A conceptual hybrid project management model for SMEs in infrastructure development in Gauteng

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Thesis accepted in fulfilment of the requirements for the degree Doctor of Philosophy in Business Administration at the North-West University

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Graduation: August 2023

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ACKNOWLEDGEMENTS

I want to convey my sincere thanks and gratitude to the following individuals for their support and contributions to completing this study.

Before anything else, I would want to thank God. Throughout the difficult phases of finishing my dissertation, He provided me with support and encouragement. I am indebted to God's eternal, unconditional love, compassion, and grace. I want to offer my most sincere gratitude. Almighty God, thank you for giving me the inner strength and wisdom to pursue my studies**.**

Secondly, my promoter, Dr Johan Jordaan, thank you for your support, direction, and leadership. This is due to your passion, dedication, professionalism and expertise that this study is complete.

Thirdly, I would like to thank my husband, Bongani Sibiya, for his understanding, support, and sacrifices, as well as for his time, effort, and vital contributions throughout the completion of this research. Thank you for your ongoing contributions, support, and encouragement.

To my son, Nkazimulo Sibiya, you are a true blessing and an inspiration. I am truly blessed to have you in my life. You truly are a miracle from God, and you should always continue to shine like the light that you are.

I would like to extend my gratitude to my father, Abie Msibi and parents-in-law Mapule and Mzwakhe Sibiya. Thank you for your support and for always being by my side. To my late mother Busisiwe Msibi, I know you are in heaven watching over me, and your words of encouragement always ring in my head and my heart whenever I felt discouraged and challenged. I may not see the pride on your face, but I know you are very proud.

My sisters, Thando Malinga and Zinhle Msibi and my brothers Mduduzi Sibiya and Obakeng Sibiya, whose support and encouragement were integral in completing the study. Thank you!

My family and friends, for all your support and interest throughout this study.

THIS THESIS IS DEDICATED TO MY HUSBAND AND MY SON

Bongani and Nkazimulo Sibiya

"*You are the light of world…Let your light shine before others, so they may see your good works and give glory to your Father who is in heaven".*
Mathew 5:14-16

ABSTRACT

The growth and development of the country's economy is mainly dependent on its infrastructural development programmes. This is taking into consideration that the South African government has intentionally prioritised and invested in infrastructure development, not only as a vital contribution to economic growth but also as an aspect of social upliftment and development.

Infrastructure development and infrastructure projects are envisaged to play an influential role in economic growth. This sector not only provides a pivotal role in the economy but also contributes to national socio-economic growth by providing employment and economic participation for the various population members. In addition to producing structures that add to productivity and quality of life, the sector is labour-intensive when the sector is working at full capacity. Large sections of the nation's workforce are active as a result of the activities in infrastructure development.

The contribution by the sector towards economic growth and development is significantly high given the variety and large scale of job opportunities created for unskilled, semi-skilled and skilled workforces. The creation of opportunities is not only limited to the direct workforce, but other indirect opportunities are created for those that are interfacing with the infrastructure development projects.

Infrastructure development as a project-based industry is not isolated from external factors, especially global factors or economic disruptors. Infrastructure development programmes are organizationally complex and highly fragmented, with a predominance of small and medium-sized enterprise projects that often deliver projects with time delays and cost overruns which has been attributed to project complexity. This is evident in the large number of projects that have changed, failed or have been halted due to economic disruptors such as the global pandemic, socio-political unrest, natural disasters and the Russia-Ukraine conflict. The unprecedented economic disruptors and their impact continue to threaten the survival of economies globally, and the disruptors have affected various industries and sectors, especially infrastructure development programmes.

The South African government and private organisations have recognised the importance of providing necessary support to develop a conducive environment where businesses can operate optimally. Several initiatives have been explored and implemented by the government to assist in the development and sustainability of SMEs. The lack of sound business processes, including project management processes, tends to adversely impact the effectiveness of the businesses and delivery of the projects. In most instances, the challenge in the implementation or execution of the project emanates from projects not being managed effectively in terms of best practices.

The concept of project management as a discipline is important for SMEs undertaking infrastructure projects because the lack or non-adherence to this discipline impedes the growth and sustainability of companies that are supposed to be contributing significantly to the economy and the provision of employment opportunities.

The primary objective of this study is to evaluate existing project management methodologies and approaches adopted and/or utilised by SMEs in infrastructure development programmes in Gauteng and to present a hybrid project management approach that not only relies on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

Keywords: Project Management, agile project management, traditional project management, hybrid project management, management, performance, infrastructure development, Small and medium-sized enterprises

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DEFINITION OF KEY TERMS

APEC	**:**	Asia Pacific Economic Cooperation
Co	**:**	Company
EC	**:**	European Commission
EEC	**:**	European Economic Community
FTAs	**:**	Free Trade Agreements
GDP	**:**	Gross Domestic Product
GNP	**:**	Gross National Product
GP	**:**	Gauteng Province
GPG	**:**	Gauteng Provincial Government
IDS	**:**	Institute of Development Studies
ILO	**:**	International Labour Organisation
LED	**:**	Local Economic Development
MNCs	**:**	Multinational Corporations
OECD	**:**	Organisation for Economic Cooperation and Development
PM	**:**	Project Management
PMBOK	**:**	Project Management Body of Knowledge
PMI	**:**	Project Management Institute
PMSA	**:**	Project Management South Africa
R&D	**:**	Research and Development
SMME	**:**	Small Medium Micro Enterprise
SME	**:**	Small and Medium Enterprise
SOE	**:**	State Owned Enterprises
SPSS	**:**	Statistical Package for the Social Sciences
StatsSA	**:**	Statistics South Africa
TFR	**:**	Total Fertility Rate
UK	**:**	United Kingdom
UNDP	**:**	United Nations Development Program
USA	**:**	United States of America
WTO	**:**	World Trade Organisation

