skill enhancement and government support.

The Significance of Enterprise Resource Planning Systems in the Digital Integration of SMMEs

Slimov (2019) highlights the central role of Enterprise Resource Planning systems in driving digital transformation, particularly in the context of the Covid-19 pandemic. Enterprise Resource Planning systems such as Oracle, JD Edwards,

and Ariba facilitate SMME integration into the financial services sector by enabling them to respond efficiently to Requests for Proposals from large corporations. However, as Slimov (2019) assert, these systems can only add value if SMMEs are adequately trained in their use. This creates an opportunity for large organizations to support SMMEs by developing virtual training and development hubs to ensure that small businesses can fully leverage Enterprise Resource Planning technologies for growth.

Empowering SMMEs to Reap the Benefits of the Digital Transition

Despite the clear potential of digital transformation, South Africa faces significant challenges in fully integrating SMMEs into the digital economy. Walwyn and Cloete (2020) note that while other nations have successfully harnessed the power of digitalization for socio-economic development, South Africa has lagged behind, as evidenced by its declining ranking on the International Telecommunications Union's Information Society index. The PwC Strategy and global digital operations study conducted in 2018 also reveals that only a small percentage of global manufacturing companies are classified as "Digital Champions," with many still in the early stages of digital transformation (Walwyn *et al*., 2020).

The European Commission (2020) points out that SMMEs in Europe thrive when they are empowered with the resources to fully capitalize on digitalization. Cutting-edge technologies such as blockchain, AI, and cloud computing offer SMMEs significant opportunities to enhance production processes and develop new products and business models. However, the EU (2020) notes that many SMMEs have not fully embraced the potential of data, which is a critical component of the digital economy. While 54% of large corporations have successfully integrated digital technologies, only 17% of SMMEs have achieved similar success, illustrating the gap in digital adoption between large and small enterprises.

IoT as an Enabler of Digitalisation and Connectivity

The IoT has increasingly become a critical enabler of digitalization and connectivity, with various implications for businesses and industries worldwide. According to Ulas (2019), IoT refers to a technology that utilizes the internet to transmit data between devices, such as wearable technology, smartphones, and sensors. Ben-Daya, Hassini and Bahroun (2019) further defines IoT as a network of interconnected physical objects capable of sensing, monitoring, and interacting within an organization and its supply chain. This broad conceptualization highlights IoT's ability to enhance operational efficiency and optimize supply chain management by enabling seamless communication and data sharing between devices.

With a focus on South Africa, Burger (2021) predicted a 14% annual growth rate for IoT between 2020 and 2025. This growth is expected to be particularly evident in sectors such as financial services, energy, agriculture, and healthcare, with IoT adoption also increasing across telecommunications, manufacturing, logistics, transport, and government sectors. This broad application of IoT technologies suggests that South Africa, like many other regions, is on the cusp of significant technological advancements that could reshape its economy.

However, for IoT to function effectively, a critical component is internet connectivity. As depicted in Figure 1 (Economist Intelligence Unit, 2020), connectivity is essential for transmitting data between IoT devices and the systems responsible for processing and interpreting this data. The telecommunications sector, which provides the necessary internet infrastructure, is at the core of the IoT transition, with internet access being indispensable for the seamless operation of IoT networks.

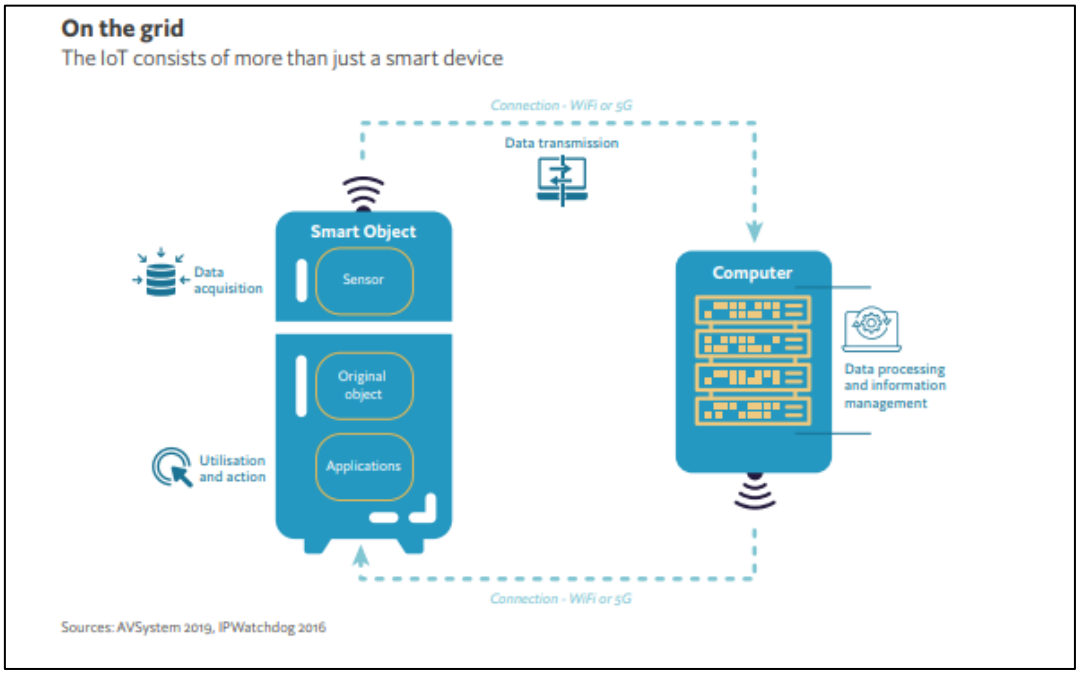

Fig. 1 On the grid
Source: Economist Intelligence Unit (2020)

According to the Economist Intelligence Unit (2020), by 2025, IoT is expected to generate an additional US$1.1 trillion in revenue globally, contributing approximately 1% of the global GDP. However, this revenue generation will not be limited to North America and Europe. A significant portion of this growth is anticipated to emerge from regions outside these traditionally dominant markets. This global expansion of IoT adoption presents an opportunity for emerging markets, including South Africa, to harness the economic benefits of digital connectivity.

Despite these promising developments, the challenge remains that SMMEs in rural and township areas often face significant barriers to digital connectivity. As highlighted by an interviewee in the study, the cost of data bundles required for uninterrupted and fast connectivity remains a major obstacle for these businesses. Furthermore, the digital tools and IoT devices employed by SMMEs demand reliable, cost-effective, and high-speed connectivity to function optimally and unlock business opportunities. Therefore, while IoT presents transformative potential, its benefits for SMMEs in underserved regions can only be fully realized when the issues surrounding digital access and affordability are addressed.

