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STRATEGIES FOR ENHANCING SOUTH AFRICAN ECONOMIC GROWTH IN THE DIGITAL ERA

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A RESEARCH ARTICLE SUBMITTED TO THE FACULTY OF COMMERCE, LAW, AND MANAGEMENT, UNIVERSITY OF THE WITWATERSRAND, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

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DECLARATION

I, Bongani Sidwell Sukazi (Student number: 2456884), hereby state that this Applied Research Project (ARP) titled “Strategies for enhancing South African Economic growth in the digital Era” is my own original work. Unless it says otherwise, all of the sources mentioned have been looked at. This ARP is part of the standards for the Masters in Business Administration degree at the Witwatersrand Business School (Wits Business School), University of the Witwatersrand, Republic of South Africa. Also, I want to say that neither I nor anyone was turned in this work for an educational certificate or degree at any other college or university.

_____

BONGANI SIDEWELL SUKAZI (MBA CANDIDATE)

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I would like to acknowledge Profs E. Schaling and J. Odei-Mensah, for their support and guidance during my academic journey. Your encouragement went a long way.

In loving memory and deepest gratitude, I dedicate this tribute to my beloved parents, Mr J.S. Sukazi and Mrs J.S. Sukazi. Their lives were a testament to sacrifice, boundless love, and a steadfast commitment to nurturing the seeds of continuous learning and personal growth. To you, dear parents, your legacy lives on in our hearts.

To my cherished and diverse family, encompassing the Sukazi lineage, mere words cannot express the depth of gratitude I feel for your unwavering support throughout my journey. Ngiyabonga kakhulu boMavundla.

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ABSTRACT

This study examines the potential for improving sustainable economic growth and development in the Republic of South Africa (RSA) by leveraging advancements in the digital era. The paper evaluates the capacity of information communication technologies (ICTs) to promote economic growth and development. It specifically examines the spread of these technologies, as well as the institutional and regulatory frameworks in the sector, and explores how these new ICTs can contribute to sustainable economic growth and development. The primary aim of the study is to offer the government solutions for capitalizing on the prospects for sustainable development by extensively utilizing ICTs. Significant insights are derived from comprehensive literature research and the analysis of strategic papers that speak directly towards the ICT environment. The ICT ecosystem in the country is facing challenges, with much lower average tele density, mobile access, internet, and broadband penetration rates. The country's limited adoption of ICT hinders the ability to utilize digital solutions for promoting sustainable development. To fully harness the benefits of ICTs in promoting sustainable development in RSA, it is recommended that the country's policy and regulatory framework be strengthened to address the existing lack of regulatory capacity and to foster the growth of the sector and innovative practices that contribute to the economy. Moreover, it is crucial to ensure the security of electronic transactions and prevent RSA from becoming a sanctuary for cyber-crime. This importance cannot be overstated. Similarly, the ICT sector necessitates a supportive policy framework, which includes well-organized national strategies that incorporate ICT-driven progress. Enhancing the impact of new ICTs on the economy relies heavily on strengthening the policy and regulatory environment, as this promotes higher levels of ICT investment and dissemination.

DEFINITION OF KEY CONCEPTS

Digital era: a period in which the circulation of information occurs very easily and quickly, affecting the circulation of knowledge in society

Digital divide: The digital gap limits equal participation and opportunity in all aspects of life, hurting people of colour, Indigenous peoples, low-income households, people with disabilities, and older adults disproportionately.

Digital Infrastructure: The availability and quality of digital infrastructure, such as broadband internet, cellular networks, and Wi-Fi hotspots, can have a substantial impact on digital equity.

Digital Literacy: The skills, knowledge, and attitudes required to effectively use digital technology are referred to as digital literacy.

Digital redlining: Digital redlining is discrimination by internet service providers on the basis of income, race, and ethnicity.

Gross Domestic Product: the total value of goods produced, and services provided in a country for one year

Economic growth: An increase in the amount of goods and services produced per head of the population over a period of time

Fourth industrial revolution: the next phase in the digitisation of the manufacturing sector

Policy and Regulation: Policy and regulation can have a considerable impact on digital equity, both positively and negatively.

ABBREVIATIONS

4IR	Fourth Industrial Revolution
CEF	Connecting Europe Facility
Cov19	Covid 19
DAE	Digital Agenda for Europe
DATA	Deployment Accuracy and Technological Availability
EEC	European Electronic Communications Code
EU	European Union
GDP	Gross Domestic Product
ICT	Information and communication and telecomms
IIJA	Infrastructure Investment and Jobs Act
IMF	International Monetary Fund
NDP	National Development Plan
SOE	State Owned Entity
Stats SA	Statistics South Africa
US	United States

Table of Contents

DECLARATION i
ACKNOWLEDGEMENTS ii
SUPPLEMENTARY INFORMATION iii
ABSTRACT iv
DEFINITION OF KEY CONCEPTS v
ABBREVIATIONS vi
CHAPTER 1. INTRODUCTION 1
1.1 Introduction 1
1.2 Background of the study 1
1.3 Research conceptualization 3
1.3.1 Problem statement 3
1.3.2 Research questions 6
1.3.3 Research objectives 6
1.4 Delimitations of the study 7
1.5 Significance of the research study 7
1.6 Research chapter outline 8
CHAPTER 2. LITERATURE REVIEW 9
2.1 Introduction 9
2.2 Background 9
2.2.1 Global North 11
2.2.2 Global South 13
2.2.3 South African perspective 14
2.3 Theoretical framework 17
2.3.1 Equity theory 17
2.3.2 Stakeholder theory 18
2.3.3 Relative deprivation theory 18
2.3.4 Institutional theory 18
2.3.5 Applying and integrate trans-disciplinary management theories applicable to the problem statement 19
2.4 Conceptual framework 22
2.5 Empirical literature review 23
2.6 Research proposition 26

2.7 Key knowledge gaps 26
2.8 Conclusion 27
CHAPTER 3: RESEARCH METHODOLOGY 28
3.1 Introduction 28
3.2 Research Strategy 29
3.3 Research Design 31
3.4 Data Collection and Sampling 32
3.4.1 Data Sources 32
3.4.2 Sampling Procedure 33
3.4.3 Data Collection Instrument 34
3.5 Data Analysis 35
3.5.1 Descriptive Statistics 35
3.5.2 Inferential Statistics 36
3.6 Validity and Reliability 37
3.7 Ethical Considerations 38
CHAPTER 4. PRESENTATIONS OF RESULTS 40
4.1 Introduction 40
4.2 Key factors 41
4.2.1 Universal access 41
4.2.2 ICT Procurement 42
4.2.3 Public Sector Involvement 43
4.2.4 Investment 44
4.3 Impact on the economy 45
4.3.1 Revenue generated 45
4.3.2 Employment created 45
4.3.3 Job creation 47
4.3.4 Skills 48
4.4.4 Economy 49
4.4 Conclusion 49
CHAPTER 5. DISCUSSIONS AND RECOMMENDATIONS 51
5.1 Discussions 51
5.2 Findings 51
5.3 Recommendations 53

5.2.1 Recommendation 1. Investing in ICT skills 53
5.2.2 Recommendation 2. Attract FDI 54
5.2.3 Recommendation 3. Investment in R&D 54
5.2.4 Recommendation 4. Infrastructure development 54
5.2.5 Recommendation 5. Public sector involvement 55
5.2.6 Recommendation 6. ICT product promotion 55
5.2.7 Recommendation 7. Universal access 55
5.2.8 Recommendation 8. ICT Regulatory environment 56
CHAPTER 6. CONCLUSION 57
6.1 Introduction 57
6.2 Summary 57
6.3 Recommendations for future research 57
REFERENCES 59

CHAPTER 1. INTRODUCTION

1.1 Introduction

This research aims to investigate solutions for promoting economic growth in South Africa within the digital era. Prior to discussing the study conceptualization in section 1.2, we provide an introduction to the terms and concepts used in this research in section 1.1 in a basic and broad manner. The research conceptualization part includes the research problem statement (section 1.2.1), the aim of this research (section 1.2.2), and the research questions (Section 1.2.3). The boundaries and underlying beliefs of the research study may be found in section 1.3. The importance of the research study is discussed in section 1.4, and an introduction to the research report is provided in section 1.5.

1.2 Background of the study

Economic growth refers to the enhancement of an economy's ability to generate goods and services within a specific timeframe, as assessed by Raisova and Durcova (2014). Hall and Sobel (2006) provided a definition of economic growth as the process of utilizing economic inputs and resources, such as a skilled workforce, investment, and funding for new and established enterprises, to produce economic results such as increased income and job opportunities. Gross domestic product (GDP) is the standard statistic used to quantify economic growth. According to Leamer (2009), GDP is defined as the monetary worth of all commodities and services produced within a country, both for domestic and foreign use, within a twelve-month period. GDP per capita is a statistic used to compare countries based on their population and gross domestic product (GDP) levels. It is computed by dividing a country's real GDP by its population (World Bank, 2022).

The global Gross Domestic Product (GDP) has shown a rise from US$66.6 trillion in 2010 to US$96.1 trillion in 2021, indicating a cumulative growth rate of 44.29% (World Bank, 2022). The GDP experienced a growth rate of 13.18% over the period from 2020 to 2021. These data account for a rebound from the 3.13% decrease observed in 2020 compared to 2019, which was caused by the severe impact of the COVID-19 epidemic (World Bank, 2022). The worldwide real gross domestic product (GDP) per person

amounts to US$12,263, according to the World Bank's data for the year 2022. The economic growth of South Africa's real GDP is strongly correlated with the overall performance of the global economy. Recent economic growth trends in South Africa have seen a total gain of 28.71% in GDP, rising from US$614.1 in 2010 to US$790.4 in 2019. However, this suggests that while the South African economy is expanding, it is falling behind global standards. From 2017 to 2020, the average annual real GDP growth rate was -1.2%, according to the World Bank's World Economics report in 2021. However, the target growth rate set by the National Development Plan 2030 is 5% per year. In 2021, the GDP per capita amounted to US$6,994, which is 42.97% below the global average. This calculation is derived using the formula (US$12,263 - US$6,994) / US$12,263. South Africa must nearly double its production/GDP in order to reach the same level as the rest of the globe. This would require an increase of 75.33% (US12,263/US6,994-1).

Seleteng and Motelle (2015) identified several primary drivers of economic growth in Southern Africa, which includes, government expenditure, human capital development, free trade, social and political stability, and financial development. Anyanwu (2015) proposed that countries characterized by well-functioning and high-quality institutions, such as State-Owned Entities and government agencies, as well as higher levels of domestic investment, are likely to witness more rapid economic growth. According to Anyawu (2014), the key elements that influence economic growth in Africa and South Africa are domestic investment, advancements in education, the efficiency of government institutions, the prices of metals or resources, the increase of urbanization, and net official development assistance. South Africa's sluggish economic growth can be attributed to its dysfunctional institutions, as outlined in the National Development Plan 2030, and its significantly low domestic investment. Consequently, the country's growth rate is slower compared to its worldwide competitors.

We are currently experiencing the onset of the fourth industrial revolution, which has led to the world economy and corporations functioning inside a digital environment. In their 2011 study, Sener and Saridogan proposed that nations that placed a high importance on research, technology, and innovation have established a lasting

competitive edge and achieved sustained economic growth. The digital era encompasses the establishment of enduring socio-economic connections between communities and organizations through the utilization of technology and the application of advanced knowledge facilitated by technology. As per the research conducted by Khan and Aftab in 2015, digitalization has a beneficial influence on both the economy and society. It accomplishes this by diminishing unemployment rates, enhancing knowledge accessibility, and lowering production expenses. Traditional physical businesses are being impacted by innovative companies that have transitioned their operations to omnichannel and cloud-based platforms (source). Customers have transitioned to utilizing online banking platforms, including popular apps like Takealot, Mr Delivery, and Amazon, resulting in a substantial transformation of the retail landscape towards e-commerce.

The Corona Virus Disease 2019 (COVID-19) pandemic brought to light the importance of the digital economy's impact on economic development. During the COVID-19 pandemic, digitization was instrumental in reducing economic losses and fostering economic recovery (Zhang et al., 2022). Under this digital era, South Africa must embrace, learn, and, most importantly, thrive. South African businesses must align and assume a leading role if we are to compete. Consequently, the primary objective of this research is to investigate the potential for the South African economy to expand in the digital era, thereby generating wealth, reducing poverty, inequality, unemployment, and underdevelopment, and fostering social cohesion.

1.3 Research conceptualization

1.3.1 Problem statement

The problem is that while extensive literature confirms digitalization as a powerful driver of global economic growth (Sabbagh et al., 2013), a significant research gap exists in applying this knowledge to South Africa’s unique and persistent economic challenges. The country's growth is severely constrained, failing to outpace population increases and exacerbating deep-rooted issues of unemployment, poverty, and inequality (Stiegler, 2020). Existing studies have thoroughly documented the benefits of ICT adoption and reviewed various policy interventions in both developed and developing nations. However, this body of work has not sufficiently addressed how

digital strategies can be specifically adapted and implemented to overcome South Africa’s distinct structural impediments, including inefficient state-owned enterprises, constraints on small businesses, and a profound digital divide rooted in historical inequality. Consequently, a critical knowledge gap remains in formulating an integrated strategic framework that effectively harnesses digital transformation not just for marginal gains, but as a primary mechanism to fundamentally resolve the nation's persistent socio-economic challenges and catalyze sustainable, inclusive growth.

South Africa is experiencing constrained economic growth, failing to keep pace with population increases and lagging behind global benchmarks. This underperformance exacerbates critical socio-economic challenges, including high unemployment, poverty, and inequality. Key contributing factors to this stagnation include a low national savings rate, an inadequate education system, significant constraints on small and medium-sized enterprises, inefficiencies within state-owned enterprises, and a challenging business environment. In the context of the global digital era, these problems are compounded by the nation's limited adoption and diffusion of Information and Communication Technologies (ICTs). Despite the proven potential of digitalization to drive GDP growth, create jobs, and enhance productivity, South Africa's progress is hindered by a weak policy and regulatory framework, insufficient investment in digital infrastructure, and a persistent digital divide. The country is not effectively capitalizing on the transformative opportunities of the digital economy to stimulate sustainable development, address structural economic flaws, and improve its global competitiveness. This leaves South Africa in a vulnerable position, unable to fully leverage technological advancements to build a more inclusive and prosperous economy for its citizens.

South Africa is presently experiencing a phase of constrained economic growth, which lags behind the rate of population increase. This adversely impacts unemployment, development, poverty, and inequality. Stiegler (2020) identifies five factors contributing to the low growth rate of 1.1% over the past four years, alongside a population growth of 1.6%: insufficient savings rate, inadequate education system, constraints on Small, Medium, and Micro Enterprises (e.g., cash flow challenges and capital limitations), inefficient State-Owned Enterprises, and the business environment in South Africa.