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1. CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE RESEARCH PROBLEM

1.1 Introduction

Infrastructure development forms part of the emerging economic uplifters in South Africa and internationally. Infrastructure development is a global multibillion-dollar industry that has contributed to the livelihoods of billions of people nationally and globally. Infrastructure development and infrastructure projects are envisaged to play a crucial role in ensuring economic growth and development and aid in alleviating poverty in South Africa. In addition to producing structures that add to productivity and quality of life, the sector is labour-intensive, and when the sector is working at its total capacity, large sections of the nation's workforce are active (Dlamini, 2020; Unnikrishnan & Kattookaran, 2020; Maciulyte-Sniukiene & Butkus, 2022). This sector not only plays a pivotal role in the economy but also contributes to national socio-economic growth by providing shelter and employment. The role played by infrastructure development concerning employment creation is significant, considering the number of diverse jobs and opportunities created by the sector. The contribution by the sector towards economic growth and development is vital as this sector creates job opportunities for millions of unskilled, semi-skilled and skilled workforces (Yang, van Dam, Majumdar, Anvari, Ochieng & Zhang, 2019; Appiah, Onifade & Gyamfi, 2022.).

The growth of infrastructure development programmes has been a critical national priority for the South African government, as an investment in infrastructure development is not only a vital contribution to economic growth but also an aspect of social upliftment and development (Cigu, Agheorghiesei, Gavriluță & Toader, 2018; Kihombo, Ahmed, Chen, Adebayo & Kirikkaleli, 2021.). Investments have been injected into large infrastructure projects; however, the government’s plans are not translating into projects with sufficient rapidity, as only a few tangible projects have resulted. Big infrastructure plans are not translating into work for the construction industry (Mphomela, 2020; Maciulyte-Sniukiene *et al.,* 2022). This has resulted in many companies filing for business rescue or declaring bankruptcy in the last few years. The impact of economic disruptors such as the global pandemic, socio-political unrest, natural disasters and the Russia-Ukraine conflict have

adversely impacted companies and the development of infrastructure (Brenner & Bhugra, 2020:18; Ma *et al.,* 2020:76; Vanclay, 2020:129).

The unprecedented economic disruptors and their impact continue to threaten the survival of economies globally. The disruptors have affected various industries and sectors, especially infrastructure development programmes (Linthorst & de Waal, 2020), since two-thirds of infrastructure development projects are unsuccessful or have been delivered with time delays and cost overruns in South Africa. The success rate of infrastructure development projects is highest in Africa and North America, where over 40% of the projects met expectations; in Asia and Oceania, the success rate is 30% (Phalatse, 2022). Infrastructure development s understood as a branch of manufacture and trade based on building, maintaining, and repairing structures. This definition includes drilling and solid mineral exploration. Infrastructure development also consists of all general contractors and operative builders primarily engaged in constructing residential, farm, industrial, commercial, or other buildings (Standard Development Indicator Group, 1996) is a project-based industry that is not isolated from global factors. These highly influential factors are essential to determine the success or survival of SMEs in this sector. Infrastructure development programmes are organizationally complex and highly fragmented, with a predominance of small and medium-sized companies projects that often deliver projects with time delays and cost overruns, which has been attributed to project complexity (Sohi, Hertogh, Bosch-Rekveldt & Blom, 2016). Projects delivered through specific project management parameters cannot adapt to changes necessitated by global factors (Biygautane, Neesham & Al-Yahya, 2019:216). This inability to adapt is evident in the large number of projects that have changed, failed or have been stopped due to economic disruptors such as the global pandemic, socio-political unrest, natural disasters and the Russia-Ukraine conflict (Alsharef, Banerjee, Uddin, Albert & Jaselskis, 2021). The Government has continued to prioritize its spending through its commitment notwithstanding the challenges that have manifested because of the pandemic. This prioritisation is evident through the revised budget for 2020, which had a greater focus on recurrent expenditure. The emphasis on recurrent expenditure continues to impact the annual gap in infrastructure investment (Deloitte, 2020).

1.2 Problem statement

Economic development is significantly enhanced by implementing infrastructure development initiatives and the various associated programmes. Furthermore, not only does infrastructure development contributes immensely to economic growth, but it also aids in increasing productivity by providing amenities which enhance the quality of life (Kessides, 2013; De Guimarães, Severo, Júnior, Da Costa, & Salmoria, 2020; Bandari, 2022). Infrastructure development has evolved through the introduction of legislated regulations, specifications, and standardising of building materials, and this has culminated in an industry that markedly contributes to the economy and generates significant economic participation and income, as well as employment opportunities. Job opportunities presented by infrastructure development programmes account for nearly 11% of the nation's workforce, offering employment opportunities with low entry barriers (Sohi *et al.,* 2016; Deloitte, 2020; Maulik, 2019; Roy Maulik, 2019). These programmes are essential building blocks of the economy as they enable trade and power businesses. A well-established infrastructure system connects workers to their jobs, creates opportunities for struggling communities and protects the nation from an increasingly unpredictable natural environment (Puentes, 2015; Bandari, 2022; Kanwal, Rasheed, Pitafi, Pitafi & Ren, 2020).

