

Working Title: ASSESSING THE EFFECTIVENESS OF 4IR STRATEGY ON SOUTH AFRICAN TOWNSHIP ECONOMY: SMART TOWNSHIP PERSPECTIVE

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ABSTRACT:

As the Coronavirus disease (COVID-19) pandemic changed how people and business interact, its impact severely impacted the global economy. The government imposed heavy lockdown regulations further damaged an already struggling informal sector economy as many livelihoods and informal businesses within the townships came to a halt. Though the South African government introduced various financial relief through the R500 billion support grant, there are township entrepreneurs who could not access the government grant to sustain their everyday business operations.

Despite the invisibility of the informal sector, it is considered to contribute about 5 – 30% of the Gross Domestic Product (GDP). Hence, the need to develop a smart township strategy for the township economy will better prepare the township entrepreneurs with a creative and innovative way to survive any future pandemics. This chapter aims to identify factors and enablers that can catalyse critical and innovative thinking to safeguard the township economy and assess the maturity level of the national fourth industrial revolution (4IR) strategy towards building on a South African smart township economy.

A digital infrastructure value chain model for building the smart township is proposed. The model also identified digital skills training and upskilling township entrepreneurs to reposition and align themselves within the smart township ecosystems. Furthermore, the chapter proposed key recommendations on how the policy makers could leverage on the 4IR strategy in enabling the township entrepreneurs to actively participate in the digital economy.

The objective and significance of this chapter is to assist the policy makers (at provincial and local government level) in understanding both theoretically and practically technological innovation strategies and methods to adopt post-pandemic.

1. INTRODUCTION

There is an acknowledgement on the vital role that the township economy plays in eradicating poverty, reducing unemployment, and contributing towards the country's gross domestic product (GDP) (Charman, 2017). This has led to continued growth and inquiry into the township economy literature stream (Charman and Petersen, 2019). The Township economy is referred to the small, micro, and medium enterprises (SMMEs) -- both formal and informal -- and markets based in the townships (Rogerson, 2019). A township is a dense settlement located in the outskirts of the city centres and far from commercial and industrial activities (Rogerson, 2018). The then South African apartheid government brought about the idea of townships to segregate people of colour and place them away from economic opportunities. Since the democratic government, post-1994, townships have experienced significant growth due to large-scale low-cost housing projects (Rogerson, 2005). The social, infrastructural, and economic costs have disadvantaged township communities and entrepreneurs. Charman and Peterson (2019) argue that there is a need for further investigations on how the support for the township economies could stimulate employment and income growth.

The fourth industrial revolution (4IR) promises to disrupt traditional ways of stimulating the global economy through digital transformation. Although the 4IR appears to support their economic growth, countries are expected to assess their readiness for the 4IR paradigm and develop relevant and inclusive 4IR strategies for their citizens to benefit instead of being excluded from economic development. The availability and accessibility of information and communication technology (ICT) and digital infrastructure is crucial to support the 4IR (Rashid, 2020). Furthermore, in the 21st century and 4IR era, businesses are expected to transform to remain digitally competitive.

Digital transformation requires businesses to become active participants in the digital economy, introducing a complete paradigm shift from the traditional analogous mode (e.g. cash-based business) to a digital mode of doing business (e.g. using e-commerce). Accordingly, we believe that the township economy could benefit significantly by being

active participants in the digital economy ecosystem. Moreover, the advent of the COVID-19 pandemic has fast-tracked the need for SMMEs to pivot and transform their businesses faster than expected.

A call exists for continued investigation into those factors, which can be seen as identifiers and enablers that can catalyze critical and innovative thinking to develop township economy, especially on the African continent where the township economy is still dominated by large informal enterprises (Rankumise, 2017; Rogerson, 2016). The timing of the study becomes critical because of the current challenges imposed by the COVID-19 pandemic. Furthermore, and to the best of our knowledge, there is a lack of research on how enterprises in the township perceive the adoption of the 4IR. The assessment of the maturity level of the 4IR strategy pillars in successfully building a South African smart township economy is deemed important for this study.

The remainder of this chapter is arranged as follows; Section 2 provides a literature review, the research methodology is presented in Section 3, Section 4 proposes a proposed digital infrastructure value chain model to be adopted for the smart township economy, and the chapter is concluded with recommendations under Section 5.

2. LITERATURE REVIEW

This section provides the literature review on township economy, developments in the national 4IR strategy, digitisation and digitalisation for digital transformation and the smart township.