The International Monetary Fund (IMF, Article IV, 2023) recommends that South Africa meticulously assess its fiscal circumstances to mitigate debt risks and foster conditions conducive to enhanced real economic growth. It also advises rectifying the eight principal strategic flaws highlighted by the Financial Action Task Force to combat and prevent money laundering. The IMF advocates for structural reforms including the restoration of energy security, the alleviation of transportation bottlenecks, the resolution of unsustainable high unemployment, the rationalization of inefficient State-Owned Entities, the promotion of competition and regional integration, and the enhancement of good governance. Finally, the IMF advocates for enhancing gender inclusion (IMF Article IV, 2023).

According to Statistics SA, South Africa achieved an average real growth rate of 5% per annum from 2004 to 2007 and from 2008 to 2012 an average real growth rate of just above 2% due to global economic recession.

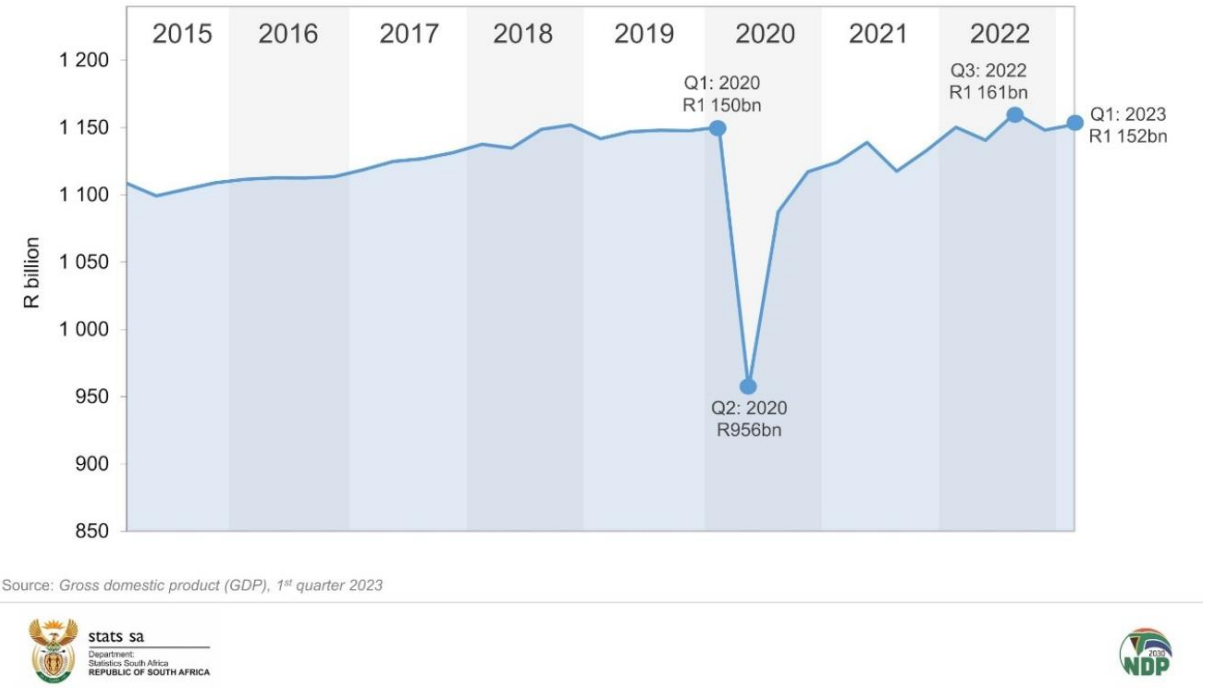


Figure 1 GDP expansion of 0.4% in Q1 of 2023 (Source StatsSA).

The relatively lower economic growth in relation to population increase indicates a negative growth per capita. Meyer (2014) attributes South Africa's elevated unemployment rate to inherent flaws in the country's economic framework, which in turn have led to widespread poverty, inequality, and various other socio-economic

predicaments. Meyer suggests a range of measures to stimulate economic development and growth, such as strong leadership, a common vision, enhanced education and skills training, reform of labor regulations, improved implementation of government policies, fostering entrepreneurship, targeted sectoral development, and increased investment in research and development. The synchronization of all these suggested remedies will result in a complete turnaround of unemployment, underdevelopment, poverty, and inequality.

Sabbagh et al. (2013) state that digitalization is a powerful force that drives economic progress and promotes job creation. In 2011, the process of converting information into a digital format contributed a total of US$193 billion to the overall economic output worldwide and resulted in the creation of six million job opportunities. According to a 2013 report by Booz & Company, digitization in 2011 had a significant impact on GDP growth, contributing $8.3 billion, and also resulted in the creation of 618,699 jobs. The economic impact of digitization is growing fast as countries and regions transition to increasingly powerful digital technologies. Developing and promoting the ICT ecosystem in South Africa is crucial in order to fully use the advantages of digitalization.

1.3.2 Research questions

The main research question for this research is how the South African economy can be grown or developed in the digital era or environment. The research question will be answered by looking at the following:

- Do factors such as policy environment, infrastructure development, human capital and trade relations influence economic growth in South Africa?
- Would Digitization have an impact on productivity and job creation in the South African economy and to what extent would Digitization influence innovation, GDP growth and rate of employment?
- How can South Africa capitalize on digitization to enhance its economic growth?

1.3.3 Research objectives

The following research objectives were brought forward.

- To identify key factors that can influence the impact of digitization on the economic growth in South Africa.
- To quantitatively measure the impact of digitization on GDP growth in the South African economy.
- Provide recommendations.

1.4 Delimitations of the study

The research makes the assumption that the majority of South Africans have access to the internet and digital gadgets at a fundamental level. In addition to this, it presupposes that digital equity, both in the past and in the present, has a discernible influence on the economy of South Africa. Several factors contribute to South Africa's bad economic situation, including historical redlining tactics, economic inequality, gaps in infrastructure, education discrepancies, and policy and regulation concerns. These factors all contribute to the country's poor economic situation. Taking action to address infrastructure inequities is of the utmost importance since it has a direct influence on the accessibility and quality of digital services. Through the examination of economic inequality, the study emphasizes the ways in which income disparities affect access to digital technology and provide strategies to bridge the economic divide.

The use of delimitations helps to narrow the scope of the study and define its boundaries, which in turn provides insights that are more targeted and insightful into the particular features of digital equity and redlining in South Africa. The study is able to provide actionable insights that are relevant and practicable for policymakers and local authorities to execute because it focuses on specific urban regions, has a sample size that is manageable, has a specified timeline, and provides suggestions that are targeted to the specific issues being investigated.

1.5 Significance of the research study

The rationale for this research is to understand how digitization is currently impacting the South Africa economy, to draw on lessons from developed economies and organizations in order to drive development and economic growth in our economy. The research will be used to recommend solutions or strategies for the South African social

partners (government, business, and labour) on what route to take in order overcome the development and economic growth challenges.

1.6 Research chapter outline

This study comprises six chapters. Chapter 1 provides an overview of the study's background, including the problem statement, research objectives, research questions, propositions, delimitations, assumptions, and the significance of the study. The remaining portion of the study is divided into the following sections. Chapter 2 presents a comprehensive literature review that examines the problem, previous investigations, the theoretical and conceptual frameworks, the legislative perspective, and the formulation or propositions. Chapter 3 explores several aspects of the research process, including the research paradigm, research design, data collection methods, demographic and sampling procedures, research instruments, data analysis reliability and validity metrics, and ethical considerations. Chapter 4 presents the outcomes. Chapter 5 summarizes and discusses the findings in relation to the research questions. Chapter 6 provides a concise summary and draws conclusions based on the study conducted.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This section is the most critical element of the research, as it contextualizes the study by placing it within the existing body of knowledge. It identifies the gaps and limitations and reveals areas where current research is deficient or incomplete. Additionally, it will contribute to the methodology by facilitating the selection of suitable research designs, methods, and instruments, as outlined in Chapter 3. Additionally, it establishes a theoretical framework that is appropriate to theories and concepts, which serves as the foundation for this study. This section also improves the validity and reliability by illustrating an understanding of potential biases and limitations. Further, it facilitates the comparison and generalization of findings with other studies. By advocating for ethical research practices, it prevents the duplication of prior research and promotes awareness of ethical considerations. Ultimately, it contributes to the field's collective knowledge and progress.

2.2 Background

According to Khan (2015), the digital era and digitization has significantly altered the global economy, societal connections, and the development of new industries, while also disrupting numerous others. Digitization is the primary factor driving economic development in developing countries, as it enhances the productivity of capital and labor and decreases transaction costs (Dahlman et al., 2016; Myovella et al., 2020). Additionally, the digitization of a nation is crucial for its integration into global industries (Jurayevich and Bulturbayevich, 2020). Economic development is anticipated to be significantly influenced by digitization and the development of the digital economy, as per Jiao and Sun (2021). Vu et al (2020) advocate for countries to conduct a comprehensive examination of the relationship between economic development and digital technology, with a particular emphasis on the direct or indirect effects of these technologies on economic performance.

Parviainen et al. (2017) concluded that digitization requires incremental economic expansion. Parviainen et al. (2017) also observed that countries that have made significant progress in digitization experience significantly greater economic

advantages than those that are still in the early phases of its implementation. A positive contribution to economic growth was observed in study that reviewed the impact of digital transformation on the development of the economies of selected Sub-Saharan African countries (Myovella et al., 2020). The framework for evaluating the socio-economic impact of digitization considers three components: (a) economy, which is measured by GDP growth and GDP per capita, employment creation, and innovation. Society: monitoring the quality of life and access to basic amenities (b) governance: focusing on transparency and corruption (c) Education and e-governance (Sabbagh et al., 2013).

The quality of social life, employment creation, and education is being impacted by digitization and the digital economy. Global economies are transitioning from resource-driven to knowledge-driven due to digitization. Khan et al. (2015) found that the advancement in digitisation resulted in 19 million jobs growth globally from 2009 to 2010 and 18 million jobs growth from 2007 to 2008. Conventional industries are being revolutionized by digital platforms and ICT advancements (Yong et al., 2020). This is resulting in a reduction in costs, an improvement in work-life balance, and an increase in productivity and autonomy for both employees and employers. Zaric and Bozhovic (2021) demonstrated a correlation between labor productivity and digital technologies. The accelerated realization of digitisation benefits is contingent upon the establishment of infrastructure and economic inclusion for all members of society.

World Digital Competitiveness (2021) identifies three primary factors that contribute to digital competitiveness: (a) knowledge (which encompasses talent, training, education, and scientific concentration), (b) technology (which encompasses the regulatory framework, capital, and technological framework), and (c) future readiness (which includes adaptive attitudes, business agility, and IT integration). In terms of technological/digital capabilities, South Africa has experienced a decline from a score of 5.77 in 2018 to 5.48. The digital competitiveness of our economy is contingent upon the acquisition of digital/technological skills that would provide a competitive advantage over our competitors. The score of digital transformation in companies/organizations in our country has also decreased from 5.61 in 2018 to 5.19 in 2022.

2.2.1 Global North

Conversely, in developed nations, the emphasis is on guaranteeing that all citizens have equal access to the advantages of digital advancements. For example, the Australian Digital Inclusion Index offers a comprehensive evaluation of digital inclusion in various demographics and regions, which informs targeted policy interventions (Wilson, Thomas, & Barraket, 2019). The legislative parameters for digital equity as a remedy to improve economic output are multifaceted and necessitate a nuanced approach. The effective implementation and adaptation of these policies to the diverse requirements of global communities remain a challenge, despite the substantial progress that has been made, particularly in developed regions. To effectively address this and bridge the digital divide, future legislative initiatives must implement robust implementation strategies and international cooperation. Their approach should be holistic and context specific.

The United States has implemented a variety of legislative measures, which is indicative of an evolving approach to ensuring digital equity and ultimately leveraging from the digital ear to improve its economy. The success of these measures in addressing the requirements of marginalized communities has been inconsistent, despite their intention to promote competition and expand services to underserved areas. The US Telecommunications Act of 1996 was a groundbreaking legislative initiative that sought to de-regulate the telecommunications industry. Its primary objectives were to promote competition, reduce prices, and expand telecommunications services to underserved regions (Gillwald, Moyo, & Rademan, 2021). Nevertheless, critics contend that the Act has failed to adequately address the requirements of marginalized communities. The Act has frequently exacerbated the digital divide, according to Lambright (2019), rather than bridging it. This is primarily due to its failure to guarantee equitable access to the most recent technologies and infrastructure advancements for all demographic groups. This legislation, the US Broadband Deployment Accuracy and Technological Availability (DATA) Act of 2020, is a substantial effort to enhance broadband access in the United States. The Act requires the acquisition of more precise data on broadband availability, which is essential for the more accurate identification of underserved areas (Gillwald, 2019). The enhanced granularity of data is designed to provide more accurate information for

policy decisions and funding allocations, thereby ensuring that resources are allocated to the most critical areas. This Act is a significant improvement in addressing the inaccuracies and voids in previous broadband maps, which frequently neglected rural and low-income urban areas, as per Peha (2020).

Significant investments in broadband infrastructure are included in the US Infrastructure Investment and Jobs Act (IIJA), which was enacted into law in 2021. The Act allocates $65 billion to enhance broadband access, with a particular emphasis on the expansion of high-speed internet to rural and underserved urban areas (Federal Communications Commission, 2021). The IIJA endeavors to comprehensively address the digital divide by providing funding for infrastructure projects, digital literacy initiatives, and affordability programs. This Act is a more comprehensive approach to addressing digital redlining, acknowledging the multifaceted nature of digital inequities (Horrigan,, 2021). In spite of these legislative initiatives, there are still obstacles to effectively mitigating digital equity. One significant criticism is that the majority of these measures concentrate on infrastructure and access, frequently neglecting the equally critical issues of affordability and digital literacy (Napoli & Obar, 2020). Additionally, the implementation and enforcement of these legislative measures are subject to significant variation across various states and localities, resulting in inconsistent results. The absence of a coordinated national strategy and the dependence on state-level execution, as highlighted by Bode (2021), can lead to discrepancies in the efficacy of these policies in addressing digital redlining.

The European Electronic Communications Code (EECC), which was implemented in December 2018, is designed to modernize and harmonize the regulatory framework for electronic communications in the European Union. It emphasizes the significance of universal service obligations (USOs), which guarantee that all citizens have access to high-quality broadband services at a reasonable cost (Directive (EU) 2018/1972). However, its efficacy is contingent upon national implementations, and certain member states have been slower to adopt comprehensive measures, resulting in uneven development throughout Europe (Bauer & Bohlin, 2020).

The Digital Agenda for Europe (DAE), which is a component of the Europe 2020 Strategy, sets objectives for the enhancement of digital literacy and broadband access, as well as the promotion of digital literacy, skills, and inclusion (European Commission, 2019). The DAE has encountered difficulties in addressing the profound socioeconomic factors that contribute to digital inequity, despite its ambitious objectives. Van Dijk (2020) has observed that progress has been made; however, the tempo is frequently impeded by financial and infrastructural constraints in less developed regions. The Connecting Europe Facility (CEF) is a fund that aims to support initiatives that improve digital connectivity across the continent by providing funding for trans-European networks, including digital infrastructure (European Commission, 2020). Despite the fact that CEF funding has facilitated a multitude of projects, the allocation process can be intricate and competitive, which frequently disadvantages smaller, less resourced communities that are most in need of digital infrastructure enhancements (Falch, 2019).