A View from South Africa on Digitalisation

South Africa's potential to leverage digitisation and automation is immense, with substantial economic benefits projected for the coming years. According to Magwentshu, Rajagopaul, Chui, and Singh (2019), the adoption of digital technologies could generate up to 1.2 million jobs by 2030, provided that businesses act swiftly and capitalize on emerging opportunities. Technologies such as machine learning, AI, and advanced robotics are expected to revolutionize South African workplaces, leading to greater production efficiencies. Although digitisation may induce significant disruption, it promises not only improved outcomes for consumers but also the creation of high-quality jobs (Magwentshu *et al*., 2019).

However, Mphahlele (2018) critiques the financial burden that regulatory frameworks, such as the B-BBEE Amended Code of Good Practice (CoGP), impose on South African businesses, highlighting that approximately 65% of companies report increased costs due to these regulations, according to Grant Thornton's International Business Report generated in 2016 (Business Tech, 2016). Conversely, Mphahlele *et al*., (2018) argues that digitisation can be harnessed to streamline these regulatory processes, particularly by implementing contract management systems that facilitate the efficient verification of supplier criteria. Such systems could not only ease compliance with the Protection of Personal Information Act (PoPIA) and the Federal Insurance Compensation Act (FICA) but also help businesses reduce costs and improve operational efficiency.

Frackiewicz (2023) further expounds on the transformative potential of digital technologies in Africa, noting that they could significantly improve sectors such as finance, agriculture, and healthcare. Through the implementation of digital transformation initiatives, there is a clear opportunity to address systemic issues such as corruption, promote transparency, and enhance the delivery of public services. This underscores the critical role of digitisation in driving broader socio-economic progress across the continent.

Magwentshu et al. (2019) concurs by referencing a McKinsey report that illustrates the profound economic impact of digital technologies on South Africa. The rapid integration of digital tools could triple productivity growth, more than double per capita income growth, and contribute over one percentage point to the country's real GDP growth over the next decade. Furthermore, digitalisation has the potential to generate a net increase of 1.2 million jobs, with a notable portion of these jobs benefiting women. This represents a significant opportunity for gender empowerment through the digital economy.

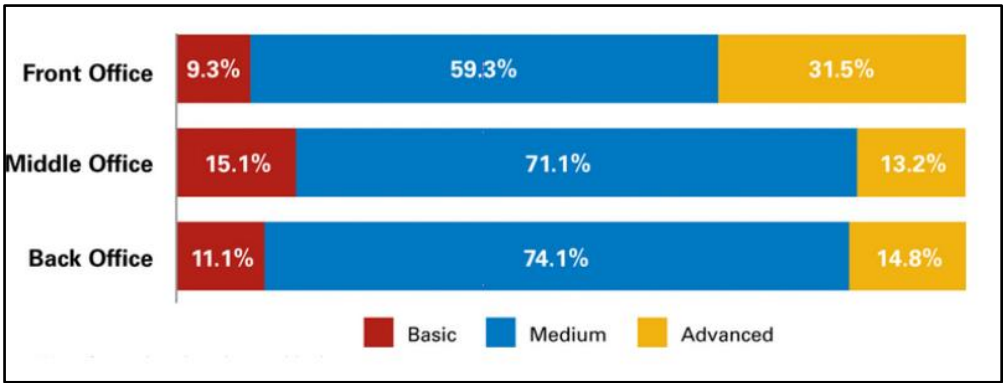

Fig. 2 Current Condition of Digitisation

Source: Banking on Digital Future: A Guide to Digital Transformation in Banking, Kofax (2020)

In the banking sector, Meena and Ganesan (2020) highlight a disparity in the digitalisation of front and back-office services. A report from Capgemini's World Retail Banking Report (2020), as illustrated in figure 2, indicates that while 31.5% of bank executives classify their front-office services as digitally advanced, fewer than 15% apply the same label to their back-office processes. This presents a critical gap in the banking sector's approach to digitalisation, as banks have focused their efforts on enhancing customer-facing services while neglecting the optimization of internal, back-office operations (Meena & Ganesan, 2020).

Furthermore, Meena and Ganesan (2020) argue that this neglect of the back office is a missed opportunity, as banks could significantly enhance their efficiency and service delivery by digitising these processes. The infographic, in figure 3, presented by Capgemini below underscores the detrimental effect of inefficiencies in the back office, where 60% of customers report dissatisfaction with back-office sources. Additionally, 10%-20% of customer service issues are a direct result of failures in the back-office execution. This inefficiency not only contributes to higher operational costs but also limits the ability to deliver timely and accurate information to customers.

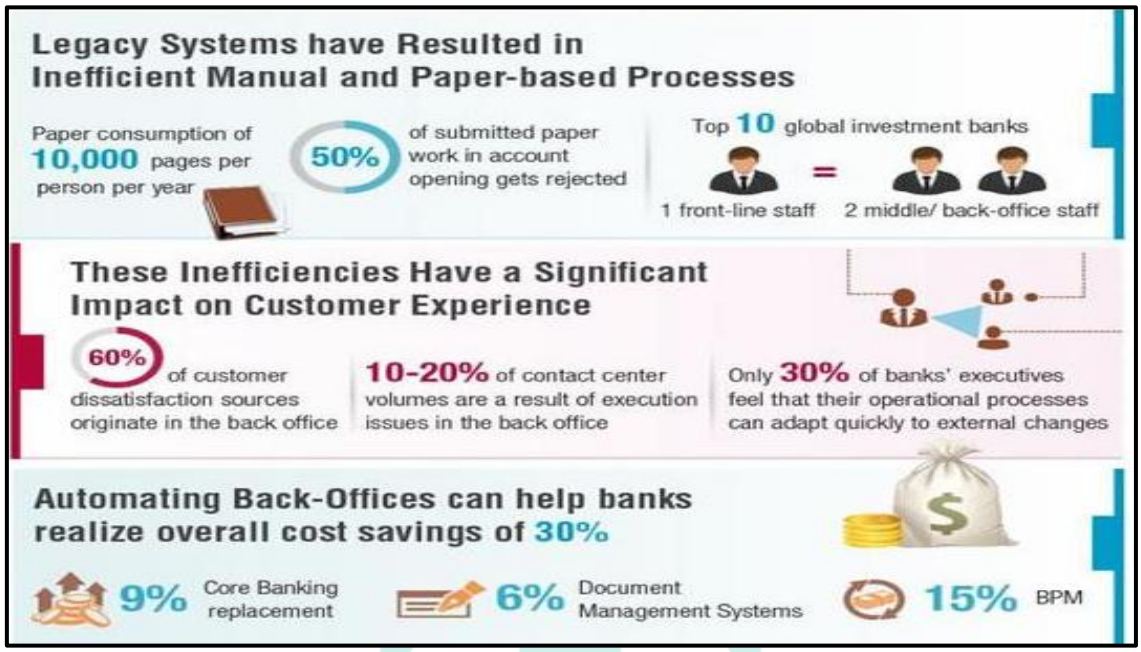

Fig. 3 The Impact of Inefficiencies on Customer Experience
Source: The impact of the current state of back office – Capgemini Consulting (2020)