However, infrastructure development as an economic stimulator and contributor is, in most instances, adversely affected as it is a locally based sector, meaning that most of its programmes and activities depend on the local markets and investment or financial capacity. For infrastructure as a sector to effectively stimulate the economy and contribute as intended, government and private sector need adequate financial investment and appetite to sponsor infrastructure development. The challenge emanates from the fact that infrastructure development might be a local-based sector, but it is, however, susceptible to global force influences and cannot be compared to other commodities, equities and currencies (Ashridge, 2017; Appio, Lima & Paroutis, 2019).

On the contrary, as part of the government's support to SMEs delivering infrastructure development projects, certain conditions have been set to privilege these businesses through government processes. The conditions ensure that SMEs are provided preservation

and privileges when conducting business with the government. The government has noticed that sustaining a business is challenging for these SMEs. Therefore, the government has devised interventions such as making it compulsory for tenders awarded to large organisations to subcontract a minimum of 30% of the tender's value to predominately black, women-or youth-owned SMEs. Most SMEs delivering infrastructure development projects depend on the availability of projects and programmes often brought through government and private sector investment. It is difficult for them to maintain a structured business model, which includes various effective business processes such as project management. The insufficiency of business processes, such as applying a hybrid project management model, is a challenge, considering the changes imposed by external factors on the business (Rane *et al*., 2019). This, in turn, influences the growth and sustainability of SMEs as the interconnectedness, complexity, and global nature of the infrastructure industry's supply chains and workforce affect the cost and schedule of infrastructure projects. Any slowdown across infrastructure investments due to, for example, the uncertainty of demand or access to financing could impact a project's start dates or stall construction progress, with potential longer-term economic repercussions (PricewaterhouseCoopers, 2020).

The insufficiency of project management and business processes impacts the effectiveness of the businesses and the delivery of the projects. When SMEs are undertaking projects, they may end up either not completing the project on time or delivering a project that has exceeded the budget that was initially set for the project. The challenge in the implementation or execution of the project is due to the project not being managed effectively in terms of best practices (Willumsen, Oehmen, Stingl & Geraldi*.,* 2019). Project management as a discipline is essential for SMEs undertaking infrastructure projects. The inability to maximise the use of different approaches in this discipline impedes the growth and sustainability of companies that contribute significantly to the economy and employment opportunities. In addition, South African infrastructure development programmes are highly influenced by current political instability and access to public and private sector finance that continue to affect unfolding domestic developments significantly (Makhathini, Mlambo & Mpanza, 2020).

The South African government and private organisations have recognised the importance of providing necessary support and provision to develop a conducive environment where businesses can operate optimally. The government has explored and implemented several development and sustainability initiatives for SMEs. This support has involved affirmative public procurement, assistance for promoting local clusters of SMEs, the establishment of business incubators as an infrastructural support measure, new frameworks for informal economy entrepreneurs, and the innovation of a range of local advice or support centres designed both to nurture entrepreneurship and the advancement of existing SME entrepreneurs (Rogerson 2006; Ziervogel, 2019; Madzivhandila & Musara, 2020). Although SMEs play an essential role in a nation's economic and social development, compared with large enterprises, SMEs are less competitive. Still, SMEs may be unable to seize business opportunities due to the limitation of technical skills, shortage of finance and the lack of structure or inadequate project management skills and capabilities (Ribeiro and Fernandes, 2010; Amoah & Amoah, 2018; Manzoor, Wei & Sahito, 2021).

Interventions by government and private organizations that are accomplished to ensure business continuity have not incorporated the changes and adaptability of SMEs to changing global factors. SMEs have often offered lessons to large organizations to survive in a volatile environment (Hughes, 1997; Gherghina, Botezatu, Hosszu & Simionescu, 2020; Tahir, Razak & Rentah, 2018). An additional innovation is required to ensure the success and competition of infrastructure development programmes, and solutions such as a combination of lean construction and agile project management principles are hypothesized as a possible resolution to cope with project complexity resulting from time delays and cost overruns (Sohi *et al*., 2016).

SMEs employ thousands of people and represent the next generation of empowered businesses (Mphomela, 2018). This study, therefore, proposes a conceptual model that strives to be adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening customer engagement through employing agile project

management components to increase the likelihood of success of infrastructure development projects, as the effective implementation of projects by SMEs is critical not only for infrastructure development by also for the sustainability of the business (Mishra, 2019:11). SMEs also contribute to creating sustainable employment and contribute significantly towards the irradiation of poverty, which ultimately affects the social and economic development agenda (Gherghina *et al.,* 2020; Tahir *et al.,* 2018).

Employing project management by SMEs in infrastructure development will assist in managing projects effectively and efficiently, which will minimise impairments ordinarily associated with projects of that nature. The proposed approach to developing effective project management for infrastructure projects should articulate and encompass the various elements impacting and contributing to the projects, including internal and external factors and other imperative factors (Sethy, 2018).

Project management entails a plethora of approaches that contain, to a certain extent, models that can be adapted for specific projects. This includes approaches such as traditional, agile, Kanban, and lean project management, which are adaptable to a project's requirements and specifications.

The use of a hybrid project management model incorporating various project management methodologies by SMEs in infrastructure development projects could result in teams that "*complete work faster, adapting to changing project requirements, and optimisation of workflow*" (Al-Hajj, Khawarizmi, Company & al Khawarizmi, 2018). Each project management process could ensure continuous collaboration with stakeholders. The beneficial elements of a hybrid project management model will aim to assist SMEs in adjusting the projects in response to environmental factors that can influence or impact, such as the current economic disruptors, without compromising the project's delivery. The unique ability of the hybrid model proposes that it will enable and equip teams in the SME environment to be prepared to change direction and focus rapidly but with precision and accuracy.