2.2.2 Global South

The pursuit of digital equity in Africa is exemplified by a number of legislative initiatives. South Africa's National Integrated ICT Policy White Paper aims to guarantee universal access to affordable broadband by means of regulatory reforms and infrastructure sharing. However, it encounters obstacles such as inadequate funding for digital literacy programs and slow rural connectivity (Republic of South Africa, 2020; Dlodlo, 2022). Nigeria's National Broadband Plan (2020-2025) is designed to achieve 90% broadband penetration by improving regulatory frameworks and promoting public-private partnerships. However, the expansion of the plan into underserved regions is impeded by funding gaps and bureaucratic delays (Nigerian Communications Commission, 2020; Olusola & Oyelaran-Oyeyinka, 2021). Kenya's Digital Economy Blueprint 2019-2023 emphasizes sectoral digital transformation and inclusivity in financial services and e-commerce, but it encounters obstacles in the development of digital skills and rural internet accessibility (Government of Kenya, 2019; Ng'ang'a, 2020). In a similar vein, Rwanda's Vision 2020 and beyond seeks to establish the nation as a knowledge-based economy by implementing a wide range of digital access initiatives. However, the country is faced with challenges in rural connectivity and comprehensive digital skills training (Government of Rwanda, 2021; Karangwa, 2022).

The implementation of digital equity strategies in Africa is contingent upon economic status, with high-income countries such as South Africa and Kenya making substantial progress in digital infrastructure and literacy. However, there are persistent challenges in ensuring equitable distribution (Dlodlo, 2022; Ng'ang'a, 2020). In contrast, middle and low-income countries, such as Nigeria and Rwanda, face more severe infrastructural and economic obstacles, which require the implementation of innovative policy strategies and partnerships to effectively address the digital divide (Olusola & Oyelaran-Oyeyinka, 2021; Karangwa, 2022).

The primary obstacles to attaining digital equity are the need for sustainable funding mechanisms, policy coherence that is consistent with developmental objectives, improved stakeholder engagement, and robust monitoring and evaluation frameworks to ensure accountability (Milner, 2019; Awojobi & Ndiaye, 2020). These imperatives underscore the necessity of comprehensive legislative frameworks that are customized to the diverse socio-economic contexts of Africa. These frameworks should be designed to ensure that all African citizens have equitable access to digital technology through innovative and inclusive policies, thereby combating digital redlining (Republic of South Africa, 2020). Although African nations have made progress in digital equity through initiatives such as national broadband plans and digital economy frameworks, persistent disparities require ongoing efforts and adaptive strategies to achieve universal digital inclusion across the continent.

2.2.3 South African perspective

In order to guarantee universal access to affordable broadband in South Africa, it is imperative to examine the multifaceted perspectives and approaches of both the public and private sectors regarding the policy. The 2020 National Integrated ICT Policy White Paper of the Republic of South Africa is a strategic initiative that aims to address digital disparities throughout the country by overcoming regulatory obstacles and fostering infrastructure sharing. The government's initiatives are primarily concentrated on the expansion of broadband coverage and the improvement of digital literacy through concerted public investments and regulatory reforms from a public sector perspective. This method emphasizes a dedication to bridging the digital divide, which disproportionately impacts rural and marginalized urban communities. The

government's objective is to establish an environment that is conducive to economic development, social inclusion, and democratic participation by investing in broadband infrastructure (Dlodlo, 2022).

These endeavors are enhanced by the private sector's perspective, which is achieved through investments in digital infrastructure and partnerships. Although private entities are instrumental in the expansion of broadband access, particularly in urban and economically viable regions, obstacles such as profitability concerns in underserved and remote areas continue to exist. These profitability challenges are identified by the ICT Sector Council (2021) as substantial impediments to the equitable deployment of broadband infrastructure throughout South Africa. Rural areas frequently encounter higher costs and lesser returns on investment, which result in slower deployment rates and perpetuate digital exclusion in these regions, despite the potential for profitability in urban centres. Additionally, the private sector's participation is essential for the efficient and innovative delivery of services; however, it requires a regulatory framework that is well-balanced and encourages investment in underserved regions. The obstacle is in the alignment of private sector incentives with broader developmental objectives, thereby guaranteeing that the deployment of digital infrastructure extends beyond commercially profitable markets to incorporate socially impactful outcomes. This necessitates continuous communication between government regulatory bodies and private sector stakeholders to optimize policies that foster sustainable development and mitigate financial risks in all regions of South Africa.

Although the National Integrated ICT Policy White Paper of South Africa is a substantial milestone in the pursuit of universal broadband access, the success of these initiatives is contingent upon the collaboration of the public and private sectors. The critical challenge of addressing profitability concerns in marginalized areas necessitates strategic investments and nuanced policy interventions to promote equitable digital inclusion on a national scale. South Africa can advance toward its digital equity objectives and guarantee that all citizens capitalize on the advantages of comprehensive broadband access by improving regulatory frameworks and encouraging private sector participation.

The Digital Transformation Strategy 2020-2030 of South Africa is a multifaceted strategy that is intended to capitalize on digital technologies in order to foster inclusive economic development. This strategy prioritizes the expansion of e-government services, digital skills training, and infrastructure development (Department of Communications and Digital Technologies, 2021). It is designed to create an environment that is conducive to economic inclusivity and societal development in order to address the digital divide. The government's objectives from a public sector perspective are to establish robust regulatory frameworks, achieve policy coherence, and make targeted public investments to bridge digital divides across socio-economic strata. This necessitates the development of policies that facilitate the deployment of digital infrastructure and guarantee its equitable distribution, particularly in marginalized urban and rural areas. The collective objective of government initiatives is to promote greater social inclusion and economic participation. This includes substantial investments in broadband infrastructure, the support of digital literacy programs, and the enhancement of the accessibility of e-government services (Dlodlo, 2022). These endeavors are essential for the establishment of a facilitating environment that promotes digital innovation and guarantees that the advantages of technological advancements are available to all members of society. Deichmann, Goyal, and Mishra (2019) conducted research that underscores the significance of governmental policy coherence and regulatory frameworks in the promotion of digital inclusivity. Additionally, their research emphasizes the beneficial effects of public investments in digital infrastructure on economic growth and social development.

By contrast, stakeholders are instrumental in the private sector's efforts to promote innovation and service provision, which are critical for the expansion of digital access and services to marginalized communities. Private entities play a critical role in the development and deployment of new technologies, the establishment of digital platforms, and the provision of essential services that promote digital inclusion. Public-private partnerships (PPPs) are especially significant in this context, as they facilitate the pooling of resources, expertise, and infrastructure, thereby increasing the efficacy and reach of digital initiatives.. Public investments may not be sufficient to address the deficiencies in digital infrastructure and services that private sector contributions are essential for addressing (ICT Sector Council, 2021). Nevertheless, the comprehensive

deployment of digital infrastructure is still impeded by profitability concerns in less economically viable regions. Aker and Mbiti (2021) have conducted studies that underscore the obstacles that private enterprises encounter when investing in marginalized regions. These studies identify high costs and low returns on investment as substantial obstacles.

2.3 Theoretical framework

2.3.1 Equity theory

The Equity Theory, which is profoundly rooted in the pursuit of fairness in social and economic interactions, provides a valuable lens for understanding digital equity disparities in both workplaces and broader societal contexts, such as the changing digital landscape of South Africa (World of Work, 2021). Digital equity is especially important in a country with a history of apartheid, such as South Africa, because it encompasses fair and equal opportunities in the utilization of digital resources, in addition to ordinary access (Gudmundsdottir, 2010).

The Equity Theory offers a nuanced analysis of the access to and utilization of digital technologies, thereby identifying disparities in digital equity and directing efforts to reconcile them. The relevance of the Equity Theory in comprehending digital equity dynamics is affirmed by Mukuhlani & Musara (2020) and Nxumalo (2021). Employees' attitudes toward digital resources in workplace interactions are substantially influenced by their perceptions of fairness, which in turn affects their job satisfaction. The urgency to address digital equity is exacerbated by disparities in digital access, which contribute to feelings of exclusion and disengagement in educational settings, particularly in the context of the COVID-19 pandemic.

Equity Theory and other theoretical frameworks illuminate how individuals perceive technology access in terms of equity and fairness (Warschauer & Matuchniak, 2010). The digital divide, which restricts opportunities for lower socioeconomic groups, is exacerbated by the correlation between socioeconomic status and internet access (DiMaggi & Eszter, 2001). Perceptions of fairness in digital equity are significantly influenced by government policies. Policies that prioritize digital equity are perceived

as fair and equitable, while those that disregard the digital divide are considered discriminatory (Mossberger et al., 2003).

2.3.2 Stakeholder theory

According to R. Edward Freeman's Stakeholder Theory, businesses should take into account the concerns and interests of all stakeholders, rather than solely focusing on shareholders, when making decisions (Freeman, 1984). This theory plays a crucial role in comprehending digital inequality by highlighting the importance of inclusive decision-making procedures that acknowledge and tackle the requirements of underrepresented communities. The approach promotes the inclusion of diverse stakeholders, particularly those from marginalized groups, in the process of designing and implementing digital services, strategies and plans. By adopting this participatory method, it is possible to get fairer results and guarantee that digital technologies are accessible and advantageous for all segments of society. The Stakeholder Theory emphasizes the difficulties of managing different interests and proposes the need for strong systems to involve stakeholders and resolve conflicts (Freeman, 1984).

2.3.3 Relative deprivation theory

Relative Deprivation Theory, which was initially proposed by social scientists such as Samuel Stouffer and subsequently expanded by others, is a valuable tool for comprehending digital inequalities (Helsper, 2017). This theory concentrates on the perception of deprivation in comparison to others, which can impact the sense of inequity and the demands for equitable access to resources of individuals and communities. By applying this theory to digital inequalities, it is possible to comprehend the extent to which the relative comparisons between various socio-economic groups influence their access to digital technologies and services. It offers a perspective on the ways in which perceptions of digital deprivation can motivate the demand for policy changes and interventions to address these disparities.

2.3.4 Institutional theory

Institutional Theory investigates the more profound aspects of social structures, such as the establishment and reinforcement of rules, norms, and routines as authoritative behavior guidelines (DiMaggio & Powell, 1983). Institutional Theory is employed to

examine the regulatory and policy obstacles associated with digital redlining in the context of digital transformation in South Africa. This theory emphasizes the challenges associated with the implementation of effective policies, which are a result of entrenched institutional norms and resistance from established interests. Institutional Theory emphasizes the necessity of reshaping institutional frameworks to facilitate digital inclusivity and mitigate systemic obstacles to technology access (Manda & Backhouse, 2018).

2.3.5 Applying and integrate trans-disciplinary management theories applicable to the problem statement

The concept of the National Innovation System (NIS)—often referred to as NSI—has long provided critical intellectual and practical coherence for policy makers globally. While initially adopted strongly by OECD countries, the framework has recently become a central focus for developing nations seeking to understand the root causes of economic development disparities and to establish policies capable of bridging this gulf. Defined as a network of economic agents, encompassing the institutions and policies that influence their innovative behavior and performance, the NSI framework emphasizes interconnected themes: a variety of institutions, continuous interactions, and perpetual technological learning.

In South Africa (SA), the NSI concept was formally introduced into public policy discourse through the White Paper on Science and Technology in 1996. This framework was intended to serve as an organizing structure to understand institutional linkages across all sectors, with the ultimate goal of maximizing technological performance and responding effectively to entrenched national challenges such as poverty, inequality, and unemployment. Decades later, the NSI remains a central pillar, having successfully demonstrated the connections between science and economic activity, made innovation central to scientific efforts, and ensured that science and technology are prioritized within the macroeconomic public policy sphere. Crucially, the foundational theme of the NSI has been to emphasize synergy within the established network of institutions.

Despite its foundational importance, the traditional NSI framework, as applied in South Africa, faces significant structural limitations when confronted with the realities of the digital era and the country's unique socio-economic complexities. A central critique suggests that SA's NSI has relied predominantly on technological innovations, resulting in a deficient analytical framework for comprehensively understanding economic change. This bias has created significant analytical gaps.

First, there is a recognized failure to integrate the value of non-technological innovations. The current approach improperly views technological and non-technological variants of innovation as a binary choice. Policy analysis indicates that true technological breakthroughs often arise from the synergistic combination of both types of innovation, necessitating an expanded analytical scope.

Second, and most critical for inclusive growth, is the profound failure to integrate informal institutions into the understanding of the innovation system. Institutions are broadly defined as both formal (codified rules, laws, regulations) and informal (unwritten norms, customs, and cultural values). By excluding informal institutions, the NSI significantly diminishes its particularity and relevance to the South African context, leaving a vast amount of grassroots, innovative activities outside the scope of policy analysis. The NSI's initial mandate was to address deep socio-economic issues like poverty and inequality. Yet, by relying too heavily on a formal R&D push—a reflection of the post-WWII linear model of innovation [1]—and excluding the informal economy where much of the nation's survival innovation and job creation occurs, the framework limits its own ability to drive *inclusive* economic growth. Furthermore, the contribution of traditional knowledge systems, while acknowledged, remains insufficiently explored within the evolution of the NSI.

To address the limitations inherent in the traditional NSI, a trans-disciplinary approach integrating Systems Theory and Institutional Theory is essential, leading to the formation of the Digital-Integrated Innovation System (DIIS) framework. Systems Theory provides the necessary perspective to understand digital transformation not merely as a technological upgrade, but as a complex adaptive system. For enterprises, particularly Small- and Medium-sized Enterprises (SMEs), digitalization involves the

dynamic interplay of technological, social, and organizational elements. Empirical analysis demonstrates that components like digital adoption, digital drive, and digital culture interact systemically to enhance Innovation Performance. Crucially, if the national innovation system is structurally blind to these non-technological, cultural, and systemic drivers—as the traditional NSI is —it cannot design policies adequate to support the systemic digitalization needs of these key economic drivers.

Institutional Theory provides the conceptual structure to bridge the NSI's gap concerning informal institutions. The digital era is characterized by the rapid digital transformation of the informal institutional environment, an evolution that significantly impacts critical developmental areas such as social entrepreneurship. This integration allows the DIIS to shift its primary focus beyond formal R&D expenditure to incorporating crucial systemic inputs, such as *digital culture*, and recognizing the value generated by the digitized informal economy. The resulting framework can move beyond simple deficit-spotting to understanding how localized innovative processes are sustained through complex interactions between formal policy and unwritten digital norms.