The rise of electronic markets, as defined by Misra, Mahajan, Singh, Khorana, and Rana (2022), represents another facet of digitisation reshaping business environments globally. These digital platforms, which provide technological and logistical infrastructure for electronic transactions, have experienced substantial growth, particularly in the wake of the COVID-19 pandemic. Misra et al. (2022) highlight the rapid surge in platforms such as Amazon India and Flipkart, where new vendor participation increased by 50%, demonstrating how small businesses were compelled to transition online to remain competitive. This shift to digital platforms has significant implications for South African SMMEs, which are increasingly expected to engage with digital marketplaces to access funding and expand their market reach (Meena & Ganesan, 2020).

Digitalisation Support to SMMEs - A European Framework

The EU has underscored the importance of fostering digitalisation, particularly within SMMEs, through a collaborative approach involving business and innovation development centres across Belgium, Denmark, Estonia, Germany, and Sweden. According to the EU (2020), this initiative demonstrates a shared commitment across these nations to enhance the digital capabilities of SMMEs. However, the question remains: why is the digitalisation of SMMEs so pivotal, particularly when these enterprises are often less digitalised than their larger counterparts? The EU study suggests that many of these small enterprises face significant obstacles in integrating digital technologies into their operations, labour processes, and market interactions. To address these challenges, various financial incentives have been introduced to encourage SMMEs to overcome the barriers to digital adoption. Yet, it remains critical to understand why digitalisation efforts are primarily concentrated on these smaller entities.

This focus on SMMEs brings attention to key themes regarding digitalisation's potential benefits for organisations across Europe.

Digitalisation will enhance productivity - Notably, the 2015 Federation of German Industries research revealed that European industries could generate an additional €1.25 trillion in the next decade by fully embracing digitalisation. Conversely, failure to engage with digital technologies could lead to a 10% contraction of Europe's industrial base. Consequently, the EU argues that the participation of all sectors, including SMMEs, is essential for realising this potential value (EU, 2020).

On the other hand, the African continent's Digital Transformation Strategy (2020-2030), approved by the AU in 2020, shares several critical elements with Europe's digitalisation framework. According to Fafunwa and Odufuwa (2022), the strategy emphasizes skills development, infrastructure, legislation, innovation, and entrepreneurship which are areas that are crucial for driving digital transformation. The role of SMMEs in this strategy is particularly noteworthy, as the innovation and entrepreneurship pillar highlight their potential in spurring economic growth and employment across

Africa. However, the widespread adoption of digital technologies remains a challenge for SMMEs, especially in terms of their participation in the African Continental Free Trade Area. Research indicates that despite increased mobile network penetration and the growing use of digital platforms and social media, many African SMMEs still lack the advanced digital capabilities required to engage fully in these trade initiatives (Partnership for Finance in a Digital Africa , 2019).

Despite the policy support and private sector efforts to enhance digital capacity, SMME participation in digital transformation initiatives remains limited. Fafunwa and Odufuwa (2022) argue that this underrepresentation in continental trade agreements should be a focal point for proactive policy development, which could unlock the potential for automated, adaptable, and self-sustaining manufacturing processes. These advances would serve as a foundation for reindustrialisation and transform value chains, creating new business models and value creation opportunities. Therefore, there is a pressing need for policies that equip SMMEs with the digital tools and frameworks necessary to compete in an increasingly globalized and digital economy.

Emerging technologies provide novel opportunities - While the emerging technologies associated with the next phase of Industry 4.0, including IoT, AI, Big Data, and robotics, offer considerable opportunities for SMMEs, they also introduce new challenges that could disrupt existing business models and employment practices (Fafunwa & Odufuwa, 2022). To effectively capitalize on these opportunities, stakeholders must be willing to embrace these technologies and adapt their strategies accordingly. This critical juncture will require SMMEs to evolve their business models to remain competitive in an ever-changing digital landscape.

Europe must excel in using digitalisation in order to maintain its leading position - In contrast, Europe faces an urgent need to maintain its technological edge in digital sectors. Although the region leads in areas such as automotive electronics, energy markets, and communications, other global players are rapidly closing the technological gap. Fafunwa and Odufuwa (2022) reflect on how even companies with a dominant position, such as Nokia, were unable to sustain their leadership when confronted with the rise of new digital business models. This serves as a cautionary account for Europe's continued investment in digitalisation, particularly as other regions advance in digital innovation.

Meanwhile, the influence of digitalisation on SMMEs in developing countries like Nigeria and Kenya provides valuable insight into the transformative impact of digital tools. According to a survey of 500 SMMEs in Nigeria, digitalisation significantly contributed to job creation, poverty alleviation, and the emergence of new business opportunities (Fafunwa & Odufuwa, 2022). Similarly, research by Atiyas and Dutz (2021) highlights the positive correlation between smartphone usage by Senegalese SMMEs and their ability to engage in export activities. Kenyan micro-businesses have similarly embraced digital tools, enhancing their economic and financial inclusion, as reported by the (Partnership for Finance in a Digital Africa , 2019). These examples underscore the widespread benefits of digital adoption, not just for large firms but also for SMMEs in emerging markets.

Ultimately, the success of digitalisation in Europe depends on the extent to which industries, enterprises, and organisations embrace technological advances. As noted by the EU (2020), the more digitally advanced the stakeholders, the greater their capacity to leverage digitalisation for competitiveness. Therefore, Europe's future success in the digital era hinges on its ability to foster widespread digital engagement across all sectors, including SMMEs, to maintain its leadership in the global economy.