1.3 Research objectives

1.3.1.1 Primary objectives

- The study's primary objective is to understand project management knowledge and utilisation of project management methodologies and approaches by SMEs in infrastructure development in Gauteng. The study further aims to identify and propose an efficient and effective project management methodology or approach for SMEs undertaking infrastructure development.

1.3.1.2 Secondary objectives

- To describe the environment where SMEs involved in infrastructure development projects operate and the nature of SMEs operating in South Africa
- To examine and identify relevant project management methodologies that can contribute to infrastructure development programmes for SMEs.
- To propose a theoretical project management model for SMEs involved in infrastructure development in South Africa.
- To empirically investigate the application of project management principles used by SMEs involved in infrastructure development.
- To propose a usable project management model to enable SMEs to successfully complete infrastructure development projects.

1.4 Ethical considerations

In essence, the study aims to understand project management knowledge and utilisation of project management methodologies and approaches by SMEs in infrastructure development in Gauteng. The research was submitted to the EduREC Research Ethics Committee of the North-West University and has received ethical clearance (Ethics approval number NWU-00994-21-A4). All qualitative responses from participants were anonymous. Consent forms are an imperative aspect of the study; consent forms were provided to the identified participants with sufficient detailed information on the study. This allowed potential participants to make an informed, voluntary decision to participate in the study. Consent forms that were given to the identified entrepreneurs were written in a language that the entrepreneurs easily understood. This allowed the entrepreneurs to either participate or

decline to participate in the study. All entrepreneurs, willing to participate in the study, were required to sign consent forms. The researcher guaranteed the protection and confidentiality of subjects and ensured that the participant's information shared during the interview was not traced back to them. Each participant was allocated a unique identification number to give effect and maintain anonymity. This study continuously observed the rights to confidentiality and free withdrawal. Ethics issues relating to the research are described in detail in Chapter 5.

1.5 Significance of the study

The significance of this research is that it provides the South African infrastructure development industry, specifically the Gauteng infrastructure development authorities, with the data that can be used to develop and improve infrastructure development programmes. The research further assists in understanding the use of project management in infrastructure development and identifying and mitigating challenges experienced by SMEs within the sector in effectively managing their projects.

The research study further contributes to the existing body of knowledge; insufficient information exists on the contribution of the project management approach in infrastructure development projects and programmes in Gauteng. Findings from this research report could also help propose a conceptual hybrid project management model that is adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

1.6 Outline of the study

The study will explore SMEs using a hybrid project management approach in infrastructure development in Gauteng. The study adopts a qualitative research methodology and aims to a conceptual hybrid project management model that is adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure

projects affected by the economic disruptors in Gauteng. The study consists of eight chapters, of which chapter one focused on providing a technical layout of information of the study. Chapter One also included the problem statement, the research aims and objectives, the significance of the study, as well as the assumption and delimitations of the research paper.

The next chapter will define and characterise Small and Medium Sized Enterprises (SMEs) globally and in developing countries. Thus, to sufficiently address the study objective, the second chapter will deliberate on the literature reviewed for the research. Chapter two will further highlight the role of SMEs in the South African economy and the contribution that SMEs have in creating jobs in South Africa nationally and provincially. Challenges prominent in SMEs will also be discussed in chapter two, including institutions' role in ensuring the stability and prominence of the enterprises in the economy.

Chapter three will provide a brief overview of the South African economy and the socio-economic and economic profile of the Gauteng province. The outline in chapter three is critical for this study as it establishes the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles currently existing in the province. This is imperative for the development of the study framework. The Gauteng province’s current socio-economic and economic profile and status explored in this chapter will contextualise the province's level of development. Furthermore, the province's socio-economic and economic review will provide valuable information on the condition of the province, challenges, and difficulties that exist in the province, assisting in holistically understanding the various industries that exist and the impact that infrastructure development projects have within the province.

Chapter four will outline the importance of project management as a fundamental aspect and discipline of planning and executing tasks and activities in an organized and systematic way to achieve goals and milestones within a certain period within certain budgetary constraints. Chapter four will provide an analysis of project management, including various methodologies. Chapter four will also refer to the systematic process of initiating, planning,

executing, monitoring and controlling, closing and evaluating the effectiveness of an activity set within the parameters of what is classified in a scoped activity.
Chapter Five will unpack the research methodology applied in the research. This will include data collection, analysis, and sampling techniques. The fifth chapter also explored the study area, study design, and the methods to maintain and ensure rigour and reflexivity.

An adaptive and agile conceptual hybrid project management model considering internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors this be discussed further in this chapter six. The research results will be presented in chapter seven, and the findings from the literature review and the data collected through the questionnaires will be analysed in chapter seven. This chapter will explore recommendations concerning addressing the findings and challenges identified in the study. Arguments for and against the research and progressive inputs into the improvement of the study are highlighted. Challenges emanating from undertaking the study are also identified. Finally, a summary of the findings and concluding remarks will be provided in chapter eight. Chapter Eight will complete the study.