The Digital-Integrated Innovation System (DIIS) is defined as an evolutionary system that explicitly incorporates dynamic systemic elements (Digital Drive, Digital Culture) and integrates both formal (policy, R&D) and digitally-transformed informal institutions to optimize innovation performance, knowledge circulation, and economic resilience in the digital era. The fundamental principle governing the DIIS is that the role of planning is not the creation of an innovation system *ex nihilo*, but rather the shaping of its evolutionary path in a way that measurably improves general welfare.

South Africa's trajectory toward enhanced economic growth in the digital era is dependent upon transcending the conceptual limitations of the foundational National Systems of Innovation (NSI) framework. The adoption of the Digital-Integrated Innovation System (DIIS)—which synthesizes NSI with Institutional Theory and Systems Thinking—provides a blueprint for this necessary evolution. The DIIS acknowledges that innovation is driven not solely by formal R&D, but by dynamic,

systemic elements such as digital culture and the formalized recognition of the digitized informal economy.

Operationalizing the DIIS requires the effective functioning of the Triple Helix and the strategic funding of hybrid institutions, specifically tech hubs, which serve as localized mechanisms for Innovation Entanglement. Entanglement is the mechanism that allows South African firms to turn structural complexity and adversity into competitive advantage by creating locally appropriate solutions. Success hinges on resolving persistent systemic challenges, notably the severe digital skills crisis, the necessity of securing user trust through stringent DPI governance, and, fundamentally, transforming the government's role from a mere regulator to an active anchor customer of local innovation. By implementing these strategic recommendations, South Africa can shift its evolutionary path toward an inclusive, resilient, and globally competitive digital economy.

2.4 Conceptual framework

Various components, such as reliable software and affordable hardware, should be included in the foundation of digital strategies. Initiatives such as the implementation of digital literacy programs, the promotion of open-source alternatives, and the analysis of cost-effective availability all contribute to the improvement of digital access. Furthermore, equitable digital participation necessitates initiatives to mitigate concealed expenses and guarantee affordability. The framework also emphasizes the importance of digital literacy, which encompasses fundamental digital skills, information literacy, media literacy, and technical literacy. these competencies enable individuals to critically evaluate information, engage with digital content meaningfully, and effectively navigate the digital landscape. Additionally, the promotion of engagement and relevance necessitates the creation of high-quality digital content. In order to accommodate the diverse learning preferences and accessibility requirements of their audience, content creators must prioritize relevance, accuracy, interactivity, and multimodality.

Economic digital enablers, including community initiatives, inclusive representation, and equal access policies, are essential for promoting inclusion and bridging the digital

divide. It is imperative to foster community-driven initiatives and increase awareness of digital equity concerns through collaboration among government, private sector, and non-profit organizations. The holistic impact of interventions is emphasized by the interconnectedness of digital access, literacy, and cost. The quality of digital content is enhanced, and equitable participation is promoted as a result of improvements in one area, which have a positive impact on others. The comprehensive roadmap for stakeholders to resolve the complexities of digital inclusion is provided by the integrated conceptual framework for digital equity. By emphasizing universal access, fostering high-quality content development, and enhancing digital literacy, policymakers and educators can facilitate equitable participation in the digital era. The relevance and effectiveness of initiatives in fostering inclusive digital environments are guaranteed by continuous feedback mechanisms, which ensure ongoing adaptation to evolving requirements.

2.5 Empirical literature review

Digital equity is the practice of providing access to digital services and infrastructure, particularly the internet, to specific marginalized groups or geographic areas. Existing social inequalities are perpetuated by this phenomenon, which also establishes new obstacles to socioeconomic advancement. Digital equity and its influence on the economy have emerged as a significant concern in South Africa, a nation that is currently contending with profound historical inequalities. This literature review examines the numerous factors that contribute to digitisation in South Africa, utilizing the most recent research and publications. Digitization in South Africa is primarily driven by socioeconomic disparities. Significant economic and social divisions have been the consequence of historical inequalities that are deeply entrenched in apartheid. Gillwald, Moyo, and Stork (2019) conducted an analysis of the current status of ICT access and usage in South Africa, with a particular emphasis on the disparities that exist among various socioeconomic groups.

A mixed-methods approach was implemented in their investigation, which involved the integration of quantitative data from national surveys and qualitative interviews with a sample of 1,500 households in both urban and rural regions. Limited access to digital infrastructure and services disproportionately impacts low-income households and

those residing in rural areas, as per Gillwald et al. (2019). These groups frequently lack the financial resources to purchase the devices and internet services required to access the digital world. Gillwald et al. (2019) also discovered that the dynamics of the telecommunications market in South Africa are a factor. Major service providers frequently prioritize high-income regions in order to optimize their profits, disregarding less profitable regions. Gillwald et al. (2019) contend that the absence of competition in the telecommunications sector further exacerbates this issue by providing companies with inadequate incentives to invest in underserved regions.

Another critical factor is geographic inequality. The infrastructure of rural areas in South Africa is frequently deficient, and this includes inadequate internet connectivity. The South African government has made efforts to enhance digital infrastructure; however, progress has been sluggish. The state of ICT infrastructure and its distribution throughout South Africa was assessed by the Independent Communications Authority of South Africa (ICASA) in 2020. This report employed a quantitative analysis of data from the Independent Communications Authority of South Africa's annual surveys, which encompassed all nine provinces and significant metropolitan areas. Data from household surveys and telecommunications providers comprised the sample. ICASA (2020) emphasizes that urban areas, notably major cities such as Johannesburg and Cape Town, have significantly superior internet coverage and speeds in comparison to rural areas.

Digital redlining is also influenced by educational disparities. Schools in underprivileged regions frequently lack the requisite digital infrastructure and resources to deliver high-quality education. Prinsloo and Walton (2018) investigated the influence of digital access on educational outcomes in South Africa. The study employed a qualitative methodology, which involved conducting interviews and focus groups with students and teachers from both metropolitan and rural schools. The sample consisted of 20 colleges, including a combination of primary and secondary institutions. Prinsloo and Walton (2018) discovered that students in under-resourced institutions are less likely to have access to computers and the internet, which impedes their ability to develop digital literacy skills. The perpetuation of broader social and economic inequalities is facilitated by the digital divide in education. Prinsloo and

Walton (2018) also discovered that digital access is also influenced by social and cultural factors. In certain rural communities, there may be a dearth of awareness or comprehension of the advantages of digital technology. According to Prinsloo and Walton (2018), adoption rates can be influenced by cultural attitudes toward technology and the internet, particularly among older generations who may be less acquainted with digital tools.

Digitization can be either mitigated or exacerbated by policy and regulatory frameworks. The regulatory environment in South Africa has been criticized for failing to sufficiently guarantee equitable access to digital services. Roberts and McIntyre (2021) carried out an analysis of the efficacy of South Africa's regulatory policies in fostering digital inclusion. These authors implemented a policy analysis methodology, which involved an examination of the current regulatory frameworks and legislation. Interviews with policymakers and industry experts were conducted with a sample size of 30 stakeholders. Roberts and McIntyre (2021) have conducted an analysis that indicates that regulatory policies frequently favour large telecommunications companies, which prioritize profit over equitable access. This leads to a dearth of investment in rural and low-income urban areas that are less profitable.

Although the South African government has implemented numerous initiatives to address the digital divide, these endeavors have been met with varying degrees of success. The South African Connect policy and other initiatives are designed to increase broadband accessibility; however, their implementation has been inconsistent and sluggish. According to Roberts and McIntyre (2021), these initiatives are significantly hindered by inadequate funding and coordination. Research ICT Africa (2020) examined the pricing strategies of mobile service providers in Africa and their influence on the availability of digital services. The quantitative analysis of mobile pricing data from across the continent, with a particular emphasis on South Africa, was employed in the study. The pricing data from the most prominent mobile network operators was included in the sample. Digital redlining is further exacerbated by technological obstacles, including the exorbitant cost of internet-enabled devices and data. Many low-income South Africans continue to find the cost of smartphones and computers to be prohibitively expensive. Additionally, the cost of data in South Africa

is among the highest in the globe. According to Research ICT Africa (2020), the high costs of internet access are a substantial impediment for a significant number of South Africans.

2.6 Research proposition

The first proposition (H1) indicates that digitization does not have an impact on economic growth in South Africa. The second proposition (H2) states that South Africa can capitalize on digitization to enhance economic growth. The null proposition (H0) indicates that such relationships do not exist.

2.7 Key knowledge gaps

Based on the provided research, several key knowledge gaps have been identified that hinder the effective use of digitalization to foster economic growth in South Africa. While global literature confirms that digitalization is a powerful driver of economic progress, a significant research deficit exists in creating and applying an integrated strategic framework specifically tailored to the nation's unique structural impediments. General models for digital transformation are not sufficiently adapted to address the distinct challenges of inefficient State-Owned Enterprises (SOEs), severe constraints on Small, Medium, and Micro Enterprises (SMMEs), and a profound digital divide rooted in the country's history of inequality. This overarching gap leads to an insufficient sector-specific impact analysis, leaving it unclear what digital interventions would be most effective in resolving operational inefficiencies within SOEs or alleviating the capital constraints faced by SMMEs.

Furthermore, there is a limited understanding of the complex interplay within South Africa's digital literacy ecosystem. The intricate relationships between digital skills, socio-economic factors, affordability, infrastructure access, and educational disparities are not fully understood. This issue is compounded by the unexplored role of content relevance. The research focus has largely been on infrastructure and access, with less attention paid to whether the availability of high-quality, culturally, and linguistically relevant digital content is sufficient to drive meaningful adoption and economic participation among the country's diverse demographic groups. Finally, a significant methodological limitation exists in the current body of research. Much of the understanding is based on cross-sectional data, which provides only a snapshot in

time. There is a critical absence of longitudinal and impact-oriented studies designed to track the real-world effects of digital policies and interventions over the long term. Without such studies, it remains difficult for policymakers to accurately assess the true effectiveness of strategies aimed at bridging the digital divide and stimulating sustainable economic growth. Addressing these interconnected gaps is essential for developing an evidence-based approach to unlock the full potential of the digital era for all South Africans.

2.8 Conclusion

In order to establish a more digitally inclusive economy, it is imperative that the public and private sectors collaborate. The private sector contributes technological expertise and investment to advance these initiatives, while the government establishes the regulatory and policy framework required to cultivate a favourable environment for digital innovation. This symbiotic relationship guarantees that digital transformation endeavors are sustainable and inclusive, addressing both the technological and socio-economic aspects of the digital divide (Büchi, Just, & Latzer, 2019). In a variety of international contexts, successful examples of such collaborations have been observed in Zimbabwe and Kenya, where coordinated efforts between governments and private firms have significantly reduced digital exclusion and enhanced economic participation (Van Deursen & Helsper, 2021).

The critical responsibilities of both the public and private sectors in promoting digital equity and inclusive economic growth are underscored by South Africa's Digital Transformation Strategy 2020-2030. The strategy endeavors to establish a foundation for widespread digital inclusion by concentrating on infrastructure development, digital skills training, and the expansion of e-government services. To ensure that all citizens can capitalize on the opportunities presented by digital technologies and bridge digital divides, it is essential to establish robust regulatory frameworks, public investments, and effective policy coherence, as well as innovation and service provision from the private sector. In order to optimize the impact of digital transformation on social and economic inclusivity and refine approaches, it is imperative to conduct ongoing research and evaluation of these initiatives (Büchi et al., 2019; Aker & Mbiti, 2021).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a comprehensive and systematic account of the methodological framework employed in this study. The primary purpose of research methodology is to furnish a clear and logical pathway that connects the research questions and objectives outlined in Chapter 1 with the eventual findings and conclusions. It serves as the architectural blueprint of the investigation, detailing the principles and procedures that guide the collection, measurement, and analysis of data. A rigorously defined methodology is paramount, as it ensures the study's transparency, replicability, and, ultimately, its academic credibility and the trustworthiness of its results. By articulating the rationale behind each methodological choice, this chapter demonstrates that the approaches selected are not arbitrary but are deliberately aligned with the study's specific aims and the nature of the phenomena under investigation.

The central objective of this research is to quantitatively assess the impact of digitalization on the South African economy. To achieve this, a clear and robust methodological structure is essential. This chapter is therefore structured to provide a detailed and sequential explanation of the entire research process. It commences with Section 3.2, which delves into the philosophical underpinnings of the research by discussing the chosen research strategy. This section will justify the adoption of a quantitative approach, situated within a positivist paradigm, and explain why alternative strategies such as qualitative or mixed-methods were deemed less suitable for the research objectives. Following this, Section 3.3 elaborates on the research design, which provides the structural framework for the investigation. The rationale for selecting a cross-sectional design will be thoroughly explained, contrasting it with other designs like longitudinal or experimental approaches and linking its utility directly to the study's focus on analyzing relationships within a defined timeframe.

Section 3.4 is dedicated to the procedures of data collection and sampling. It will explicitly state that this study utilizes secondary data, thereby eschewing primary data collection methods like surveys or interviews. This section will provide a detailed

description of the authoritative data sources used, justify the purposive sampling method employed for their selection, and describe the data extraction instrument developed to ensure systematic and consistent data capture. Section 3.5 focuses on the critical process of data analysis. It will detail the preparatory steps of data cleaning and coding before explaining the two-stage analytical approach. The first stage, descriptive statistics, will be outlined as the means to summarize and understand the fundamental characteristics of the dataset. The second, more complex stage will detail the use of inferential statistics, providing an in-depth explanation of correlation and multiple regression analysis as the core techniques for testing the relationships and impacts central to the research questions.

Subsequently, Section 3.6 addresses the crucial concepts of validity and reliability. It will explain how these cornerstones of research quality are established and maintained within the context of a quantitative secondary data study, focusing on the credibility of the sources and the consistency of the data extraction protocol. Finally, Section 3.7 outlines the ethical considerations that governed the research process. This section will affirm the study's adherence to the ethical standards of the Wits Business School, with a particular focus on the principles of accurate data representation and proper attribution, which are paramount in secondary data analysis.

3.2 Research Strategy

A research strategy constitutes the overarching plan and logic that guides an investigation, deeply rooted in the philosophical assumptions about the nature of reality (ontology) and knowledge (epistemology). The choice of a research strategy is the most critical initial decision in the methodological process, as it dictates the type of research questions that can be posed and the methods that can be used to answer them. Research strategies are broadly categorized into three main types: qualitative, quantitative, and mixed-methods. Qualitative research is an exploratory approach used to gain a deep, contextual understanding of human behavior, experiences, and social phenomena. It is rooted in an interpretivist paradigm, which posits that social reality is subjective and constructed through individual interpretation. Methods such as in-depth interviews, focus groups, and ethnographic observation are employed to gather rich, narrative data, which is then analyzed thematically to uncover nuanced

insights. While invaluable for exploring complex social issues and generating hypotheses, a qualitative strategy was deemed inappropriate for this study. The research objective is not to explore the subjective experiences of individuals within the digital economy but to objectively measure the *impact* of digitalization at a macroeconomic level.