METHODOLOGY

This study employed the Grounded Theory methodology, which is both structured and flexible, making it particularly suitable for investigating phenomena with limited existing academic literature (Tie, Birks, and Francis, 2019). Grounded Theory was selected due to the scarcity of studies focusing on the digitalisation of ESD and its role in integrating SMMEs into larger corporate supply chains. This methodology's flexibility allowed it to effectively address the research objective. Additionally, an exploratory research design was used to investigate previously unexplored questions, often qualitative and primary in nature (George, 2023). The complexity of the research questions further justified the use of Grounded Theory, which was essential in uncovering new insights and understanding emerging trends:

- What are the digital accelerators of ESD for the advancement of SMMEs?
- What is the significance of digitally enabling platforms for the financial services sector?

The study adhered to an interpretivist philosophy, aiming to gather insights, beliefs, and opinions from interview participants, particularly concerning the emerging phenomenon of digitally transforming ESD to integrate SMMEs into large corporations. According to Stainton (2023), interpretivism is particularly suitable for studies involving unknown elements, such as societal shifts. Furthermore, this study incorporated a postmodernist qualitative paradigm, which contrasts with traditional sociological theories by rejecting the Enlightenment project's emphasis on rational thought as the sole means of understanding and controlling society (Perera, 2023). This philosophical choice allowed for a deeper exploration of subjective experiences and interpretations.

In line with the interpretivist and postmodernist perspectives, the study used an inductive research approach. The study sought to understand the reasoning and context behind the digital integration of SMMEs into larger corporations, drawing on the participants' experiences and insights. This approach provided a comprehensive understanding of the processes and factors that contribute to the digital transformation of SMMEs within the larger business ecosystem.

The study utilized a qualitative methodology due to its interpretive and exploratory nature, which facilitated the discovery of new insights into the digitalisation of SMME integration into large corporations (Shikalepo, 2021). A sample of twelve key role players from diverse economic sectors was selected, ensuring a broad range of perspectives and helping to uncover new themes related to digital integration. The research design was cross-sectional, spanning 18 months, during which interviews were conducted, transcripts were collated, and the data was refined before being shared with a statistician.

Data collection involved semi-structured online interviews, which incorporated open-ended questions to encourage detailed responses and in-depth opinions from the participants (Jones and Naidoo, 2022). The study explored the significance of 4IR technologies, such as digitisation, chatbots, AI, and the IoT, in enabling ESD. These disruptive technologies were examined in terms of their role in facilitating the integration of SMMEs into large corporate frameworks, providing valuable insights into the future of digital transformation in business.

RESULTS

The results from this study provide critical insights into the role of digital transformation and 4IR technologies in integrating South African SMMEs into large corporate supply chains. Through the perspectives of respondents, the findings address the challenges, opportunities, and strategies necessary for enhancing competitiveness and fostering inclusive economic growth. Emerging themes reveal key enablers and disablers of digitalisation in ESD, as well as practical approaches for improving digital adoption.

Adoption of Digital Tools for SMME Integration

A key theme in the interviews was the significance of digital tools in integrating SMMEs into large corporate supply chains. Respondents emphasized how digital platforms became indispensable during the COVID-19 pandemic, enabling global connectivity and maintaining business continuity. One respondent highlighted the transformative potential of two-sided Business-to-Business (B2B) platforms, which reduce transaction costs, enhance transparency, and create flexible business environments. This aligns with Marzi, Marrucci, Vianelli and Ciappei (2023), who argued that globalisation facilitates collaboration between diverse suppliers through expansive digital networks.

The findings also revealed that platforms traditionally used for Business-to-Contract (B2C) transactions, such as Uber and Airbnb, are now influencing B2B models by creating streamlined marketplaces that connect producers, buyers, and service providers. As Shree, Singh, Paul, Hao and Xu (2021) noted, these platforms are driving the evolution of traditional business models toward digital integration, allowing for 24/7 transactions and negotiations. However, the study identified a critical challenge: the limited access to spectrum, which hinders connectivity for SMMEs. Respondents underscored the importance of auctioning spectrum to enable faster, affordable internet access and facilitate nationwide 5G rollout (South African News Agency, 2022). Such measures are vital for ensuring SMMEs can effectively participate in digital supply chains.

Local Best Practices in ESD and the Role of Technology

Respondents discussed best practices in using digital tools for ESD, revealing a gap in awareness and implementation of these technologies. One respondent noted the resilience of the SaaS sector during the COVID-19 pandemic, which effectively managed shutdowns and provided continuity in operations. Gilbert (2023) supported this view, emphasizing the role of SaaS solutions in navigating disruptions.

Sutton (2023) highlighted the transformative potential of integrating technologies such as automation, data analytics, blockchain, and AI into ESD frameworks under South Africa's B-BBEE policy. Respondents consistently identified these tools as critical for modernizing small businesses, making ESD initiatives more scalable, efficient, and impactful. However, the lack of knowledge and uneven adoption of these technologies in South Africa was seen as a barrier to achieving their full potential.

Barriers and Opportunities in the Digitalisation of ESD

The study identified significant barriers to the digitalisation of ESD. Respondents highlighted reluctance among some suppliers to adopt digital platforms, reflecting similar trends observed in the MENAP (Middle East, North Africa, Afghanistan, and Pakistan) region, where only a small percentage of SMMEs have embraced online presence despite growing internet usage (Lukonga, 2020). Infrastructure deficiencies, including limited access to cloud services, remain a substantial obstacle, particularly for SMMEs in lower-income nations (WTO, 2019).

Conversely, the findings pointed to opportunities for leveraging 4IR technologies. Respondents noted the potential of cloud computing, social media, and other digital tools to improve operational efficiency and expand market reach. Despite slow adoption, these technologies were seen as key drivers of innovation and growth for SMMEs, provided that infrastructural and skill-based challenges are addressed.

The Need for Training and Development in Digital Transformation

Respondents strongly emphasized the need for targeted training programs to equip supply chain practitioners with digital skills. According to Maseko (2019), digital transformation has gained significant global momentum over the past decade but remains largely absent from mainstream training programs in Africa. This gap limits the ability of SMMEs to adopt comprehensive digital strategies.

Participants highlighted the importance of training in areas such as digital marketing, cloud computing, and analytics to help SMMEs fully understand and leverage the benefits of digital tools. One respondent pointed out that providing accessible digital advisory services could play a transformative role in empowering SMMEs to navigate digital adoption effectively.