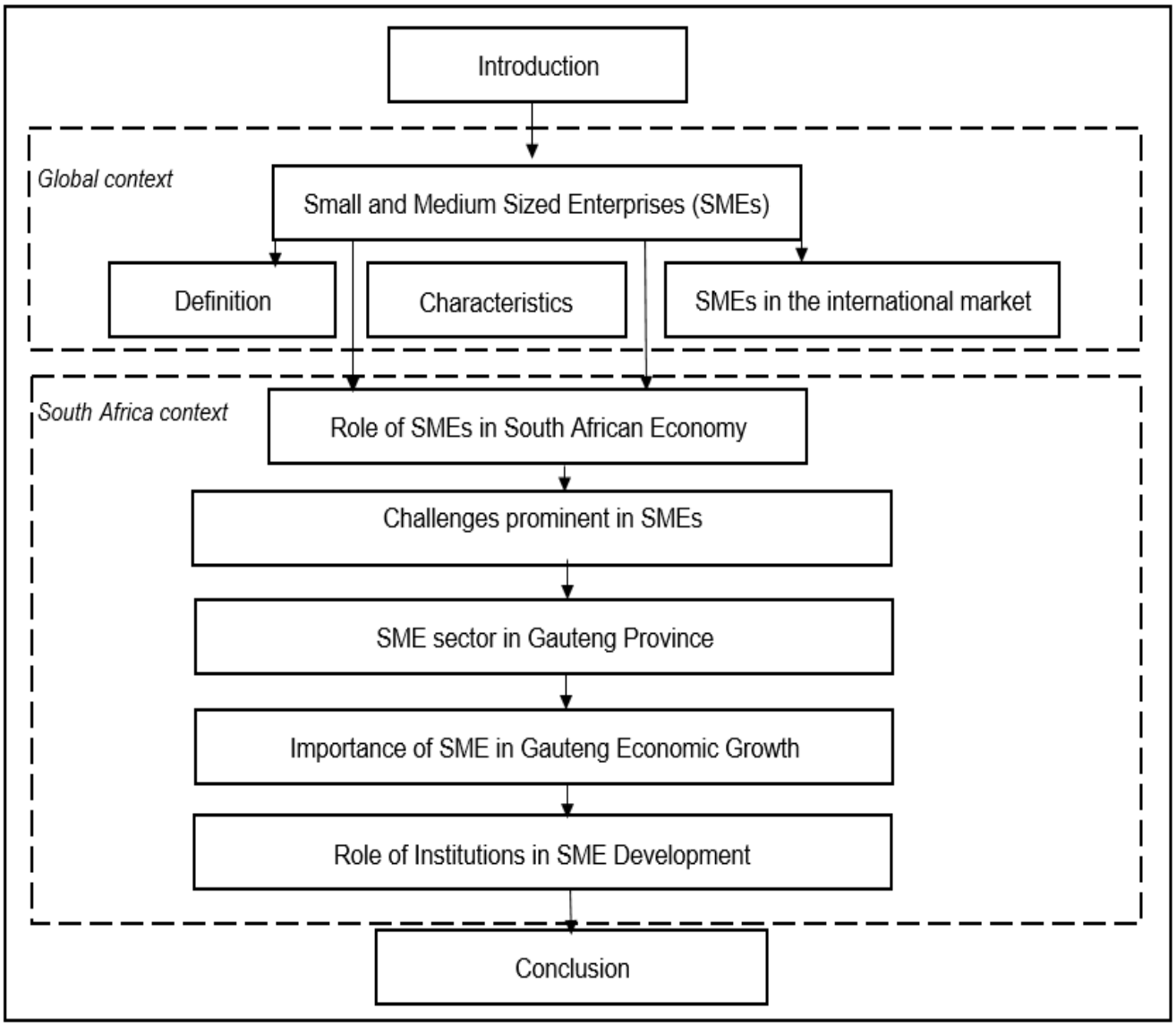
1.7 Chapter Summary

In this chapter, an introduction and the background of the study were provided. This chapter also included the rationale and significance of the study as well as the assumption and delimitations of the study. The problem statement was discussed in this chapter, and the study's research aims and objectives were deliberated. Since the study will explore a hybrid project management model that is adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors, the second chapter will deliberate on the literature reviewed for the research. The definition and characteristics of Small and Medium Sized Enterprises (SMEs) will be provided, and the role of SMEs in the South African economy and the contribution that SMEs and challenges prominent in SMEs will also be discussed in chapter two.

2. CHAPTER 2: SMALL AND MEDIUM ENTERPRISES IN SOUTH AFRICA

2.1 Introduction

Figure 2.1: Structure of chapter 2



The primary purpose of chapter two, illustrated in figure 2.1, is to study and deliberate on the literature focusing on the Small and Medium Sized Enterprises (SMEs) sector in South Africa and the Gauteng province, respectively. The previous chapter gave an outline of the study and included the problem statement, the research aims and objectives and the significance of the study.

This chapter will provide an overview of SMEs, and the definition and various characteristics of SMEs will be explored (par 2.2.1). The global definition and attributes will be compared to the definition in developing countries (par 2.2.2). This chapter will also explore an overview of the role of the SME sector in South Africa (par 2.6) concerning economic development and the creation of jobs (par 2.7.1). Challenges prominent in SMEs (par 2.8) are also discussed in chapter two. This chapter will further deliberate on the importance of the SME sector in Gauteng. The chapter will also look at provincial institutions and the role institutions play in facilitating growth and development (par 2.9), ensuring the stability and prominence of the enterprises in the economy.

2.2 Definition of Small and Medium-Sized Enterprises

In many countries, including developed and developing countries, their economies develop in a way that has to consider the respective countries' circumstances regarding their market and economic activities. Most of these countries have developed economies over the years; these economies are now matured to accommodate these circumstances to enable effective economic activity, participation, and growth. Different forms of involvement exist to allow economies to grow and for inhabitants of the respective country to access and engage in the economy. Small and Medium Enterprises (SMEs) are pivotal in any economy they function in.