2.1 The Township Economy

The development of the township economy remains the key focus of the South African government. However, there are inequalities of economic opportunities within metros, with townships often marginalised from the benefits of growth and constrained in their ability to contribute to development. Though the government has set out strategies to channel resources and create opportunities for township enterprises (Charman, 2017), an economic gap between cities and townships remains.

South African townships are the most dynamic political, social, and economic spaces. Due to their urbanisation and continued economic development, they have become more significant over time. A township can be defined as a residential area that confined

predominantly black African people, formerly officially designated for black occupation by apartheid legislation, often found on the outskirts of existing towns and cities in the urban area (Siyakhana, 2020; Cant & Rabie, 2018; McGaffin, Rabe and Crankshaw, 2015). Townships are concentrated by poverty, unemployment, and related social ills, making them the top priority for inclusive growth and development (Drakenstein Municipality, 2018).

2.1.1 The Informal Business Sector

The township economy refers to enterprises and markets based in the townships (McGaffin, Rabe and Crankshaw, 2015), and provides a unique insight into the township informal sector and entrepreneurship (Charman & Petersen, 2020). Research shows data, about 2 689 000 South Africans worked in the informal economy, and the informal sector makes up 30% of the township economy (Stats SA, 2017). The National Development Plan (NDP), for example, sees the informal sector creating between 1.2 and 2 million new jobs by 2030 (Stats SA, 2017). The informal sector is viewed as one of the primary drivers of a country's economy. It appears to be an alternative form of employment, given challenges across the entire African continent. These challenges include: (a) *high rate of unemployment*, (b) *increasing poverty levels and inequality*, and (c) *lack of jobs and job security* (Hartwell & Malinowska, 2019; Mintah & Darkwah, 2018; Başbay, Elgin & Torul 2018; Mintah & Darkwah, 2018). There is an observation that most of those who operate in the informal sector are necessity entrepreneurs often relegated from the formal sector into the informal sector. Therefore, there is a continued need to pay attention to both the formal and informal sector (Alrawadieh & Alrawadieh 2018; Bozhikin, Macke, & da Costa 2019; Rogerson 2018).

Informal sector businesses employ a high number of undeclared workers with limited skills, and sometimes unpaid family members who labour in precarious conditions, and yet it contributes to the GDP of many African countries (Kabongo, 2019; Madichie et al., 2020). Empirical evidence shows that the informal businesses sustain the formal business in some countries, especially in sub-Saharan Africa (Devine and Kiggundu, 2016). Adesanya (2014) reported that the African informal sector created 1.41 million jobs out of 2.48 million jobs between 2012 and 2014. Therefore, how governments treat the informal sector profoundly impacts employment, growth, equity, and sustainability (Sparks and Barnett, 2010). Considering the informal sector's role in countries' economic development and job creation, the informal sector should not only continue to exist, but it should be growing (Udimal, & Biyase, 2021; Verick, 2006).

The informal sector is heterogeneous in nature, which means there are informal businesses and partially formal businesses operating in the informal sector. Very small businesses, owned and operated by individuals with little or no schooling, women, and the poor, tend to be more informal (Canagarajah and Sethuraman, 2001). Those that are partially formal have access to resources and markets. The partial compliance by the businesses in the informal sector comes whenever non-compliance threatens their very survival as a business. However, the compliance turns to be for those regulations that matter instead of regulations that improve their income and security (Abiola and Asiwe, 2012). For example, enterprises with significant investment and engaged in non-traditional activities often find it costly to remain informal because they require backwards and forward linkages with the rest of the economy for efficient operation (Devine and Kiggundu, 2016). Therefore, the cost of remaining informal is relatively higher for some businesses in the sector. The task at hand is to legitimise the informal sector to incorporate them into a new low-cost business ecosystem (Simanis and Hart, 2009). Despite all this, there is a growing need for well-designed policies to enable and support the sector rather than suppress it (Fourie, 2018).

2.1.2 Summary of the Township Economy

There is a belief that township enterprises have a vital role in creating a socially inclusive, labour absorbing, and growing economy (Fu, Mohnen & Zanello, 2018; Mintah & Darkwah, 2018). Township enterprises are diverse with a high rate of informality. They are operated by township entrepreneurs within and beyond the borders of the townships (Alrawadieh & Alrawadieh 2018; Başbay, Elgin & Torul 2018). An observation is that most township entrepreneurs are relegated from the formal sector in the cities (Alrawadieh & Alrawadieh 2018; Bozhikin, Macke, & da Costa 2019). Yet, these enterprises significantly contribute to the countries' GDP (Kabongo, 2019; Madichie et al., 2020). This led to constant need, especially on the African continent, to pay attention to the development of the township economy (Herrington, Kew & Kew 2010; Mintah & Darkwah, 2018). However, even if the township economy provides insight into the communities, the informal and formal enterprises, it remains under-researched (Charman, 2019).