Key Enablers and Disablers of Digital Transformation

Enablers

Respondents identified several enablers that could drive digital transformation in ESD. These included:

- Business development support through upskilling and reskilling.
- Collaborative partnerships between Original Equipment Manufacturers and SMMEs.
- Strong leadership and supportive policy frameworks fostering inclusivity and transparency.
- The integration of automation and other digital tools to improve visibility, efficiency, and scalability.

Disablers

On the other hand, significant disablers were identified, such as:

- Bias toward larger corporations, which limits opportunities for SMMEs.
- Resistance to change among businesses due to fears of job displacement by AI and digital technologies.
- Persistent infrastructure gaps, including insufficient internet access and connectivity issues.

Implications for Competitiveness and Inclusive Growth

The findings demonstrate the potential of digital transformation and 4IR technologies to enhance the competitiveness of South African SMMEs and foster inclusive economic growth. While digital platforms, automation, and other disruptive technologies offer immense opportunities for integration into corporate supply chains, systemic challenges such as infrastructure deficiencies, skill gaps, and resistance to change must be addressed.

By implementing targeted strategies, such as improved spectrum access, tailored training programs, and supportive policy measures, stakeholders can unlock the full potential of digitalisation in South Africa's ESD landscape. These efforts will not only enhance SMME integration into supply chains but also contribute significantly to the country's broader economic development goals.

FINDINGS AND DISCUSSION

The role of digital transformation and 4IR technologies in integrating South African SMMEs into corporate supply chains emerges as both a critical opportunity and a complex challenge. The findings reveal that while digital platforms have become indispensable tools, particularly during the COVID-19 pandemic, their integration into the broader ESD landscape remains uneven and fraught with systemic barriers. Respondents consistently underscored the transformative potential of digital platforms to enhance connectivity, streamline transactions, and create flexible business ecosystems. This aligns with Marzi et al.'s (2023) argument that globalization, when coupled with digital networks, fosters collaboration among diverse suppliers. However, the South African context presents a unique set of challenges that must be addressed to unlock this potential fully.

A significant insight from the study was the reliance on digital tools during the pandemic, which forced a rapid shift toward virtual operations to maintain business continuity. Respondents highlighted two-sided B2B platforms as revolutionary, facilitating lower transaction costs and greater transparency. These platforms reflect a growing trend, as also noted by Shree et al. (2021), where digital tools traditionally associated with B2C transactions are now transforming B2B interactions. However, this transformation is not without its challenges. A glaring issue is the limited access to internet spectrum, which remains a fundamental barrier to widespread adoption of these technologies. Without urgent intervention to auction spectrum and expand affordable 5G connectivity, the envisioned integration of SMMEs into digital supply chains will remain out of reach for many businesses, especially those operating in resource-constrained environments.

The study also uncovered a significant gap in the understanding and implementation of digital tools within ESD frameworks. While the resilience of SaaS during the pandemic demonstrated its potential to provide operational continuity, the broader adoption of advanced technologies such as AI, blockchain, and automation has been slow. Sutton (2023) has argued that these tools are essential for modernizing and scaling ESD programs, particularly within the framework of South Africa's B-BBEE policy. Yet, respondents highlighted a pervasive lack of awareness and uneven technological uptake as critical barriers. This disconnect underscores the need for more proactive strategies to integrate cutting-edge technologies into ESD initiatives. Stakeholders, including policymakers, corporate partners, and SMMEs, must prioritize knowledge-sharing and capacity-building initiatives to bridge this gap and ensure that the benefits of digital transformation are equitably distributed.

The reluctance among some SMMEs to adopt digital platforms also reflects broader systemic challenges. Similar trends observed in the MENAP region, where a significant percentage of SMMEs lack an online presence despite growing internet usage (Lukonga, 2020), suggest that this issue is not unique to South Africa. Respondents identified key obstacles, including infrastructure deficiencies and resistance to change, which are compounded by fears of job displacement through automation. These findings align with WTO (2019), which emphasized the critical need for robust

infrastructure to support digital adoption in lower-income nations. Without addressing these foundational issues, the promise of digital tools to enhance operational efficiency and expand market reach will remain unrealized for many SMMEs.

Despite these barriers, the findings illuminate significant opportunities for leveraging 4IR technologies to foster competitiveness and inclusive growth. Cloud computing, social media, and data analytics emerged as key drivers of innovation for SMMEs, offering pathways to reduce operational costs, enhance market visibility, and build resilience against future disruptions. However, the slow pace of adoption raises questions about the readiness of South African SMMEs to engage meaningfully with these technologies. Respondents strongly emphasized the need for targeted training and development programs to equip supply chain practitioners with the digital skills necessary to navigate this new landscape. Maseko's (2019) observation that digital transformation remains absent from mainstream training programs in Africa is particularly relevant here. Comprehensive and accessible training initiatives in areas such as digital marketing, cloud computing, and analytics are essential to empower SMMEs and enable them to take full advantage of digital platforms.

Perhaps the most compelling finding of this study is the identification of key enablers and disablers of digital transformation in the South African ESD context. On the one hand, collaborative partnerships between Original Equipment Manufacturers and SMMEs, supportive leadership, and inclusive policy frameworks were seen as critical to fostering a conducive environment for digital adoption. On the other hand, persistent biases towards larger corporations and infrastructural deficits continue to marginalize smaller players, limiting their ability to participate fully in digital supply chains. The study's findings reveal that systemic challenges, including inadequate internet access and resistance to technological change, perpetuate a cycle of exclusion that undermines efforts to drive inclusive economic growth.

The implications of these findings are profound. They underscore the need for a holistic approach that combines infrastructural investments, policy reform, and capacity-building initiatives to address the multifaceted challenges faced by South African SMMEs. Improved spectrum access, for instance, is not merely a technical issue but a foundational enabler for digital transformation. Similarly, targeted training programs must be developed with a clear focus on addressing the unique needs and contexts of SMMEs, ensuring that they are equipped to leverage digital tools effectively. The study also highlights the importance of fostering an ecosystem of collaboration, where corporate entities, government agencies, and SMMEs work together to drive innovation and growth.

In conclusion, the findings of this study provide a nuanced understanding of the role of digital transformation and 4IR technologies in integrating South African SMMEs into corporate supply chains. While the opportunities for enhanced competitiveness and inclusive growth are immense, they are contingent upon addressing systemic barriers and fostering an enabling environment. By adopting targeted strategies that prioritize connectivity, training, and collaboration, stakeholders can unlock the transformative potential of digitalization, ensuring that SMMEs not only survive but thrive in the era of the 4IR.