SMEs are found worldwide and may even account for more than 90% of businesses in specific regions and locations (Morina & Gashi, 2017; Razak, Abdullah & Ersoy, 2018; Bala & Feng, 2019 and even employ more than 50% of the population worldwide (The World Bank, 2017). These organizations play a crucial role in developing the economy by creating employment opportunities, generating income, and thus reducing poverty. Formally registered SMEs contribute an estimated 40% of the revenue generated to the Gross Domestic Product or national income of developing and underdeveloped countries (Oladinrin, Ogunsemi & Aje, 2012; Bakos, Siu, Orengo & Kasiri, 2020). SMEs contribute significantly to the creation of products, goods and services. The contribution of SMEs is imperative because of the challenges of job creation, poverty and inequality that still exist globally, particularly in emerging economies. The role of SMEs is essential, particularly in

underdeveloped and developing countries, as the sector contributes significantly to new product development and technological innovation (Olatunji & Houghton, 2017; Asgary, Ozdemir & Özyürek, 2020), as innovation and entrepreneurship are fundamental aspects of industrial renewal and economic growth.

2.2.1 Definition of SMEs

In the plight of developing SMEs, it is vital to understand the term SME and its various definitions. A universal or standard international definition of SME does not exist, as the definition of an SME is legislated by each country. Therefore, each country has defined the term in correlation to the specific country's domestic economy, statistical agencies and research undertaken by various organizations contributing to that country's generic term. The number of workers is the most commonly used measure for distinguishing between large and small enterprises (Alstete, 2014; Olatunji & Houghton, 2017; Ribeiro & Fernandes, 2010; Amoah *et al*., 2018). The Bolton Report 1971 was one of the earliest attempts to define SMEs (Berisha & Pula, 2015).

A government-appointed Committee of Inquiry on Small Firms in London established the Bolton Report Committee on small business. The Bolton Report focused on the existing problems and a comprehensive examination of the sector and the role and contribution of small businesses in economic development. The Bolton Report also provided a global comparison of the sector, assisting in formulating the foundation for policy recommendations for numerous institutions. Since then, partly because of the report's influence, government policies have been developed to aid small businesses and stimulate entrepreneurial activity and innovation (Gray & Stanworth, 2009; Salifu, Tofik-Abu, Rahman & Sualihu, 2018). The comprehensive report, which provides factual information on the definition and understanding of SMEs, describes two imperative types of small, medium and micro business definitions. The statistical and economic definitions categorically place SMEs in a particular criterion (Dyikanov, 2019; Popov, 2018). These criteria have guided various institutions, governments, and countries globally.

The economic definition of the Bolton Report has categorized the information into three criteria (Bolton (1971) cited in Dyikanov, 2019):

1. A small firm has a share of a relatively small marketplace.
2. In a personalized manner, not through a formal management structure and is managed by the owners or part owners.
3. This initiative forms part of a larger sense, and the owners /managers make decisions based on their own discretion and must be beyond the control of free-form independence

The Bolton Committee categorized the statistical definitions into different sectors, as illustrated in Table 2.1. The number of employees and the annual turnover are the two indicators the Bolton Committee uses.

Table 2.1: Bolton Committee definition of small business in different sectors

Sector	Definition
Manufacturing	200 employees or less
Construction	25 employees or less
Mining and Quarrying	25 employees or less
Retailing	Turnover of £ 50 000
Miscellaneous	Turnover of £ 50 000
Services	Turnover of £ 50 000
Motor Trades	Turnover of £ 100 000 or less
Wholesale Trades	Turnover of £ 200 000 or less
Road Transport	Five vehicles or less
Catering	All excluding brewery-managed houses

Source: Dyikanov, 2019

2.2.1.1 European Union and World Bank definition of SME

The European Commission's fundamental criteria used by the Commission is the number of employees in the enterprise. However, incorporating a financial criterion is also required to comprehend an enterprise's true scale, performance, and position compared to its

competitors, as illustrated in Table 2.2 (European Commission, 2003; El Madani, 2018; Razak *et al.,* 2018).

The European Commission establishes the criteria for identifying firms through a guide that defines the enterprise by the number of workers, annual balance sheet and an annual turnover (European Commission: 2005; Dyikanov, 2019). Adhering to either of the two financial conditions is the enterprise's decision. The European Commission has concluded that achieving the requirement of the number of employees is a requirement. The following table summarizes the definition of SMEs according to European Union standards.

Table 2.2: Definition of Small and Medium Enterprises with European Union Standards

Enterprise Category	**Headcount: Annual Work Unit (AWU)**	**Annual Turnover**		**Annual Balance Sheet Total**
Medium-sized	< 250	≤ € 50 million	or	≤ € 50 million
Small	< 50	≤ € 10 million	or	≤ € 10 million
Micro	< 10	≤ € 2 million	or	≤ € 2 million

Source: Berisha & Pula, 2015

The World Bank defines SMEs using three quantitative criteria: the total assets in US dollars, the number of employees, and total annual sales in US dollars (Berisha & Pula, 2015). To be classified as a micro, small, or medium business, the enterprise must fulfil the quantitative requirements of at least one financial criterion. The number of employees is a mandatory requirement. Table 2.3 summarises the definition of SMEs according to World Bank standards.