A mixed-methods strategy involves the integration of both qualitative and quantitative approaches within a single study. Its primary strength lies in triangulation—using the strengths of one method to overcome the weaknesses of another, thereby providing a more comprehensive and robust understanding of the research problem. For instance, a researcher might use a quantitative survey to identify broad trends and then conduct qualitative interviews to explore the reasons behind those trends. However, a mixed-methods approach is complex, time-consuming, and requires expertise in both paradigms. Given the study's clear focus on quantifiable economic impact and the nature of the available secondary data, incorporating a qualitative component would not add significant value commensurate with the added complexity.

Consequently, this study unequivocally adopts a quantitative research strategy. This approach is grounded in the positivist research paradigm. Positivism holds that social phenomena, like natural phenomena, can be studied objectively and that there is an external reality that can be measured and understood through empirical observation. This paradigm aligns perfectly with the research aims, which are to identify patterns, test relationships between variables, and measure the impact of one set of variables (digitalization factors) on another (economic indicators). The quantitative strategy operationalizes the positivist paradigm by collecting numerical data and subjecting it to rigorous statistical analysis. Its strengths are numerous and directly applicable to this study:

Within this broad strategy, the study specifically employs a quantitative secondary data analysis. This means the research does not involve the collection of new, primary data from participants. Instead, it leverages existing data that has been previously collected, compiled, and published by credible governmental and industry bodies. This choice carries significant advantages, including cost-effectiveness, time efficiency, and

access to large-scale, high-quality longitudinal data that would be infeasible for a single researcher to collect. However, it also presents challenges, such as the data not being in the exact format required or lacking specific variables of interest. These limitations were carefully considered and mitigated through the selection of multiple, comprehensive data sources to ensure sufficient coverage of the variables needed to address the research questions.

3.3 Research Design

The research design serves as the procedural blueprint for conducting the study, providing a detailed structure that connects the research strategy to the final analysis of the data. It specifies the methods and procedures for collecting and analyzing the required information. While the research strategy sets the broad orientation, the design operationalizes it into a concrete plan of action. Several research designs exist within the quantitative paradigm, including experimental, quasi-experimental, longitudinal, and cross-sectional designs.

An experimental design, often considered the gold standard for establishing causality, involves the manipulation of an independent variable to observe its effect on a dependent variable, while controlling for all other extraneous variables. This is typically achieved through the random assignment of subjects to control and treatment groups. However, an experimental design is wholly unsuitable for this study, as it is impossible to manipulate macroeconomic variables like a nation's ICT investment or digital policy in a controlled experimental setting.

A longitudinal design involves collecting data from the same sample repeatedly over an extended period. This design is powerful for studying trends, changes, and developmental processes over time. While the data sources used in this study do span several years, the study does not track a single cohort or entity continuously. Instead, it analyzes aggregate national data reported at different points in time. Therefore, while possessing a temporal element, it does not conform to a true longitudinal design. After careful consideration, this study adopts a cross-sectional research design. A cross-sectional design involves the collection and analysis of data from a population, or a representative subset, at one specific point in time or, as in this case, over a defined

period treated as a singular block for analysis. It provides a "snapshot" of the variables of interest at that moment.

The design's alignment with the positivist quantitative strategy is seamless. It focuses on objective measurement of variables from the selected reports and employs statistical analysis to uncover patterns and relationships. While a key limitation of the cross-sectional design is that it cannot definitively establish causality—correlation does not equal causation—it can identify statistically significant associations and the strength of those relationships. By using regression analysis, the study can move beyond simple correlation to model the predictive impact of independent variables on a dependent variable, providing strong, policy-relevant evidence even in the absence of a true experimental design.

3.4 Data Collection and Sampling

The data collection phase is the process of gathering the empirical information required to address the research problem. The integrity of the study's findings is fundamentally dependent on the quality and relevance of the data collected. As established, this study is based exclusively on the analysis of secondary data.

3.4.1 Data Sources

Secondary data refers to data that was collected by someone other than the user. For this study, the data was not gathered from individuals but was meticulously extracted from existing, high-level, official documents. The selection of these documents was a critical step, guided by the principles of authority, relevance, and comprehensiveness. The following four key sources form the data foundation for this research:

1. National Digital and Future Skills Strategy: This government strategy document outlines South Africa's vision and action plan for developing a digitally skilled citizenry and workforce. It is an authoritative source for variables related to human capital in the digital economy, providing data and targets for digital literacy, ICT skills training programs, and the integration of technology in education.
2. ICT Strategic Plan 2020-2025: This document, likely from the Department of Communications and Digital Technologies, details the government's strategic

objectives for the ICT sector. It is a crucial source for data on policy initiatives, planned infrastructure investments, targets for universal broadband access, and strategies for promoting digital transformation across various economic sectors.

3. State of the ICT Sector in South Africa-2023 Report: Typically published by the Independent Communications Authority of South Africa (ICASA), this annual report provides a comprehensive statistical overview of the country's ICT landscape. It is a primary source for quantitative data on telecommunications infrastructure, market competition, ICT sector revenue, investment figures, broadband penetration rates, and mobile connectivity statistics.
4. Telecommunication Report 2009-2020 Report: This report, likely a consolidated publication or a series of reports from a national statistical agency or regulatory body, provides historical data on the telecommunications sector. It is vital for establishing trends over time and provides a longer-term perspective on the growth of key indicators like internet usage, mobile subscriptions, and investment in network infrastructure.

These sources are considered highly authoritative, providing the official national-level data required to rigorously address the research questions. Their use ensures that the analysis is based on credible and validated information.

3.4.2 Sampling Procedure

Sampling is the process of selecting a subset of a population for the purpose of making observations and statistical inferences about that population. In quantitative research involving human participants, probability sampling methods (e.g., simple random, stratified) are often used to ensure the sample is representative and that findings can be generalized. However, such methods are irrelevant to this study, as the population of interest is not people but a finite set of documents.

Therefore, the sampling method employed was purposive sampling, a type of non-probability sampling. Purposive sampling, also known as judgmental or expert sampling, involves the intentional selection of specific sources based on their unique characteristics and direct relevance to the research objectives. The documents were not chosen at random. They were meticulously selected based on the following explicit criteria:

- Authority: The sources had to be official publications from government bodies, regulatory agencies, or major industry authorities.
- Relevance: The content of the documents had to be directly related to the study's key constructs: digitalization, ICT infrastructure, digital skills, and economic indicators in the South African context.
- Comprehensiveness: The reports needed to contain rich quantitative data, including time-series data where available, to enable robust statistical analysis.
- Timeliness: The selected documents needed to be recent enough to reflect the current state of the digital economy while also providing historical context.

This purposive approach ensures that the data foundation of the study is of the highest possible relevance and quality, composed of the most pertinent information available to answer the research questions.

3.4.3 Data Collection Instrument

To ensure that data was extracted from the source documents in a systematic, consistent, and error-free manner, a data extraction sheet was developed. This structured tool served as the primary instrument for data collection. Created in Microsoft Excel, the sheet was meticulously designed to operationalize the variables identified in the conceptual framework (Chapter 2). Its structure included:

- Variable Columns: Each column was clearly labeled with a specific variable to be collected (e.g., "Annual ICT Sector Investment (ZAR billion)," "Broadband Penetration Rate (%) ," "National Digital Literacy Score," "ICT Contribution to GDP (%)").
- Time-Series Rows: Rows were designated for specific years, allowing for the consistent recording of data over the period covered by the reports.
- Source Column: A dedicated column was used to record the specific source document and page number for each data point, ensuring traceability and simplifying verification.
- Notes Column: A final column was included for any relevant notes, such as definitions of variables used in the source document or potential data quality issues.

Before its full implementation, the data extraction sheet was piloted on one of the reports. This pilot test helped to refine the variable definitions and ensure the sheet's

layout was logical and efficient. This standardized instrument was critical for enhancing the objectivity and reliability of the data collection process, transforming unstructured information within the reports into a structured, analysis-ready dataset.

3.5 Data Analysis

Data analysis is the process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, informing conclusions, and supporting decision-making. The data analysis for this study was conducted using the statistical software package SPSS (Statistical Package for the Social Sciences). The process began with data preparation, which involved digitally entering the data from the extraction sheet into SPSS, followed by a thorough cleaning phase to check for and correct any entry errors or inconsistencies. Once the dataset was clean and validated, the analysis proceeded in two main stages: descriptive and inferential statistics.

3.5.1 Descriptive Statistics

The first stage of analysis involved the use of descriptive statistics. The purpose of this stage was to summarize and organize the data to gain a fundamental understanding of the variables and identify initial patterns and trends. This process provides a clear and concise overview of the dataset before proceeding to more complex analyses. The key descriptive statistics computed included:

- Measures of Central Tendency: The mean (average), median (midpoint), and mode (most frequent value) were calculated for each key variable to identify its central position.
- Measures of Dispersion: The standard deviation (average distance from the mean), range (difference between the maximum and minimum values), and variance were calculated to understand the spread and variability of the data.
- Frequency Distributions: Frequencies and percentages were calculated to show how often different values occurred, which is particularly useful for understanding the distribution of categorical variables, if any, and for presenting overall trends in a clear, accessible format using tables and charts.

This descriptive analysis provided the foundational insights into the state of digitalization and economic performance in South Africa over the period studied, setting the stage for the subsequent inferential analysis.

3.5.2 Inferential Statistics

The second and more complex stage of the analysis involved the use of inferential statistics. While descriptive statistics simply describe the data, inferential statistics allow the researcher to make inferences and draw conclusions that extend beyond the immediate data. These techniques were employed to test the specific hypotheses of the study and to address the core research questions concerning the relationships and impacts of digitalization.

- Correlation Analysis: To investigate the strength and direction of the linear relationship between key variables, a Pearson product-moment correlation coefficient (r) was calculated. The Pearson correlation is a measure of the linear association between two continuous variables. The resulting coefficient is a value between -1 and +1, where:
    - A value of +1 indicates a perfect positive linear relationship (as one variable increases, the other increases).
    - A value of -1 indicates a perfect negative linear relationship (as one variable increases, the other decreases).
    - A value of 0 indicates no linear relationship.

For each correlation, a test of statistical significance (p-value) was conducted. This test determines the probability that the observed relationship occurred by chance. The null hypothesis (H_0) for this test is that there is no correlation between the variables in the population. A p-value of less than 0.05 was used as the threshold for statistical significance, indicating that there is less than a 5% probability that the relationship is due to random chance, thus allowing for the rejection of the null hypothesis. This analysis was crucial for determining *if* and *how strongly* key digitalization factors (e.g., internet penetration) are associated with economic indicators (e.g., GDP growth).

- Regression Analysis: To move beyond merely identifying relationships and to begin quantifying impact, a multiple linear regression analysis was conducted. Regression analysis is a powerful statistical technique used to model and predict the relationship between a dependent variable and one or more independent variables. A multiple regression model was chosen because economic growth is a complex phenomenon influenced by a multitude of factors, and this model allows for the simultaneous assessment of the impact of several independent variables.

References

There are no sources in the current document.

3.6 Validity and Reliability

In quantitative research, validity and reliability are the twin pillars upon which the trustworthiness of the findings rests. They are essential for demonstrating the quality and rigor of the research process.

Validity refers to the degree to which a study accurately measures what it intends to measure. It is concerned with the truthfulness and accuracy of the results. In this study, validity was addressed in several ways:

- External Validity: This refers to the extent to which the results of a study can be generalized to other settings, populations, or times. The external validity of this research is strong because the data is derived from official, national-level reports. Therefore, the findings related to the South African economy as a whole are based on data that is inherently generalizable at the national level.
- Construct Validity: This concerns the extent to which the variables used in the study accurately operationalize the theoretical constructs they are intended to represent. Construct validity was ensured through a meticulous process. The variables for the data extraction sheet were not chosen arbitrarily; they were derived directly from the key theoretical concepts identified in the comprehensive literature review (Chapter 2). This ensures a strong linkage between the theoretical framework and the empirical data being analyzed.
- Content Validity: This relates to the extent to which the measurement instrument (in this case, the data extraction sheet) covers all relevant aspects of the construct. By selecting multiple, comprehensive reports covering different facets of the digital economy (policy, infrastructure, skills, market performance), the study ensured that the collected data provided a well-rounded and complete representation of the phenomenon under investigation.

Reliability refers to the consistency and stability of a measurement. It is the degree to which a research method produces stable and consistent results over time. If another researcher were to replicate the study using the same methods, they should be able to produce the same results. In primary research using surveys, reliability is often measured using statistics like Cronbach's alpha. However, this is inappropriate for a

secondary data study. Instead, reliability was ensured through the following mechanisms:

- Standardized Data Extraction Protocol: The primary tool for ensuring reliability was the data extraction sheet. This instrument provided a clear, unambiguous, and standardized protocol for how data was to be identified, interpreted, and recorded from the source documents. This standardization minimizes the potential for subjective researcher bias in data collection.
- Traceability and Replicability: By meticulously documenting the source (document name and page number) for every single data point entered into the dataset, the entire data collection process is transparent and traceable. This means that any data point can be quickly verified against its original source, and the entire process is fully replicable by another researcher, which is the hallmark of reliable research.

3.7 Ethical Considerations

Conducting research in an ethical manner is a fundamental responsibility of any researcher. This study strictly adhered to the ethical guidelines and protocols stipulated by the Wits Business School. An application for ethical clearance was submitted and granted before the commencement of the research, and the corresponding ethics clearance certificate is appended to this document.

While studies involving secondary data do not involve direct interaction with human participants, and thus bypass concerns such as informed consent or risk of harm to individuals, they are still governed by important ethical principles. The primary ethical obligations in this context relate to intellectual honesty and the responsible use of data. The key ethical considerations for this study were:

1. Accurate Representation: There is an ethical imperative to represent the data and findings from the source documents accurately and without distortion. Care was taken to avoid misinterpreting data or selectively presenting information in a way that might bias the results or support a preconceived narrative.
2. Proper Citation and Avoidance of Plagiarism: All data, concepts, and information taken from the source documents were meticulously cited. This acknowledges the intellectual property of the original authors and organizations and is fundamental to academic integrity. Plagiarism, the act of presenting

another's work or ideas as one's own, was scrupulously avoided through careful referencing.

3. Objectivity in Analysis: The analysis of the data was conducted with a commitment to objectivity. The statistical tests were chosen based on their appropriateness for the data and research questions, and the results were reported transparently, regardless of whether they supported the initial hypotheses.

By adhering to these principles, the study was conducted with the highest level of academic integrity, ensuring that the research process and its outcomes are ethically sound.

CHAPTER 4. PRESENTATIONS OF RESULTS

4.1 Introduction

Based on the 2022 Stats SA's General Household Survey (GHS) report, the percentage of households accessing digital equipment for communication rose by 1.4% over a period of two years (from 2020 to 2022) from 89.4% in 2020 to 90.80% in 2022. The proportion of household utilizing both cellular and fixed phones experienced a decline from 8.2% in 2020 to 6.5% in 2022. The proportion of households lacking access to both a landline and a cellular phone rose from 1.8% in 2020 to 2.2% in 2021. The percentage of households only utilizing landlines remained constant at 0.1% between 2016 and 2019 but rose to 0.5% between 2020-22.