RECOMMENDATIONS

To address the challenges and opportunities identified in this study, several recommendations are proposed to enhance the integration of South African SMMEs into corporate supply chains through digital transformation and 4IR technologies. These recommendations focus on improving the digitalisation of ESD strategies, fostering collaboration, and addressing systemic barriers to digital integration in the financial services and ICT sectors.

Financial services providers and ICT companies must prioritize the development of digital platforms that facilitate SMME access to business opportunities, funding, and market networks. By leveraging technologies such as blockchain, digital marketplaces can streamline transactions, reduce operational costs, and enhance trust within supply chains. Banks and large corporates should also invest in digitizing enterprise resource planning systems, incorporating automation tools like chatbots to expedite processes such as onboarding, vetting, and responding to Requests for Tenders.

Investment in digital transformation accelerators is essential for driving collaboration between corporations and SMMEs. Initiatives such as corporate accelerator programs can foster innovation, product development, and job creation (Kupp, Marval & Borchers, 2017). Banks should adopt service-oriented architecture to modernize legacy systems, enabling faster development of digital products and seamless integration with SMMEs (Megargel & Shankararaman, 2021). Furthermore, financial institutions and telecommunications providers should collaborate to roll out affordable cloud services tailored to SMMEs, ensuring compliance with third-party risk management regulations while enhancing cybersecurity and operational resilience.

Addressing connectivity challenges, particularly in rural and township areas, is crucial. Banks and mobile network operators must invest in renewable energy solutions, such as solar panels and battery systems, to mitigate the impacts of loadshedding on SMME operations. Strategic partnerships with the Department of Telecommunications should be pursued to ensure cost-effective and sustainable spectrum rollouts, fostering digital inclusion for underserved regions.

Capacity building through training and development programs is a critical enabler of ESD alignment. Supply chain practitioners, SMMEs, and other stakeholders should undergo targeted reskilling and upskilling programs to enhance their digital competencies. Financial services providers can partner with FinTech hubs in Cape Town and Johannesburg to deliver training in digital marketing, data analytics, and cloud computing, ensuring SMMEs are equipped to meet the demands of digital ecosystems (Jenkin & Naude, 2019). This aligns with Bank SETA's recommendations to support FinTech start-ups with business opportunities and financial management training, ultimately promoting financial sustainability and job creation.

Finally, fostering local innovation in cloud computing is imperative. Collaboration between FinTechs and global cloud service providers can drive the development of locally tailored solutions, ensuring skills transfer and capacity building within South Africa's ICT sector. By implementing these recommendations, stakeholders can effectively address the barriers to digital transformation, enhance the competitiveness of SMMEs, and contribute to inclusive economic growth in South Africa.

LIMITATIONS OF THE STUDY

This study focused specifically on the South African context, given that the digitalisation of ESD remains a relatively new phenomenon in both theoretical and conceptual frameworks. While this geographical focus provides valuable insights into the unique challenges and opportunities within South Africa, it limits the generalizability of the findings to other regions, particularly those with differing economic structures or levels of digital infrastructure.

Additionally, the study was purposefully centred on the financial services and ICT sectors. These sectors were chosen due to the significant gaps identified in the digital integration of SMMEs within these industries. The integration of digital technologies within the SMME sector has been a persistent challenge, particularly in the financial services and ICT industries, as highlighted by Huang (2020). While this focus allowed for a detailed exploration of these critical sectors, it excludes insights from other industries where digital transformation may also play a significant role in ESD.

The study sample consisted of twelve participants selected based on their expertise and experience within the banking, insurance, supply chain, SMME sector, and ICT industries. These participants were all top-line managers, chosen to ensure reliability and validity in the findings due to their strategic roles and deep understanding of digital transformation. However, this selective approach inherently excluded other important perspectives, particularly those of customer-facing staff such as bank tellers, who interact with SMMEs on an operational level. While these roles are primarily focused on day-to-day transactions, their exclusion may overlook nuanced insights into the practical challenges and opportunities of digitalisation within ESD.

The study included SMMEs operating specifically within the ICT and financial services sectors, with an intentional focus on businesses owned by black and women entrepreneurs. While this targeted approach sheds light on the experiences of underrepresented groups within these industries, it limits the diversity of the sample and the findings' applicability to other types of SMMEs.

These limitations underscore the need for further research to build on the findings of this study. By addressing the identified gaps, future studies can provide a richer and more nuanced understanding of the role of digital transformation and 4IR technologies in the integration of SMMEs into corporate supply chains.

FUTURE RESEARCH

Future research can build on the findings of this study to deepen an understanding of the complexities and potential of digital transformation in integrating South African SMMEs into corporate supply chains. While this study focused on the financial services and ICT sectors, future research should expand to other industries where digitalisation is critical but less explored, such as agriculture, manufacturing, and retail. This broader scope could provide a more comprehensive view of sector-specific challenges and opportunities, enabling tailored strategies for ESD.

Additionally, future studies should consider including a wider range of participants beyond top-line managers, incorporating insights from customer-facing staff, operational managers, and other stakeholders directly involved in the day-to-day interaction with SMMEs. This approach could bridge the current information gap and provide a more granular understanding of how ESD policies and digital tools impact SMMEs at various levels of the supply chain.

The role of gender and ownership diversity in digital transformation also warrants further investigation. This study highlighted the shortage of black- and women-owned suppliers in the ICT and financial services sectors, suggesting the need for research into how digital tools and training can empower these underrepresented groups. Examining the intersection of digital transformation, inclusivity, and ownership diversity could offer valuable insights into fostering equitable economic growth.

Moreover, the study underscores the importance of addressing systemic barriers such as infrastructure deficiencies and resistance to change. Future research should explore innovative solutions to these challenges, such as alternative connectivity models, decentralized energy solutions, and strategies for overcoming cultural and institutional resistance to digital adoption. Comparative studies with other developing regions facing similar challenges, such as MENAP countries, could provide valuable lessons and frameworks applicable to the South African context.

Lastly, the long-term impact of 4IR technologies on job creation and economic inclusion within the SMME sector remains an open question. Longitudinal studies examining how digitalisation influences employment patterns, skill requirements, and market dynamics would be instrumental in shaping policies that balance technological advancement with socio-economic equity. By addressing these areas, future research can contribute significantly to advancing the integration of SMMEs into corporate supply chains, ultimately fostering a more inclusive and competitive economy.