Table 2.3 Definition of Small and Medium Enterprises by World Bank Standards

Enterprise Indicators	Number of Employees	Total Assets		Total Annual Sales
Medium-sized	> 50 ≤ 300	>$ 3 million. ≤ $ 15 million	or	>$ 3 million. ≤ $ 15 million
Small	> 10 ≤ 50	>$ 100 000. ≤ $ 3 million	or	>$ 100 000. ≤ $ 3 million
Micro	< 10	≤ $ 100 000	or	≤ $ 100 000

Source: Berisha & Pula, 2015

In comparing Tables 2.2 and 2.3, the definition of small and medium enterprises by European Union standards and World Bank standards illustrated that a quantitative criterion of the approximate number of employees is used in both definitions. However, the definition used by the World Bank standards indicated a slightly higher requirement for the number of employees (300 employees) than the European Union Standards (250 employees), particularly in the medium enterprise indicator or enterprise category section. The currency used by each standard is also different as it relates to the currency of the country/state in which the standard has been developed. The European Union standards refer to the Euro (€), and the World Bank standard refers to the US Dollar ($).

A comparison of the financial criteria illustrates that the European Union standards refer to the enterprise's annual turnover and its annual balance sheet, even though the World Bank standards refer to the total assets and total annual sales as an indicator of financial criteria. According to the European Union standards, a micro-enterprise must have a turnover or revenue of up to €2 million, and a micro-enterprise in the World Bank must have annual sales of not more than $100,000. The European Union establishes a maximum barrier of €50 million to separate medium-sized enterprises from large ones. However, the World Bank sets a threshold of just 15 million dollars (Berisha & Pula, 2015; Dyikanov, 2019). The Bolton Committee Report guided the formation of the European Union and World Bank standards. However, several countries' definitions exist; the most common denominator being the

number of employees. Most definitions refer to the threshold number of 250 employees for medium-sized enterprises.

2.2.1.2 SME definition in Asia Pacific Economic Cooperation

In 1989 a regional economic forum was established; the core responsibility of the forum is to leverage and capitalize on the growing interdependence of the Asia-Pacific region. This forum is referred to as the Asia-Pacific Economic Cooperation (APEC). The composition of APEC comprises 21 member countries that progressively aim and contribute to increasing regional inclusion for the inhabitants of Asia-Pacific countries. The 21-member forum seeks to boost regional prosperity by promoting innovation, sustainability, creativity and security implemented through economic integration (Asia-Pacific Economic Cooperation, 2021).

The core responsibility of APEC is to facilitate the movement of products, investments, services, and people across the Asia-Pacific borders. “Members facilitate this trade through faster customs procedures at borders; more favourable business climates behind the border; and aligning regulations and standards across the region” (Asia-Pacific Economic Cooperation, 2021). The activities of APEC to coordinate regulatory systems are a crucial component of integrating the Asia-Pacific economy. APEC has assisted in eliminating tariffs and other trade obstacles in the Asia-Pacific region, resulting in the expansion of international trade and the economy's growth. Key to achieving APEC's vision is referred to as the “Bogor Goals”, APEC’s foundational goals of free and open trade and investment in the Asia-Pacific by 2010 for industrialized economies and by 2020 for developing economies. Leaders adopted these goals at their 1994 meeting in Bogor, Indonesia (Asia-Pacific Economic Cooperation, 2021). APEC membership includes Peru, Mexico, Canada, the Russian Federation, Hong Kong, China, Indonesia, Papua New Guinea, the Republic of Korea; Malaysia; New Zealand; Vietnam; Brunei Darussalam; Chile; the Philippines; Singapore, the People's Republic of China, Chinese Taipei, Australia, Thailand, the United States of America, and Japan.

A comparison between definitions of SMEs according to APEC is illustrated in Table 2.4. The technical description and definitions may vary from country to country. The variance in

description and definition is commonly based on the annual turnover, local operations, the number of assets, total annual sales or annual balance sheets, the total number of managers and autonomy.

Table 2.4: Definition of SME in Asia Pacific Cooperation (APEC)

Country	Definition of SMEs		Measurement
	Number of Employees	Annual turnover / Total Assets	
United States	≤ 1 500	≤ $ 50 million	Employment and assets
Canada	≤ 50 (service industry) ≤ 500 (manufacturing)		Employment
Hong Kong	≤ 50 (retail) ≤ 100 (manufacturing)		Employment
Indonesia	≤ 100 (manufacturing)		Employment
Japan	≤ 50 (retail) ≤ 100 (wholesale) ≤ 100 (service industry)	≤ ¥ 50 million (retail) ≤ ¥ 100 million (wholesale) ≤ ¥ 50 million (service industry)	Employment and assets
Malaysia	≤ 50 (service industry) ≤ 150 (manufacturing)	≤ MYR 5 million (service industry) ≤ MYR 25 million (manufacturing)	Employment and shareholder funds
Philippines	≤ 200	≤ ₱ 60 million	Employment and assets

Country	Definition of SMEs		Measurement
	Number of Employees	**Annual turnover / Total Assets**	
Republic of Korea	≤ 100 (wholesale) ≤ 300 (manufacturing)	≤ ₩ 10 billion (wholesale) ≤ ₩ 8 billion (manufacturing)	Employment assets and sales revenue
Singapore	≤ 200 (service industry)	≤ SGD 15 million (manufacturing)	Employment and assets

Source: (Makinde, Ajike & Babatunde, 2021)

2.2.1.3 Definition of SME in South Africa

In South Africa, in 1996 (two years after the start of the first democratic dispensation), the National Small Business Act Gazette its first definition of small, medium and micro enterprises. This definition included terminologies such as survivalist enterprises which can be defined as enterprises that operate in the informal sector of the economy, mainly undertaken by unemployed persons, income generated below the poverty line, little capital invested, not many assets, opportunities for growing the business and very small (National Small Business Act, 1996; Kalitanyi, 2019; Kibuuka & Tustin, 2019). Other terminologies also included micro-enterprises, which is defined as an enterprise that comprises between one to five employees, usually the owner and family; the enterprise is informal - no license, formal business premises, labour legislation, turnover below the VAT registration level of R300 000 per annum (National Small Business Act, 1996; Kibuuka *et al.,* 2019).