2.2 The Fourth Industrial Revolution for Digital Economy

The term 4IR was first coined by Professor Klaus Schwab (the founder and executive chairman of the World Economic Forum) in 2016 (Schwab, 2016). Unlike the other three revolutions, the 4IR presents "a fusion of technologies blurring the lines between the

physical, digital, and biological spheres" (Schwab, 2016). The 4IR is driven by the speed of technological breakthroughs, its scope, which affects every industry in every country, and the impact of the system on production, management, and governance. It touches the entire spectrum of human development in the 21st century, "from evolving social norms and national political attitudes to economic development and international relations" (Philbeck & Davis, 2018). The 4IR is built on existing and emerging technologies such as artificial intelligence (AI) & machine learning (ML), the internet of things, robotics, 3D (three dimensional) printing, autonomous vehicles and others that drive digitalisation and industrial automation. These technologies are crucial for the development of the smart townships. It is important to highlight that while the scope of the 4IR, as defined by Schwab, includes other emerging technologies in different disciplines such as material sciences, biosciences, manufacturing and other disciplines, this chapter will limit its focus to the digital technologies under the 4IR.

2.2.1 *The South Africa 4IR Strategy*

In 2018, the South African government established the 4IR Commission that consisted of prominent leaders from the public and private sector to prepare the country to seize the opportunities presented by the 4IR (Presidential Commission on 4IR, 2020). The commission is formally known as the *Presidential Commission on the Fourth Industrial Revolution or PC4IR*. The PC4IR released their final report with key recommendations to the state in September 2020. Among others, the PC4IR found that the South African economic structure "has changed dramatically over the past two decades with historical anchor sectors such as mining and energy, reducing in terms of their aggregate contribution to GDP as well as their average growth rate over time". Such changes call for the reindustrialisation of the country resources-based economy towards a digital economy.

The vision of the PC4IR is for "South Africa to have a globally competitive, inclusive and shared economy with the technological capability and production capacity that is driven by people harnessing the 4IR to propel the country forward towards its social and economic goals" (DCDT, 2021).

The South African Department of Communications and Digital Technologies (DCDT), which is the custodian of the South African national 4IR strategy, defined seven pillars for implementing the of the national 4IR strategy (DCDT, 2021).

Summary of the 4IR Strategy

Considering the discussions, above we believe that South Africa's 4IR strategy is moving towards the right direction. In addition, the assessment of South Africa 4IR readiness by Maisiri and van Dyk (2019) found that adoption and embracing of digital transformation are fundamental in achieving 4IR strategy realisation and readiness. In their assessment, they discovered that most companies in South Africa are falling short in the intentional development of the 4IR strategy, while the 4IR strategy is the driver for the 4IR readiness. Hence, if the status quo continues, the overall achievement of the digital transformation in this 4IR will be hampered.

Based on the discussion of the seven 4IR strategic pillars, the provincial government should focus more on the three fundamental pillars namely, digital infrastructure, human capital and coordination, engagement, and monitoring together with partnership with business and communities. These three pillars seem to be the main enablers in maturing 4IR strategy pillars in a successful building on a South African smart township economy. Such was also echoed by Maisiri and van Dyk (2019) that government-business partnership, skilling, and infrastructure resources are lacking, while they are essential for the realisation of the 4IR readiness. Hence the need for government to partner with large, small, and medium enterprises in building digital infrastructure and upskilling digital entrepreneur in the townships becomes vital to achieve the smart township economy that is relevant for the 4IR environment.

2.3 Digitisation, Digitalisation and Digital Transformation

For a business to be able to take advantage of the 4IR in the digital economy, digitisation and digitalisation will not be enough. The businesses strive to reach digital transformation becomes idea in the digital economy.