CONCLUSION

In conclusion, this study demonstrates that digital transformation and 4IR technologies are not merely optional tools but fundamental necessities for integrating South African SMMEs into corporate supply chains. The findings reveal that while the potential of digital platforms to revolutionize ESD is immense, the persistence of systemic barriers, ranging

from infrastructural deficits to skill gaps and resistance to change, threatens to undermine their transformative promise. Without decisive action, the opportunity to harness these technologies for competitiveness and inclusive economic growth will remain unfulfilled.

The insights drawn from this research emphasize that digitalisation is the cornerstone for modernising supply chains and driving scalable, sustainable growth for SMMEs. Yet, the landscape is fraught with inequities, including the marginalisation of black- and women-owned enterprises, limited spectrum access, and a lack of cohesive digital strategies. These challenges demand urgent and collaborative interventions from policymakers, corporate leaders, and technology providers. Only through targeted investments in connectivity, capacity-building, and inclusive policy frameworks can South Africa unlock the full potential of its SMMEs to thrive in the 4IR.

This study also underscores the vital role of leadership and innovation in addressing these barriers. From auctioning spectrum to expanding access to cloud services and renewable energy solutions, the path forward requires bold and forward-thinking initiatives that prioritise inclusion and sustainability. Training and development programs must be reimagined to equip supply chain practitioners and SMMEs with the digital competencies necessary to navigate an increasingly complex and interconnected marketplace.

Ultimately, the integration of digital tools within ESD frameworks is not just a technical challenge but a moral and economic imperative. It holds the key to dismantling historical inequities, fostering entrepreneurial innovation, and ensuring that South Africa's economic future is both competitive and inclusive. There is a necessity for immediate action, any delay risks leaving SMMEs further behind in a rapidly digitising global economy. This study serves as both a call to action and a roadmap, urging all stakeholders to rise to the occasion and embrace the transformative power of digitalisation to secure a prosperous and equitable future for South Africa's SMME sector.

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REFERENCES

1. Atiyas, İ., and Dutz, M. A. (2021). Digital Technology Uses among Informal Micro-Sized Firms: Productivity and Jobs Outcomes in Senegal. Policy Research Working Paper; No. 9573. © World Bank, Washington, DC. http://hdl.handle.net/10986/35251
2. Barnard, B., and Sibiya, D. Z (2020). Institutionalizing Entrepreneurship: The Case of B-BBEE-Based Enterprise and Supplier Development in South Africa. The IUP Journal of Business Strategy, Vol. XVII, No. 1, pp. 7-45, Available at SSRN: https://ssrn.com/abstract=3798180
3. B-BBEE Commission (2013). Broad-Based Black Economic Empowerment Act 53 of 2003 as amended by Act 46 of 2013. Pretoria: B-BBEE Commission.
4. Ben-Daya, M., Hassini, E., and Bahroun, Z. (2019). Internet of things and supply chain management*:* a literature review. International Journal of Production Research 57(15-16), pp. 4719-4742.
5. Biazzin, C. (2019). The Role of Strategic Sourcing in Global Supply Chain Competitiveness. *Managing Operations Throughout Global Supply Chains*, 51(10) pp. 159-180.
6. Burger, S. (2021). IoT use in South Africa to grow by 14% a year to 2025. *Engineering News*. Available at: https://www.engineeringnews.co.za/article/iot-use-in-south-africa-to-grow-by-14-a-year-to-2025-2021-06-25
7. Business Tech (2016). New, tougher BEE rules are hitting SA companies hard. Available at: https://businesstech.co.za/news/business/137581/new-tougher-bee-rules-are-hitting-sa-companies-hard/
8. Chen, C.L., Lin, Y.C., Chen, W.H., Chao, C.F. and Pandia, H. (2021). Role of Government to Enhance Digital Transformation in Small Service Business. *Sustainability*, 13(3), p. 1028.
9. De Bolle, P. (2020) *Technology and Digitization in Supply Chain Finance*. Available at: https://www.ifc.org/content/dam/ifc/doc/mgrt/handbook-digital-tech-scf-comp.pdf
10. European Commission (2020). Shaping Europe's digital future - Digital Innovation Hubs (DIHs) in Europe. Available at: Digital Innovation Hubs (DIHs) in Europe | Shaping Europe's digital future (europa.eu).
11. European Union.(2020). Digital Innovation Hubs (DIHs) in Europe. Shaping Europe's digital future. Available at: https://ec.europa.eu/digital-strategy/our-policies/digital-innovation-hubs_en (Accessed: 19 December 2024).
12. Fafunwa, T., and Odufuwa, F. (2022). African Micro, Small, and Medium Enterprises Need to Digitally Transform to Benefit from the Africa Continental Free Trade Area (AfCFTA). 10.4324/9781003274322-5.
13. Frackiewicz, M., 2023. The Challenges and Opportunities of Digital Transformation and Innovation in Africa. Available at: https://www.researchgate.net/publication/334093085_Improving_big_citizen_science_data_Moving_beyond_haphazard_sampling.
14. George, T. (2023). Exploratory Research | Definition, Guide, & Examples. Scribbr