The aggregate revenue for the telecommunications experienced a 4.61% growth, rising from R243.6 billion in 2021 to R254.8 billion in 2022. While the country experienced loadshedding, the revenue for telecommunications and broadcasting services climbed by 3.94% and 11.97% respectively. The telecoms investment experienced a 17.16% growth, rising from R33.9 billion in 2021 to R39.7 billion in 2022 resulting in the national population coverage for 3G to be at 100%.

The national population coverage for 4G/LTE was 98%. The national coverage of 5G for the population rose from 7.5% in 2021 to 20% in 2022. The aggregate employment figures for the three industries experienced a 20% growth in 2022. During the same time frame, there were changes in employment across the three industries as follows: Employment in the telecommunications industry saw a significant gain of 46.36%, while the broadcasting sector experienced a decline of 8.56% in employment. On the other hand, the postal sector witnessed a modest increase of 3.43% in employment. South Africa's ranking for fixed broadband speed has improved from 100th place in 2021 to 95th place in 2022, out of a total of 180 nations. The ranking for mobile broadband has improved from 61st position in 2021 to 58th position in 2022, out of a total of 137 countries.

4.2 Key factors

4.2.1 Universal access

The percentage of households (Fig 2) relying on cellular phones for communication and internet access rose by 1.4% over a period of three years (from 2020 to 2023) from 89.4% in 2020 to 90.80% in 2023. The percentage of households utilizing both cellular phones and landline connections declined from 8.2% in 2020 to 6.5% in 2023. Households without access to either a landline or a cellular phone accounted for 2.2% of the total. The percentage of households only utilizing landlines remained constant at 0.1% but rose to 0.5% in both 2020 and 2023. Cellular phones are increasingly replacing landline phones in households, with only 0.5% of families using landline phones. There are a small number of houses that are still without any means of communication, such as a landline or a cellular phone.

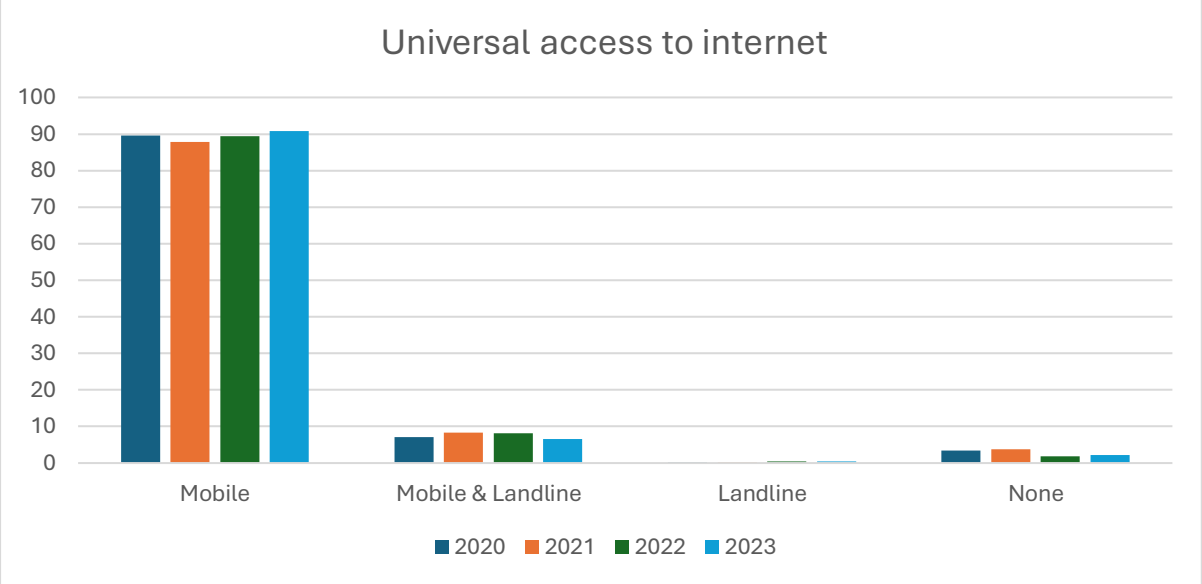


Figure 2 Universal access to internet

Table 1 below provides a more detailed breakdown of Internet access by site of access, including metropolitan, urban, and rural status, at both the provincial and national levels. In 2021, the majority of households nationwide had access to the Internet using mobile devices, with urban households accounting for 73.3% and metropolitan areas for 73.4%. These figures indicate that 69.4% of households had internet access. The most frequently used method of accessing the Internet by households in rural areas is mobile devices, with a rate of 59.2%. The geographic digital divide, as delineated in Table 1, is also evident in the division between urban,

rural, and metro areas. The primary method of accessing the Internet is through a cell phone.

Internet connect	Status	Province									
		WC	EC	NC	FS	KZN	NW	GP	MP	LP	RSA
Home	Metro	30.3	10.7		12.1	10.2		16.5			17.2
	Urban	18.3	5.1	6.7	5.1	10.0	5.2	15.4	2.5	4.4	8.8
	Rural	12.2	0.2	4.1	4.5	0.2	0.3	29.7	1.0	1.3	1.2
	Total	25.9	5.0	5.9	7.1	6.4	2.4	16.4	1.7	1.9	10.4
Work	Metro	20.4	15.2		18.8	27.9		29.0			26.1
	Urban	27.9	11.8	11.8	9.4	22.3	13.0	20.1	10.0	17.8	17.1
	Rural	11.9	7.2	5.8	8.9	3.2	1.7	9.1	4.4	4.8	4.6
	Total	22.2	11.3	14.4	12.1	17.3	6.6	27.8	6.8	7.3	17.6
Mobile access	Metro	75.4	61.7		62.8	83.5		72.4			73.4
	Urban	78.9	73.2	64.3	66.3	80.8	72.9	74.5	68.7	79.1	73.7
	Rural	55.0	53.6	52.9	72.5	57.8	61.7	63.2	66.3	57.5	59.2
	Total	75.4	60.5	60.8	66.0	73.2	66.5	72.6	67.3	61.7	69.4
Access to facilities	Metro	17.1	12.5		5.8	28.2		23.2			21.6
	Urban	18.3	1.6	1.4	6.5	7.4	3.6	24.6	18.8	1.7	11.1
	Rural	3.7	1.3	0	11.3	3.9	2.7	16.9	8.1	1.5	3.5
	Total	16.8	5.4	1.0	6.9	14.4	3.1	23.3	12.7	1.5	13.6

Table 1 Access to interne per distribution

4.2.2 ICT Procurement

The total amount spent on procuring telecommunications services from suppliers in 2022 was R166 billion. Out of this amount, R140.6 billion (84.69%) was allocated to suppliers depending on their B-BBEE rating level. This data suggests that the telecommunications provider has significantly boosted its efforts to promote B-BBEE involvement in procurement. The percentage of B-BBEE participation has risen from 65.85% in 2018 to 84.69% in 2022. The total amount spent on procuring broadcasting services from suppliers in 2022 was R3.4 billion. Out of this amount, R1.6 billion (48.14%) was allocated to suppliers depending on their B-BBEE rating level. The total aggregate expenditure on procurement of postal services paid to suppliers in 2022

amounted to R311 million. Out of this sum, R47 million (15.26%) was allocated to suppliers depending on their B-BBEE rating level.

4.2.3 Public Sector Involvement

The fixed internet and data revenue had a decline of 10.97%, dropping from R23.4 billion in 2021 to R20.9 billion in 2022. In 2022, there was a 3.63% decline in revenue from fixed (wired)-broadband services, and a 15.46% decline in revenue from fixed internet. During a span of 5 years, the combined income from fixed internet and data experienced a growth of 2.33%. The income generated from fixed (wired) broadband services experienced a decline of 3.82% during the same time.

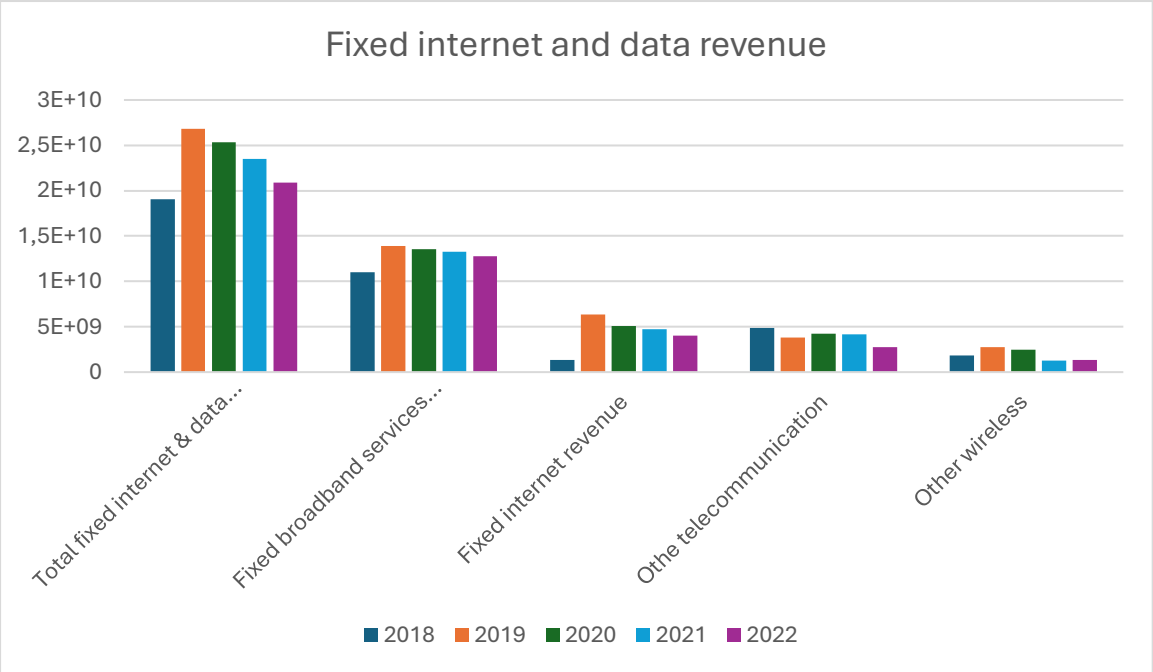


Figure 3 Fixed internet and data revenue

The Prepaid data bundle sizes range from 100 MB to 20480 MB, with price ranges as indicated in Table 2. The data bundles are valid for a month with an automatic rollover for any unused data remaining after the expiry of the validity period.

PREPAID DATA BUNDLES		
Data bundles	Current prices of 2024	
	Lowest price	Highest price
100 (MB)	R15	R20
250 (MB)	R35	R35

500 (MB)	R69	
1024 (MB)	R79	R85
1536 (MB)	R89	R99
2048 (MB)	R139	R149
3072 (MB)	R199	R229
5120 (MB)	R299	
6144 (MB)	R299	349
10240 (MB)	R469	
20480 (MB)	R599	R699

Table 2 Prepaid data bundles

4.2.4 Investment

Total telecommunications investment increased by 17.16% from R33.9 billion in 2021 to R39.7 billion in 2022. Over a 5-year period, the total telecommunications investment decreased by 4.03%.

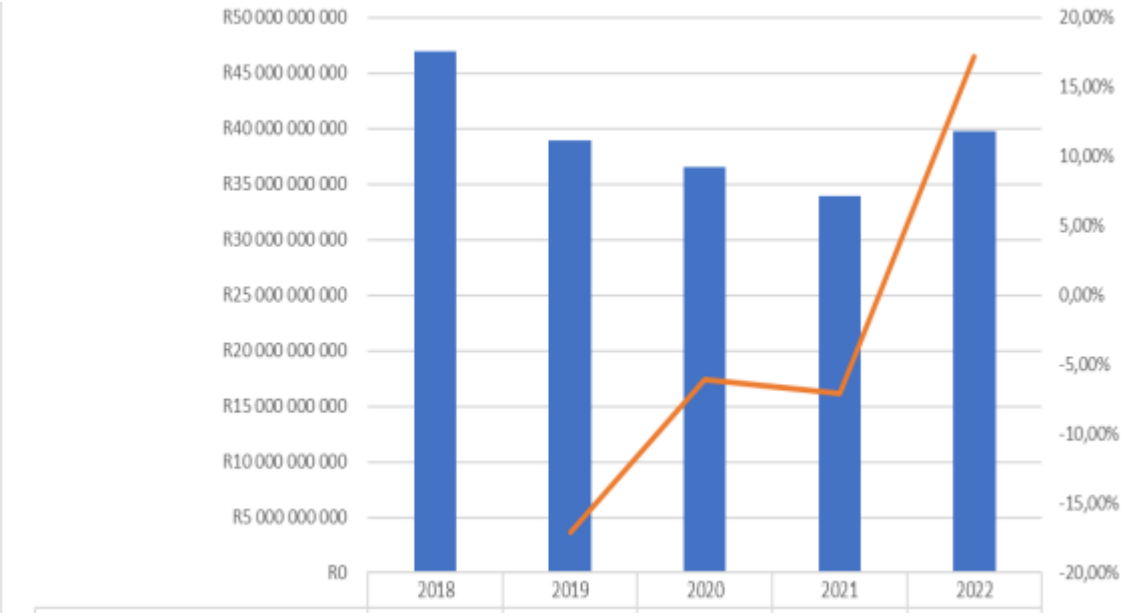
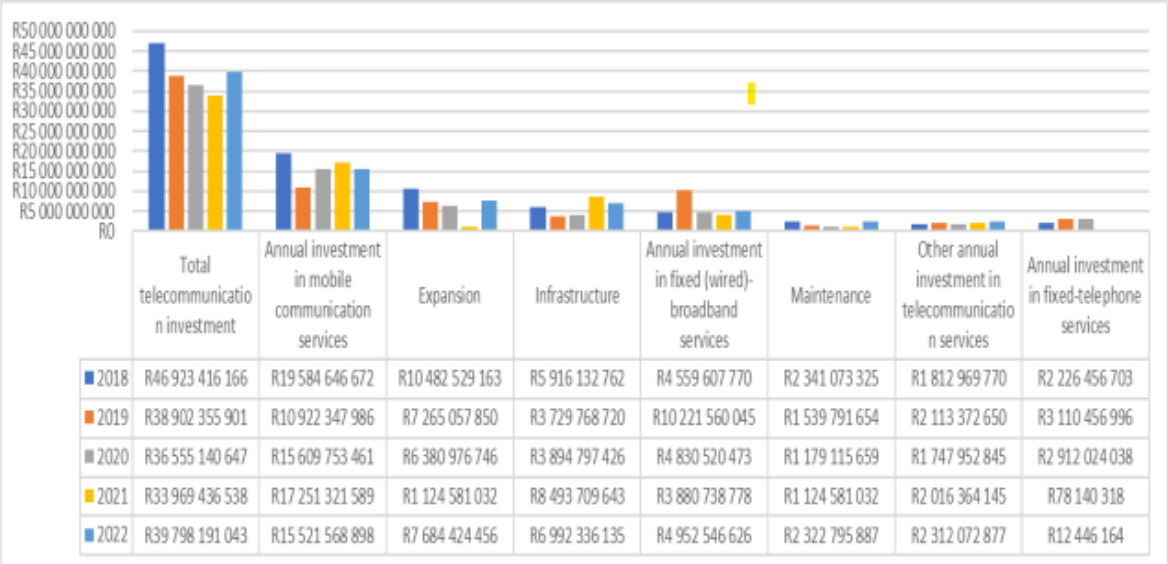


Figure 4 ICT investments

The breakdown of telecommunications investments in 2022 is displayed in Fig 4. Over a 5-year period, annual investment in fixed (wired)-broadband services and Infrastructure increased by 2.09% and 4.27%, respectively.