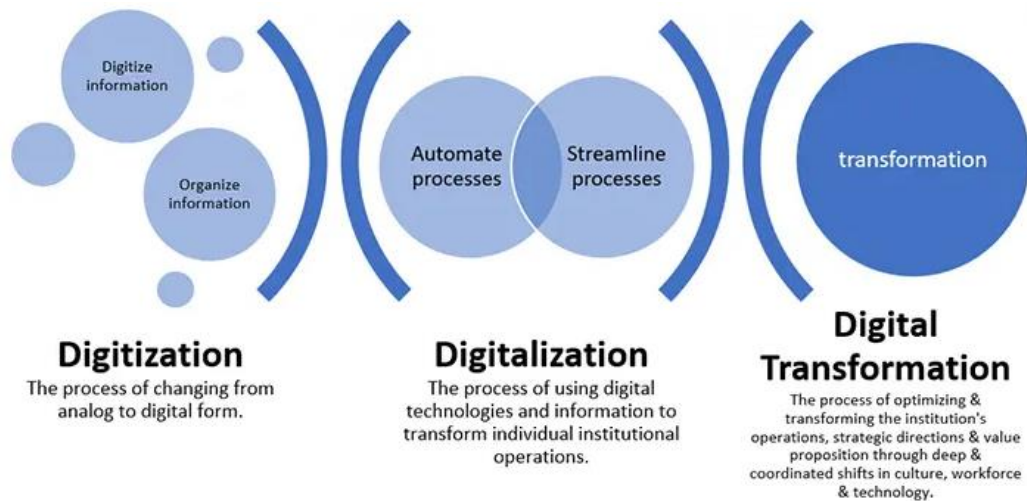


Figure 1 Digitization, Digitalization or Digital Transformation (Walter, 2021)

As presented on the **Error! Reference source not found.** above, digitisation is the first in the digital transformation as it aims at converting the analogue, and paper-based document into electronic form that will be usable in a computer system. The second stage of digital transformation is digitalisation, a process of transform the non-digital traditional operations and processes by making use of digital technologies such as e-commerce, smartphones, social media and others. The final stage for digital business will be digital transformation where business optimises its business processes and operations and stage competitive and constantly adapting new innovative way to stay relevant to their customers' needs.

2.3.1 Digitisation

Digitisation is mostly interchangeably used with the digitalisation and digital transformation. In literature they have not been a widely agreed definitions of the three terms. This section discusses the definition and importance of digitisation. In the context to this chapter, digitisation is defined as to the “*process of converting pieces of information such as a physical document, adverts, books, journal articles, sound recordings, pictures, audio tapes or videos recordings, etc. into bits. Bits are the fundamental units of information in a computer system. Converting information into these binary digits is called digitisation, which can be achieved through a variety of existing technologies*” (Arora, 2010). Scanners and digital cameras are some of the technologies that can enhance the process of digitisation.

Kayikci (2018) posit that the digitisation process together with the 4IR are at the centre for changing the business content, processes (Ritter and Pedersen, 2017) and the interaction

between business, society, and technology (Van Veldhoven and Vanthienen, 2021) in this ever-changing technological space. Kayikic (2018) further suggest that digitisation is a vital process in realising sustainable and reliable supply of goods and services in digital economy driven by 4IR. The COVID-19 pandemic made the businesses to realise how digitization initiatives in e-commerce, deliveries, supply chain virtualisation, process automation are vital in situations where physical contact with clients and suppliers is no possible. Therefore, if the digitisation process is not targeted on the business model, the business capability becomes an expense that has no return on investment (Ritter and Pedersen (2017)).

2.3.2 *Digitalisation*

Ritter and Pedersen (2017) suggest that the best way to define digitalisation is to explain the impact of digitisation on business and society. Though discussing digitalisation in manufacturing, Ardolino et. al (2016) further suggest that the adoption of the digital technologies is crucial for service-based businesses. Digitalisation can be described as the application of digital technologies to operations and processes of the business (Ritter and Pedersen, 2017). Digitalisation is the key for businesses to address customer needs such as time, efficiency, conveniency as digitalisation aims to change the business model.

2.3.3 *Digital transformation*

The RedHat Enterprise project (2020), defined digital transformation as the “*integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers. It is also a cultural change that requires organisations to continually challenge the status quo, experiment, and get comfortable with failure*”. Averina et al (2021) pointed out that digital transformation is an ongoing process that target business model. A successful digital transformation business aims to constantly monitor its competitor’s business model, new digital technologies, and leverage from them by creating innovative ways to improve their customer service and create new value-added propositions to their services and products they offer.

Changing a business model through digitalisation will lead to successful digital transformation. As discussed above the digitalisation focuses on customer value needs satisfaction, therefore, to achieve that, three strategic directions on the business model must be adopted, such as (1) operational and technological excellence, where focus will be to improve efficiency value and adoption of new technologies (2) excellence client solutions by

focusing on high quality goods and services (3) proximity to customers by presenting value preference to their customers (Averina et al, 2021).