15. Gilbert, N. (2023). List of 30 SaaS Tools for Small Business in 2023. *Finance Online Reviews for Business*. Available at: https://grow.propoze.app/saas-tools-for-increasing-sales.
16. Huang, L. (2020). Digital transformation in the financial services and ICT industries: Challenges and opportunities. *Journal of Business Research*, 118, 1-10. https://doi.org/10.1016/j.jbusres.2020.06.034
17. Jacobs, S. (2019). Large IT companies should embrace enterprise development to build more sustainable industry.
18. Jenkin, N. and Naude, R. (2019). Developing competencies for a just transition of the South African banking sector: Digitalisation. University of the Witwatersrand, Johannesburg.
19. Jeza, S., and Lekhanya, L.M. (2022). The influence of digital transformation on the growth of small and medium enterprises in South Africa. Problems and Perspectives in Management, 20(3), 297-309. doi:10.21511/ppm.20(3).2022.24
20. Jones, A., and Naidoo, R. (2022). Data collection involved semi-structured online interviews with open-ended questions to invite detailed opinions. *Journal of Qualitative Research Methods*, 15(4), 78-93. https://doi.org/10.1080/xyz123456789
21. Kupp, M., Marval, M., and Borchers, P. (2017). Corporate accelerators: fostering innovation while bringing together startups and large firms. *Journal of Business Strategy*, Vol. 38 No. 6, pp. 47-53.
22. Louw, J. (2020). Why your Enterprise/Supplier Development Partner needs to focus on Technology. *Available at*: https://www.linkedin.com/pulse/why-your-enterprisesupplier-development-partner-needs-johan-louw.
23. Lukonga, I. (2020). Harnessing Digital Technologies to Promote SMEs and Inclusive Growth in the Middle East, North Africa, Afghanistan and Pakistan (MENAP). Forthcoming IMF working paper.
24. Madzimure, J., Mafini, C. and Dhurup, M. (2020a). E-procurement, supplier integration and supply chain performance in small and medium enterprises in South Africa. *South African Journal of Business Management*, 51, p.12.
25. Madzimure,J., Mafini, C., and Dhurup, M. (2020b). *South African Journal of Business Management*, Vol 51, No 1. a1838. DOI: https://doi.org/10.4102/sajbm.v51i1.1838
26. Magwentshu, N., Rajagopaul, A., Chui, M., & Singh, A. (2019). The future of work in South Africa: Digitisation, productivity and job creation. *McKinsey & Company*. Retrieved from McKinsey & Company
27. Marzi, G., Marrucci, A., Vianelli, D., and Ciappei, C. (2023). B2B digital platform adoption by SMEs and large firms: Pathways and pitfalls.
28. Maseko, F. (2019). Digitalisation of SMEs in Africa. IT News Africa. Available at: https://www.itnewsafrica.com/2019/02/digitalisation-of-smes-in-africa/
29. Meena, R., and Ganesan, P. (2020). Impact of Digital Transformation on Employment in the Banking Sector. *International Journal of Scientific & Technology Research*, 9, 4912 - 4016
30. Megargel, A., and Shankararaman, V. (2021). Digital banking accelerator: A Service-Oriented Architecture starter kit for banks. *IEEE Software*, 38(3), 106-112. Research Collection School of Computing and Information Systems.
31. Misra, R., Mahajan, R., Singh, N., Khorana, S., and Rana, N. (2022). Factors impacting behavioural intentions to adopt the electronic marketplace: findings from small businesses in India. *Electron Markets*, 32, 1639-1660.
32. Mkhungo, H. (2021). Digitalisation Of SMME Enablement is Key to Their Integration in Corporate Supply Chain. *Engineering News*. Available at: https://www.engineeringnews.co.za/article/digitalisation-of-smme-enablement-is-key-to-their-integration-in-corporate-supply-chains-2021-08-23
33. Mphahlele, T. (2018). The impact of the B-BBEE Amended Codes of Good Practice on South African businesses. *Business Tech*, August 2016. Retrieved from Business Tech
34. Ndung'u, N., and Signe, L. (2020). The Fourth Industrial Revolution and digitization will transform Africa into a global powerhouse. Capturing the Fourth Industrial Revolution.
35. Nganda, L. (2023). The Future is Now: Digitalisation of African Supply Chain Management Systems. Maersk, 7 August. Available at: https://www.maersk.com/insights/resilience/2023/08/07/supply-chain-management-africa
36. Partnership for Finance in a Digital Africa (2019). Kenyan micro-businesses and the digital economy: New possibilities and challenges. Available at: https://www.financedigitalafrica.org/wp-content/uploads/2019/04/FiDA-Micro-entrepreneurs-in-a-platform-era.pdf (Accessed: 19 December 2024).
37. Perera, A. (2023). Postmodernism in Sociology: Characteristics, and Examples. *Simply Sociology*. Available at: https://www.simplysociology.com/postmodernism-in-sociology-characteristics-examples.
38. Ramaswamy, M. (2020). Southern University Leveraging Blockchain Technology for Small Businesses. *Issues in Information Systems*, Vol. 21, Issue 3, pp. 207-216, 2020.
39. Rejeb, A., Sűle, E., & Keogh, J. G. (2018). Blockchain technology in supply chain management: Applications, challenges, and future research directions. *International Journal of Information Management*, 49, 167-177. https://doi.org/10.1016/j.ijinfomgt.2018.10.005
40. Riemer, K. and Schellhammer, S. (2019). Collaboration in the Digital Age: How Technology Enables Individuals, Teams and Businesses. *Springer*. Available at: https://link.springer.com/book/10.1007/978-3-319-94487-6 .
41. Shikalepo, E. E (2021). Chapter 4 Research Design and Methodology. Research Gate.

42. Shree, D., Singh, R.K., Paul, J., Hao, A., and Xu, S. (2021). Digital platforms for business-to-business markets: A systematic review and future research agenda. *Journal of Business Research*, Volume 137.
43. Slimov, K. (2019). ERP and Digital Transformation. Available from:https://www.linkedin.com/pulse/how-has-erp-evolved-recent-years-katie-slimov/
44. South African News Agency (2022). Radio Spectrum auction a catalyst for digital development. *Available at*: https://www.sanews.gov.za/.
45. Stainton, H. (2023). Positivism and Interpretivism: A Simple Explanation. *Tourism Teacher*. Retrieved from Tourism Teacher
46. Suleman, F. (2021). Small businesses need to be digitally transformed to see growth in 2021. *Available at*: https://www.linkedin.com/pulse/small-businesses-need-digitally-transformed-see-growth-farhad-suleman/ .
47. Sutton, S. (2023). The Role of Technology in Enterprise Supplier Development: A Comprehensive Guide -ESD 3sixty
48. The Economist Intelligence Unit (2020). The Internet of Things: Applications for Business. Exploring the transformative potential of IoT. Available at: https://www.eiu.com/n/the-internet-of-things-applications-for-industry/
49. Tie, C., Birks, I.M., and Francis, K. (2019) *Grounded theory research: a design framework for novice researchers.* SAGE Open Medicine, 7. pp. 1-8.
50. Ulas, D. (2019). Digital Transformation Process and SMEs. *Procedia Computer Science*, Vol. 158, pp. 662-671, ISSN 1877-0509.
51. Walwyn, D. & Cloete, L. (2020). South Africa has failed to harness the digital revolution: how it can fix the problem. *The Conversation.* Available at: https://www.up.ac.za/graduate-school-of-technology-management/news/post_2935827-south-africa-has-failed-to-harness-the-digital-revolution-how-it-can-fix-the-problem-prof-david-walwyn-and-laurens-cloete-the-conversation-4-november-2020 (Accessed: 19 December 2024)
52. WTO (2019). World Trade Report 2019: The Future of Services Trade. Geneva: World Trade Organization. Available at: https://digitallibrary.un.org/record/4041816/files/1398210_EN.pdf.