	Total telecommunication investment	Annual investment in mobile communication services	Expansion	Infrastructure	Annual investment in fixed (wired)-broadband services	Maintenance	Other annual investment in telecommunication services	Annual investment in fixed-telephone services
2018	R46 923 416 166	R19 584 646 672	R10 482 529 163	R5 916 132 762	R4 559 607 770	R2 341 073 325	R1 812 969 770	R2 226 456 703
2019	R38 902 355 901	R10 922 347 986	R7 265 057 850	R3 729 768 720	R10 221 560 045	R1 539 791 654	R2 113 372 650	R3 110 456 996
2020	R36 555 140 647	R15 609 753 461	R6 380 976 746	R3 894 797 426	R4 830 520 473	R1 179 115 659	R1 747 952 845	R2 912 024 038
2021	R33 969 436 538	R17 251 321 589	R1 124 581 032	R8 493 709 643	R3 880 738 778	R1 124 581 032	R2 016 364 145	R78 140 318
2022	R39 798 191 043	R15 521 568 898	R7 684 424 456	R6 992 336 135	R4 952 546 626	R2 322 795 887	R2 312 072 877	R12 446 164

Figure 5 Impact on the economy

4.3 Impact on the economy

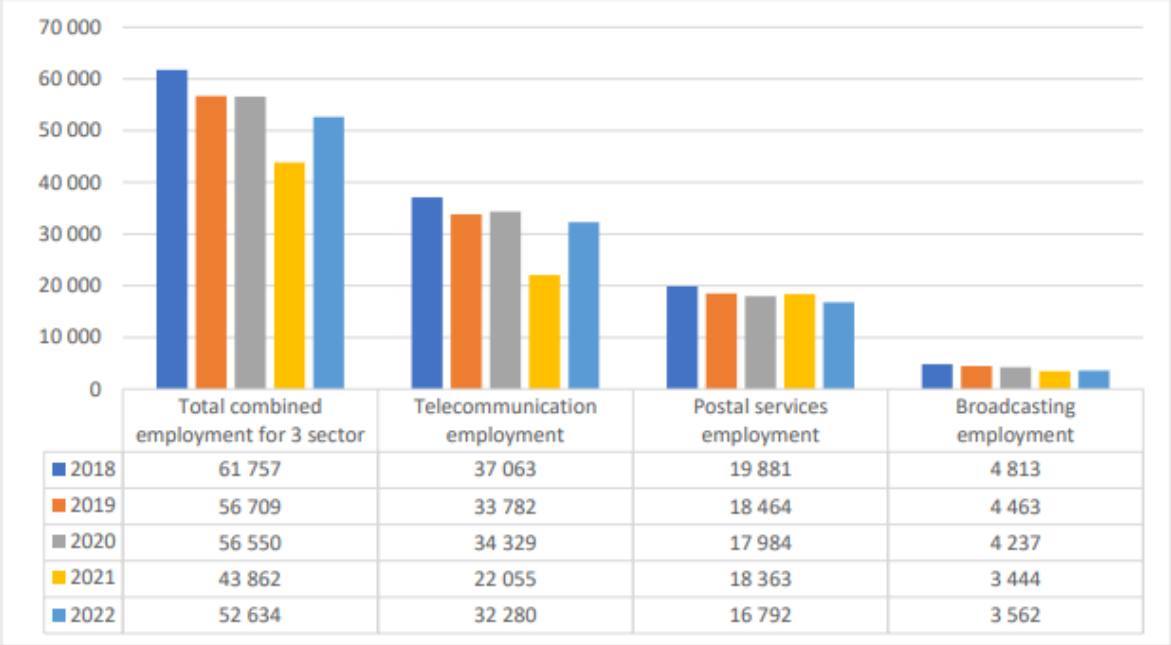
4.3.1 Revenue generated

Although loadshedding had a negative effect on the country, the combined revenue of the telecommunications, broadcasting, and postal sectors grew by 4.61% from R243.6 billion in 2021 to R254.8 billion in 2022. This increase was much higher than the 0.3% growth experienced after Covid-19, when revenue went from R243 billion in 2020 to R243.6 billion in 2021. In 2022, the revenue from telecommunications services saw a growth of 3.94%, while the income from broadcasting services experienced a significant increase of 11.97%. Nevertheless, the revenue generated by postal services had a decline of 16.26%, dropping from R6.6 billion in 2021 to R5.5 billion in 2022. Over a span of 5 years, the revenue for all three sectors experienced a growth of 2.68%. During the same time frame, there was a 2.63% growth in revenue from telecommunications services, a 2.78% growth in revenue from broadcasting services, and a 3.69% growth in revenue from postal services.

4.3.2 Employment created

The aggregate figures for the telecommunications sectors experienced a 20% employment growth in 2022 in comparison to 2021. During the same time frame, the selected sectors had the following variations in employment: In 2022, the telecommunications sector experienced a significant gain in employment, with a growth rate of 46.36% in comparison to 2021. This can be attributed to the higher

number of licensees who provided employment statistics compared to 2021. Similarly, the broadcasting sector also saw a modest increase in employment, with a growth rate of 3.43% in comparison to 2021. However, the postal sector had a decline in employment, with a loss of 8.56%. During a span of 5 years, the combined employment across the three sectors had a decline of 3.92%. The employment in the telecommunications industry experienced a decline of 3.40%, while the broadcasting sector saw a decrease of 4.13%. Similarly, the postal service sector continued to deteriorate in terms of growth, with a decrease of 7.25% during the same time.



	Total combined employment for 3 sector	Telecommunication employment	Postal services employment	Broadcasting employment
2018	61 757	37 063	19 881	4 813
2019	56 709	33 782	18 464	4 463
2020	56 550	34 329	17 984	4 237
2021	43 862	22 055	18 363	3 444
2022	52 634	32 280	16 792	3 562

Figure 6 Employment

4.3.3 Job creation

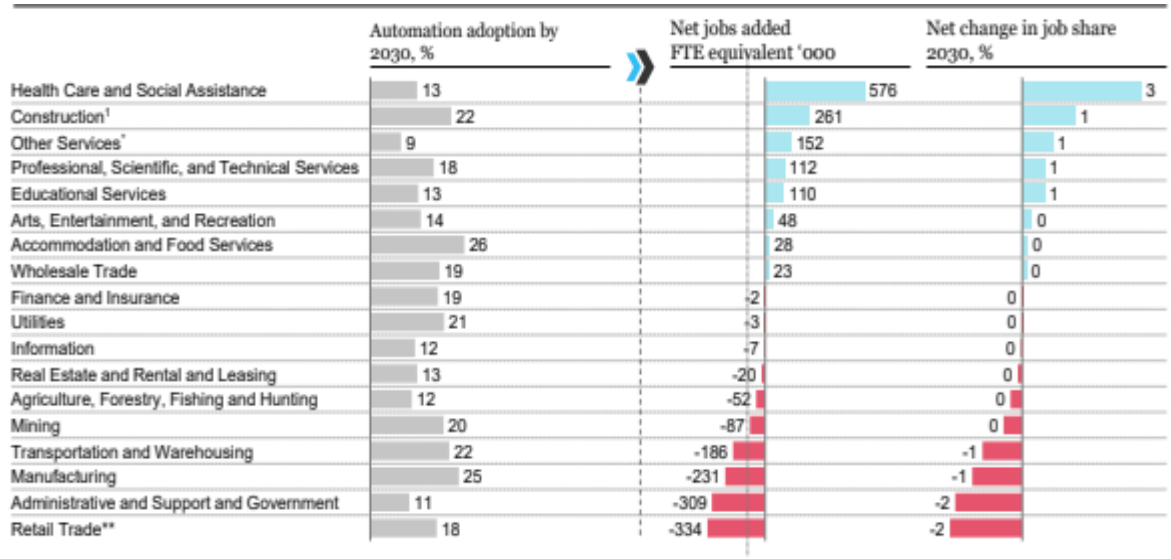


Figure 7 Job creation (Source: McKinsey, 2019)

Technology innovation has the potential to produce an additional 1.2 million new jobs in occupations that are currently unknown (McKinsey, 2019). As per McKinsey, 2019 shown above, these job gains produced by technology could be enhanced by policy decisions that improve South Africa's infrastructure to meet global standards and stimulate real estate development. South Africa has the capacity to generate up to 4.5 million additional employment opportunities in various industries through enhanced productivity, intelligent policy execution, and technological advancements (McKinsey, 2019). Healthcare and social-assistance sector might have a net increase of over 570,000 employments, while the construction industry could see a net increase of over 260,000 jobs. However, these advancements necessitate substantial changes in the workforce of South Africa. The implementation of these technologies might result in the displacement of 3.3 million current jobs, while simultaneously creating 4.5 million potential new jobs (McKinsey, 2019). When assessing employment displacement, we examined jobs at a granular level of activity. Based on our examination of work activities, we have found that there are only a few job kinds that can be completely automated. For instance, in data-processing positions like payroll officers and transaction processors, around 72 percent of tasks have the potential to be automated. Jobs in these positions was not entirely substituted, but they may decrease in quantity as fewer individuals are needed to fulfill the same positions.

4.3.4 Skills

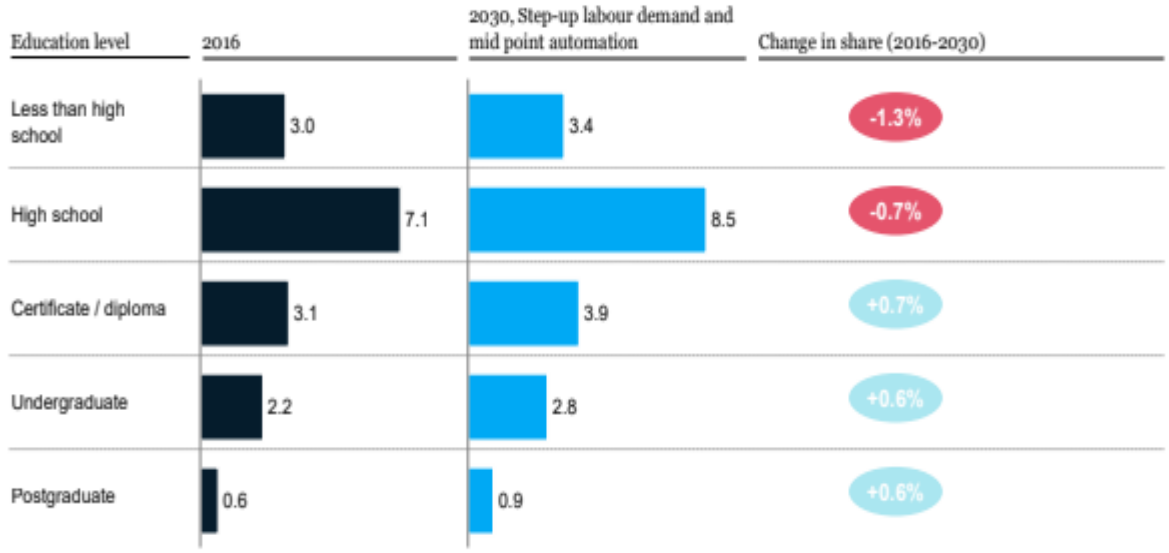


Figure 8 Required skills (Source: McKinsey, 2019)

It is important to highlight those emerging jobs, enabled by technology, demand greater levels of skills compared to the majority of the jobs that will be replaced. Consequently, automation significantly reduce the need for personnel without a high school diploma, but it simultaneously boost the demand for individuals with a college degree. By 2030, there will be a need for an extra 1.7 million personnel who possess higher education qualifications (McKinsey, 2019). If South Africa does not enhance its graduate conversion rate, a significant portion of the demand will not be met, leading to a substantial shortage of skills throughout the economy. The magnitude of these numbers presents significant obstacles for decision-makers in South Africa. If the proper management of labor displacement caused by automation is not ensured, and the improvement of the graduate conversion rate is not achieved, there is a possibility of a substantial rise in overall unemployment. Consequently, this would lead to a decrease in South Africa's tax income and an increase in expenditures on social welfare. South African enterprises would face negative impacts from both a decrease in consumer demand and a lack of essential skills. The inference is evident. South African leaders in various industries must take decisive actions to guarantee enough reskilling opportunities are provided to facilitate the reintegration of workers into the labor market. Additionally, it is imperative to enhance the education system in order to cultivate the necessary technology-related and life skills on a significant scale. South Africa will only successfully handle the big workforce transformation ahead through

these initiatives. These actions are crucial for the country to fully harness the potential of technology in order to achieve inclusive economic growth, enhance quality of life, and address the unacceptably high levels of unemployment.

4.4.4 Economy

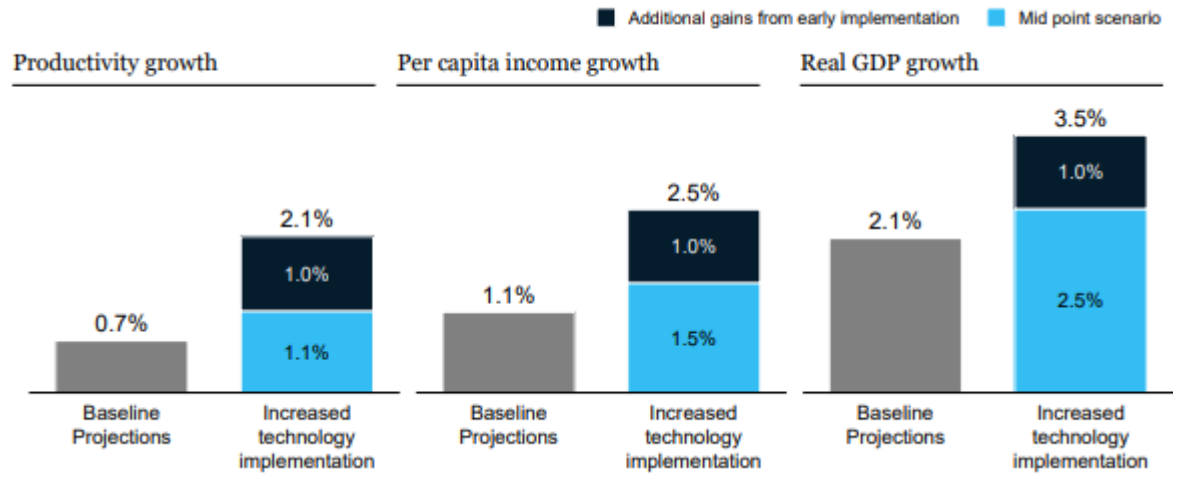


Figure 9 Contribution towards the economy (Source: McKinsey, 2019)

The implementation of digitisation and machine learning has the capacity to significantly enhance the performance of individual enterprises, as well as the whole South African economy. According to (McKinsey, 2019) , the improvements in technology might result in a threefold increase in South Africa's productivity growth, more than a twofold increase in per capita income growth, and an additional increase of more than one percentage point in South Africa's real GDP growth rate over the next ten years.