The development of digital technologies has continually changed the way business, society, and technology interact (Van Veldhoven and Vanthienen, 2021). These changes range from communication, marketing, payment, support, customer-relationships, connectivity, offerings to name just a few, as shown in

Ritter and Pedersen (2017) also suggested that digital technologies have changed what product business sell, how business sell their products and what competency the business need to be effective in selling their products. Tulinayo et. al (2018) described digital technologies as range of technologies, being electronic tools, systems, devices, and resources that generate, store or process data using various types of hardware and software. In agreement, Gharbi and Kammoun (2021) outlined digital technologies to consists of all electronic devices, automatic systems, and technological resources that generate, process or store information such as website, smartphones, blockchain technology, cryptocurrency, artificial intelligence, cloud computing, fifth generation of mobile networks (5G) data, voice interfaces or chat-bots, robotics, drones and missiles, gadgets, e-Books, and video streaming.

The impact of these various digital technologies today has changed business and societies (see **Error! Reference source not found.** above). Hence, this chapter aims to influence the township entrepreneur's mindset to adapt new concepts to their business to stay relevant and survive in the ever-changing digital economy that is characterised by disruptive technologies.

2.3.4 Summary on Digitisation, Digitalisation and Digital Transformation

In context of this chapter, the entrepreneurs in the smart township need to take advantage and capitalise on the use of digital technologies to survive and exploit the opportunities of the 4IR, otherwise they will find themselves without clients and out of business. Though many businesses were slow in the adopting of the 4IR, the COVID-19 pandemic exposed many, as they found themselves playing catchup trying to use of these digital tools to reach out to their clients. The harshness of the pandemic resulted in many township entrepreneurs closed, as most of their business models relied on physical contact with clients on advertisement with flyers, cash payments and hard copy invoicing, quotations, etc.

Very few entrepreneurs had adapted various digital technologies like online marketing, social media, e-commerce, supply chain systems, online invoicing, electronic payment systems, customer-relationship platforms in their businesses processes to connect and support their clients and suppliers. Therefore, this chapter further to investigate some of the digital technologies in the smart township entrepreneurs can take advantage and benefits within the context of 4IR and digital economy. While, digital technologies are vital in changing the traditional business models for township entrepreneurs, there is a need to understand the three important concepts namely digitisation, digitalisation, and digital transformation, and how they can be incorporated in their smart township business model since the use of digital technologies becomes vital going forward.

2.4 The Smart Township

Since there is no widely accepted definition and literature to define smart township, the concept is derived from smart homes, smart cities and smart towns. At least the concept of smart cities has been discussed in literature for over 30 years (Komninou and Mora, 2018). Hence, to understand the architecture and operations of smart township, there is a need to understand what smart home and smart city is and how it operates and functions since smart township or smart village is the interconnectivity of the smart homes. From a geography perspective, World Atlas (2021) defines cities as urban centres with larger geographical area than towns, with respect to function and population and the status they are given by the country government. Each town or city consists of homes. The same principle applies when it comes to smart homes, smart cities, and smart towns.

A smart city is referred to a city seeking to address public issues via ICT based solutions based on a multi-stakeholder, municipality-based partnership (Khatoun et.al, 2016). Whereas the smart home is residency that is deployed with computing and information technologies that responds to the occupants' needs while promoting comfort, security, convenience, and entertainment through their wirelessly connectivity to the world (Aldrich, 2003). These smart homes are the major component that can give rise to smart township that will further interconnected to form smart cities. As initial pointed out that there is no widely accepted definition of smart township, Nallathiga et.al, 2021, describes the concept of smart township as modern day "urbanisation" that can be achieved through digitalisation of township residential dwelling to smart homes that are connected via various ICTs such as Wi-Fi or Fibre-to-home connectivity, Geographical Positioning System (GPS), closed circuit television

(CCTV), internet of things (IoT), radio frequency identification (RFID). Whether in smart homes or smart cities, or smart township, ICTs is pivotal in developing of the smartness of the infrastructure in addressing the needs for its residents. Within the smart cities, the smart grids, intelligent transport systems, network and communication and connectivity are deployed to better the living conditions of its citizens. The smart cities are aimed at improving the smart cities with various benefits such as the following:

- safety and security using 24/7 surveillance CCTV cameras.
- smart education using remote online learning with smart classrooms.
- Smart Environment and smart transportation where they intelligence traffic management systems to reduce congestions on roads and smart lighting system to manage public energy usage. Sophisticated air pollution monitoring systems. This entails controlled pollution.
- Smart energy using smart grids that manage both renewable and non-renewable energy etc.