4.4 Conclusion

The potential for promoting sustainable economic growth through ICTs might arise from either production or diffusion, or both. ICT production refers to the economic impact of producing goods and services related to information and communication technology. This includes the contribution to output, employment, and export earnings. On the other hand, ICT diffusion refers to the positive effects of adopting and using ICT in various sectors of the economy and society. This includes enhanced productivity, competitiveness, growth, and improvements in human welfare. The manufacturing and exports of ICT related items have greatly benefited countries like

the USA, Japan, Korea, India, and others. Kumar (2000) states that India is recognized as one of the developing economies that have achieved significant success in the manufacturing and international trade of information and communication technology (ICT) software and services. The production of India's ICT software and service sector experienced a 43-fold increase, rising from US$0.83 billion in 1994-95 to US$36.3 billion in 2005-06. This accounted for around 4.8 percent of the country's GDP, as reported by NASSCOM in 2006. In 2006, the exports of ICT software and services constituted 20 percent of India's total exports, surpassing even the main conventional commodities in India's export portfolio, such as textiles and textile products (Chandrasekhar et al., 2006). Governments have started national e-government, e-education, and e-commerce initiatives, seeing the potential to improve competitiveness and growth. Donor agencies have also incorporated digital technologies into their programs as a common practice. The utilization of ICT has had a profound impact in India on various sectors such as banking, healthcare, education, government operations, employment, and company efficiencies. This has resulted in significant improvements in national output. ICTs have numerous benefits on the social front, including increased social engagement, strengthened family bonds, effortless communication, sharing of information and expertise, and expanded personal liberties. Despite the significant potential of ICTs in promoting sustainable growth and development, RSA ICT performance has been limited mostly due to the negative effects of which economic challenges faced in the last ten years. The unfavourable macroeconomic conditions led to limited acceptance and utilization of Information and Communication Technologies (ICTs) in the country, in contrast to other African nations which had an average yearly growth rate of approximately 50 percent in mobile phone usage between 2000 and 2007.

CHAPTER 5. DISCUSSIONS AND RECOMMENDATIONS

5.1 Discussions

The study examined the potential for sustainable economic growth and development in South Africa to be improved through the extensive adoption and utilization of ICTs. The study also evaluated the institutional and regulatory frameworks in the ICT sector, the extent of ICT diffusion, and the potential for ICTs to stimulate economic growth. The study observes that the ICT environment in the country continues to be a challenge, as the average tele density, average mobile access, internet, and broadband penetration rates are low. The opportunities for growth that arise from ICTs are restricted by the low levels of ICT diffusion. ICTs can have a more significant growth impact in developing countries once critical network penetration levels are attained, as the World Bank (2009) argues.

The study concludes that the ICT sectors in South Africa continue to encounter numerous growth-inhibiting challenges. Consequently, the sector is significantly behind in terms of the fundamental prerequisites necessary for it to contribute to socio-economic development in a more significant and enduring manner. This is demonstrated by inadequate network connectivity indicators, inadequate investments in information and communication technologies, and other complementary activities. Therefore, if the country fails to achieve ICT investment and continues to remain behind in ICT development, ICT investments may not generate the same returns for the country as they have in other countries. This is primarily due to the fact that ICT is a network technology; the more individuals and businesses utilize the network, the greater the benefits it produces. In this regard, the nation must confront the obstacles that persist in deterring investment in the sector, such as a scarcity of ICT facilities and skills, restricted access to capital, a weak regulatory environment, a lack of universal coverage, a high cost of access, a lack of a supportive environment, and a limited data management capacity.

5.2 Findings

The digital era continues to be a sector that can be leveraged to make a significant contribution to the economy of South Africa, thereby addressing the broader socio-

economic disparities. The objective of this investigation was to examine strategies for enhancing South Africa's economic growth in the digital era.

The results of this study invalidate the proposition (Ho) that digitalization has no effect on the economic growth of South Africa. The process of digitization, which involves the conversion of information into a digital format, is a crucial issue that worsens existing inequalities in the country due to unequal access to digital resources depending on socio-economic criteria. This study aims to examine the several elements that contribute to the process of digitalization in South Africa. The report highlights the existence of inequalities in broadband infrastructure, namely the unequal allocation of high-speed internet access between urban and rural regions, as a major obstacle. Financial limitations can have a significant impact, as the expensive nature of digital gadgets and internet services restricts access for those with low incomes. Moreover, insufficient regional strategies are unsuccessful in adequately tackling these discrepancies, therefore worsening digital exclusion among underprivileged areas. The findings support the proposition by providing a thorough knowledge of how gaps in infrastructure, economic constraints, and deficiencies in policies contribute to the persistence of digital inequality and the reinforcement of socio-economic disparities throughout the country.

The results emphasize a distinct and favourable relationship between digitization and economic expansion. Enhanced availability of personal digital devices and cost-effective internet services are essential in reducing obstacles to accessing digital resources. Investing strategically in the development of broadband infrastructure, especially in places that lack sufficient access, is crucial for closing the gap in digital connectivity. This association provides concrete evidence in support of proposition (H1) by demonstrating that initiatives focused on enhancing digital equity can effectively address the systemic exclusion indicated in Research Question 1. Digital equity projects play a crucial role in decreasing inequities and fostering fair access to digital opportunities among varied demographic groups in South Africa by improving accessibility and cost.

The suggestions aim to effectively promote digital equity and thoroughly tackle the issue of digital redlining. The recommendations encompass the following: extending broadband infrastructure to areas that currently lack access, creating easily accessible public digital hubs like community centres and libraries, and lowering the cost of digital technologies through subsidies and cheap pricing schemes. To empower individuals with the required competences to efficiently explore and utilize digital resources, it is crucial to enhance digital literacy through widespread educational programs and integrate digital skills into the national curriculum. Furthermore, promoting the development and distribution of culturally significant digital material guarantees that digital platforms address the various requirements and preferences of different communities, thereby improving inclusiveness. Facilitating social integration by means of community involvement programs and support systems additionally enhances the ability of marginalized populations to utilize digital resources for personal and vocational growth. These solutions jointly support the premise by providing realistic steps to narrow the gap in access to digital technology and promote digital participation throughout South Africa.

5.3 Recommendations

Government interventions should be directed toward the following broad objectives in order to fully realize the potential of ICTs in South Africa: transforming South Africa into a knowledge society as outlined in the NDP (Vision 2023); bridging the digital divide with developed countries; and promoting ICT investments, thereby enhancing the sector's contribution to sustainable economic growth and development. In this regard, the ICT sector's development paradigm should prioritize the attainment of widespread usage and high network penetration levels.

5.2.1 Recommendation 1. Investing in ICT skills

The mainstreaming and introduction of computer-based teaching and learning in schools, colleges, universities, and other digital opportunities for economic growth and development for institutions of higher learning, but not as part of on-the-job training. The utilization of ICT and its influence on growth are both influenced by the absence of the necessary ICT skills. Consequently, it is imperative to continue investing in the development of ICT human resource capacities and professionals in order to bridge

and enhance the intra and inter-digital divides. In order to assist e-government, it is necessary to develop specialized programs for public services that will improve the ICT conformance of public servants. There is a necessity to address the lack of cognizance of the potential of ICTs in all decision-making strata of government, particularly the topmost layers.

5.2.2 Recommendation 2. Attract FDI

In order to attract investment that enhance efficacy in the ICT sector, it is imperative to establish a competitive environment that guarantees profitability. It is imperative that ICT pricing formulas consider the necessity of maintaining a balance between the affordability of services and the overall competitiveness of the industrial sector. Additionally, it is imperative to establish comprehensive support programs that are designed to enhance the competitiveness of local ICT companies. Furthermore, financial assistance for improved ICT investments and service delivery to marginalized rural communities is necessary.

5.2.3 Recommendation 3. Investment in R&D

The country should learn from successful ICT R&D programs implemented by countries such as Indonesia and India. India and Indonesia are currently in the process of creating their own low-cost, customized IT terminals and devices (ITU 2006). The Indian Institute of Science has developed a low-cost Computer that is built on the Linux operating system. This device is capable of providing internet and email access in local languages and includes touch-screen capabilities. Additionally, the institute is developing speech recognition and text-to-speech software for impaired users. Software for illiterate consumers has been developed in India, Brazil, Thailand, and Niger (UNDP 2001). Public financing is needed for such endeavors, at least in the initial stages. Nevertheless, it is imperative to establish financing frameworks that encourage private investment in the long term.

5.2.4 Recommendation 4. Infrastructure development

These investments are essential for enhancing the speed and efficacy of operations by increasing the bandwidth on the national backbone and international gateway systems. Additionally, infrastructure is essential for guaranteeing that all citizens,

including rural communities and disadvantaged groups, have equitable access to ICTs. Policies must be implemented to promote infrastructure sharing, which not only facilitates economies of scale but also expedites the process of achieving nationwide coverage.

5.2.5 Recommendation 5. Public sector involvement

The development of an efficient PPP framework in ICTs can contribute to the enhancement of investments in the sector, given the limited fiscal space available for public sector investment programs. In order to promote the provision of ICT infrastructure headed by the private sector, governments and donors must take a proactive approach. Investment incentives, risk mitigation mechanisms, and training initiatives, among others, could be implemented by the public sector to serve as a support system for private investments.

5.2.6 Recommendation 6. ICT product promotion

This is crucial for guaranteeing that the content is pertinent and that the technologies used are suitable for the local and international standards and conditions. Special designs could be implemented, such as the utilization of solar panels or power backup systems to mitigate power outages. Additionally, an ICT-producing sector is crucial for the diffusion of ICT due to the close proximity of producing firms and consumers. Furthermore, a robust ICT sector should also contribute to the development of the necessary skills and competencies to capitalize on the potential of ICT. Consequently, the diffusion of ICT can be facilitated by the presence of an ICT sector, although it is not a requirement for utilizing the technology (OECD 2001a). Another benefit of an ICT production sector is the development of software in local languages, which would facilitate their extensive adoption. Additionally, the existence of an ICT production sector would guarantee that ICT programs are not solely technology-driven, but also address the requirements of the impoverished in terms of content, language, skills, design, and cost.

5.2.7 Recommendation 7. Universal access

The objective is to target rural and agricultural communities through the widespread deployment of ICT. If universal access to knowledge and information is denied, no

society can legitimately claim to be a knowledge society. In this context, access refers to the ability to access infrastructure, connectivity, content, affordability, information technology literacy, the ability to develop and utilize information in education, and the unfettered exchange of ideas, opinions, and information. There is a necessity for investments in the construction of national and regional internet backbones and community access points, as well as the promotion of the creation and dissemination of locally relevant content and applications that are compatible with the cultural and social context, reflecting the linguistic diversity. Additionally, there is a need to significantly expand education and training programs, both in general and with respect to ICTs in particular, and to promote a facilitative environment and universal access to ICT. Consultations, surveys, and demand studies should be implemented to engage local communities in the development of universal access programs. Furthermore, ICT hardware could be created in close collaboration with the impoverished and in accordance with the country's circumstances, addressing a variety of constraints, including the absence of a primary energy supply or interruptions in the supply.

5.2.8 Recommendation 8. ICT Regulatory environment

The advent of new categories of needs, rights, and vulnerabilities has been facilitated by the pervasiveness of ICTs, particularly the internet, and globalization. In order to foster the growth of the sector and innovations that add value to providers and consumers, as well as to facilitate the security, privacy, and intellectual property of all electronic transactions, the country's ICT regulatory environment must be significantly strengthened. A regulatory environment that is transparent, stable, independent, and credible is necessary to provide investors with peace of mind, while also meticulously aligning it with regional and global best practices. The current insufficient regulatory capacity should be addressed by the ICT bill, particularly in light of the convergence of networks and services. The ICT sector necessitates an enabling regulatory environment, and certain regulatory issues that necessitate attention include.

CHAPTER 6. CONCLUSION

6.1 Introduction

This report is the result of a comprehensive investigation into the strategies for improving economic growth in South Africa throughout the digital era. This study employed thorough research and analysis to reveal the complexities of access, affordability, and the regulatory framework. As we conclude, it is crucial to contemplate the significant lessons learned, deduce implications from the findings, acknowledge limitations, and offer valuable inputs for future research.

6.2 Summary

It is evident that a diverse strategy is necessary to achieve economic growth in the digital era in South Africa. In order to achieve a comprehensive strategy, it is necessary to prioritize high-quality content, resolve the cost-access issue, comprehend the challenges of digital literacy, and promote social inclusion. This includes universal access to digital technology. The nuanced examination of these characteristics in this study is the source of its knowledge contributions. It offers a roadmap for policymakers, educators, and stakeholders to customize solutions to the distinctive challenges encountered in South Africa.

6.3 Recommendations for future research

Future research must pursue a comprehensive research program in order to further our comprehension of the positive effects of digitisation on the economy. Initially, longitudinal research will enable the examination of temporal trends and changes in digitisation over time. This method will provide policymakers and stakeholders with critical insights into the dynamics of the growth of the economy through adaptations of digital strategies. Subsequently, it is imperative to investigate additional variables that may impact the correlation between digitisation and the economy. It is imperative to investigate the intricate network of factors that either facilitate or impede digital inclusion by investigating the relationships between digital literacy and other factors that influence digital equality. The examination of the impact of particular categories of high-quality digital content on various demographic groups will identify potential

discrepancies and inform targeted content initiatives to foster a more inclusive online environment. These research topics was collectively make a significant contribution to the ongoing endeavours to explore the meaningful contributions that the digital era can have on our economy.

Therefore, future research should prioritize the following: conducting longitudinal studies to monitor digital access and literacy trends, enhancing data collection efforts to capture detailed socio-economic factors that influence digital exclusion, and conducting rigorous impact evaluations of existing interventions. Intersectional analyses are also essential for comprehending the intersection of digital exclusion with factors such as gender, ethnicity, and disability status. Ultimately, the translation of research findings into effective policies and practices that promote digital equity in South Africa is contingent upon the cultivation of collaboration among researchers, policymakers, and practitioners. By addressing these knowledge gaps, we can promote inclusive digital development and equitable access to opportunities for all citizens.

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