Within South Africa, smart townships or smart villages proposition is to redress the various social ills of the past such as digital inequality, social and economic inclusion, and better equipped residence for any unforeseen pandemic (Ahmed and Gillward, 2020). The authors further outline that smart township become the base through which smart cities are going to be build. In principle, the smart township consists of interconnected smart homes while the smart cities are the interconnectivity of smart township. Based on the discussion above smart townships demand digital entrepreneurs where their businesses are digitally transformed to supply goods and services.

2.4.1 Summary on Digitisation, Digitalisation and Digital Transformation

The authors in the discussion above suggest that the concept of smart township is derived from smart cities. Based on the arguments, smart township consists of interconnected smart homes that will inherently infer that the interconnectivity of smart township led to smart cities. As a result, smart township should be the starting point for building smart cities.

3. RESEARCH METHODOLOGY

The research methodology used in this chapter is exploratory in nature, and it follows a qualitative approach. A two-phase approach to the investigation of the phenomena was

conducted. Firstly, a systematic literature review (SLR) of the role of 4IR strategy within the township economy forms the basis for further investigations. Second, the findings of the SLR were used to assess the effectiveness of the 4IR strategy in building the smart township. The literature review for the research focused on informal business and township entrepreneurs within Gauteng, South African.

The best way to understand the concept of the smart township from the perspective of digitisation and entrepreneurship is to undertake a systematic literature review based on Kitchenham (Kitchenham et al., 2009; & Xiao et al., 2019). **Error! Reference source not found.** below presents the methodological outlining the three distinct steps: planning the review, conducting the review, and reporting on the review.

This systematic literature review first defined the smart township problem with specific reference to digitisation and entrepreneurship. To identify the problem, the literature review search was undertaken not limited to major journals such as Ebscohost, Science Direct, Emerald, Google Scholar, Scopus (Xiao et al., 2019). The search limitation on journal articles was based on their extensive peer-review mechanisms in contributing to the body of knowledge.

In conducting the SLR, various combinations of words were used to form a search criterion while narrowing the body of work. The search criteria used are outlined as follows; "digitize", "digitization", "digitalization", "digital", "digitization AND /OR digitalization", were used to gather literature on the difference between digitization and digitalization. Since the research focused on digitisation and entrepreneurship in the smart township, further search criteria were used to collect information on the correlation between digitisation and entrepreneurship. Therefore, the search criteria included the phrases such as "digital entrepreneurship", "digitisations AND /OR entrepreneurship", "impact of digitisation on entrepreneurship". The search also added phrases such as "informal sector", "informal business", "township", "township economy", AND/OR "informal economy". The final literature search was on the word concept of the smart township; therefore, the search criteria employed include "smart township", "smart township" AND/OR "entrepreneurs", "smart township" or "digital entrepreneurs", "digital economy", digital entrepreneurs AND/OR "smart township", "4IR" AND digital economy", "digital economy" OR "4IR", "smart township" AND/OR "business".

The search period on the 4IR literature was limited to 2006 to 2021. Since this was the period when the 4IR started and was coined to the global space, it was vital to specify in the search. Therefore, any article of research before 2006 and cited in this report focused on the township, entrepreneurs and the economy. Furthermore, the only article written in the English language were included. Otherwise, these articles were excluded. Only the full-text articles were extracted and used was then further synthesised, analysed, and reported in the recommendation for future research opportunities.

4. CONCLUSION

4.1 Conclusions

This chapter aimed at identifying factors and enablers that could catalyse critical and innovative thinking to safeguard the township economy. The chapter used South Africa as a starting point to create smart townships. The proposed model can be tested in the townships of Gauteng Province (the densely populated South Africa province with many townships), and if successful, can be replicated in other African countries.

This book chapter makes the following main contributions to the book: First, a defined township economy and evaluating the behavioural change of township businesses, especially the informal sector businesses in adopting 4IR. Secondly, the authors applied systematic literature review to assess the maturity level of the South African 4IR strategy and its role to building a smart township that will effectively contribute to the South African economy. This was done through identifying innovation methods to adopt in building a smart township post-pandemic. Lastly, the authors identify digital skills required for informal sector to reposition and align themselves with the Smart township ecosystems.

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