In 2019, a new government gazette altering South Africa's classifications of micro, small, and medium firms was released. The new government gazette has classified small, medium, and micro enterprises as enterprises with fewer than 250 employees, and the new turnover threshold has been developing to consider the changes in the inflation rate, which was last altered in 2003. The revised government gazette also defines small, medium, and micro enterprises using two proxies which are the ‘total annual turnover’ and the ‘total full-time equivalent of paid employees’, as illustrated in table 2.5. The third proxy, the total gross asset

worth formed as part of the Small Business Act 1996, has been excluded from the new government gazette.

The excluded proxy was a vital determinant in determining the size of small, medium and micro-enterprises in South Africa. The new government gazette has also excluded categories such as survivalist enterprises and consolidated the 'very small enterprise' category into the 'micro enterprise' category as these categories were unhelpful and inconsistent with international practice.

Table 2.5: National Small Business Act Definitions

Sectors or sub-sectors in accordance with the Standard Industrial Classification	**Size or class of enterprise**	**Total full-time equivalent of paid employees**	**Total annual turnover**
Agriculture	Medium	51-250	≤ R 35 million
	Small	11-50	≤ R 17 million
	Micro	0-10	≤ R 7 million
Mining and Quarrying	Medium	51-250	≤ R 210 million
	Small	11-50	≤ R 50 million
	Micro	0-10	≤ R 15 million
Manufacturing	Medium	51-250	≤ R 170 million
	Small	11-50	≤ R 50 million
	Micro	0-10	≤ R 10 million
Electricity, Gas and Water	Medium	51-250	≤ R 180 million
	Small	11-50	≤ R 60 million
	Micro	0-10	≤ R 10 million
Construction	Medium	51-250	≤ R 170 million
	Small	11-50	≤ R 75 million
	Micro	0-10	≤ R 10 million
	Medium	51-250	≤ R 80 million

Sectors or sub-sectors in accordance with the Standard Industrial Classification	Size or class of enterprise	Total full-time equivalent of paid employees	Total annual turnover
Retail, motor trade and repair services	Small	11-50	≤ R 25 million
	Micro	0-10	≤ R 7.5 million
Wholesale	Medium	51-250	≤ R 220 million
	Small	11-50	≤ R 80 million
	Micro	0-10	≤ R 20 million
Catering, Accommodation and Other Trade	Medium	51-250	≤ R 40 million
	Small	11-50	≤ R 15 million
	Micro	0-10	≤ R 5 million
Transportation, Storage and Communication	Medium	51-250	≤ R 140 million
	Small	11-50	≤ R 45 million
	Micro	0-10	≤ R 7.5 million
Finance and Business Services	Medium	51-250	≤ R 85 million
	Small	11-50	≤ R 35 million
	Micro	0-10	≤ R 7.5 million
Community, Social and Personal Services	Medium	51-250	≤ R 70 million
	Small	11-50	≤ R 22 million
	Micro	0-10	≤ R 5 million

Source: National Small Business Act, 2019

2.3 Factors that influence and impact SMEs in developed and developing countries

Small and medium-sized enterprises continue to play a pivotal role in economies, as SMEs are essential in forming and growing contemporary knowledge-based economies. SMEs can foster innovative and technological skills, as well as the ability to be agile and adapt to changes in the economy (Bunyasi, Bwisa & Namusonge, 2014; Kosmas, 2020; Bailey, 2019), SMEs, in their nature, can respond to changing consumer demands and market demands. SMEs in developing and developed countries have continued to create new

employment opportunities (Imran *et al.*, 2019; Kosmas, 2020; Scheuer, Boot, Carse, Clardy, Gallagher, Vecchione, 2021). The SME sector is an essential component in high-income OECD countries as SMEs in OECD regions account for over 95% of businesses, employing over 60-70% of the entire private sector population (OECD, 2020). In developing countries, SMEs contribute immensely to socio-economic and economic growth by contributing significantly to innovation, promoting regional development and social cohesion. The Organization for Economic Co-operation and Development (OECD) is a unique forum where the governments of 37 democracies with market-based economies collaborate to develop policy standards to promote sustainable economic growth.

Several economic factors exist that contribute to the empowerment of SMEs; however, these factors also contribute to weakening the sustainability of SMEs globally. Economic factors that impact and contribute to SMEs can be divided into two main categories: macroeconomic and microeconomic factors (Kraja and Osmani, 2015).

Microeconomic factors significantly influence the performance of SMEs. Microeconomic factors can be defined as internal variables that affect the enterprise over which the enterprise's executive and members of management have some (but not complete) influence. Micro-economic factors include lack of management skills, limited access to credit, lack of finance, insufficient product demand, lack of marketing skills, size of business, high labour turnover, decreased profits, location of the business, lack of information about government support (Sitharam & Hoque, 2016; Ptak-Chmielewska & Matuszyk, 2019).

Macroeconomic factors are factors external to the enterprise. These factors are not only inclusive only to the enterprise but affect and impact the economy holistically. Macroeconomic factors can be defined as external variables that impact the whole economy, impacting the country's natural and non-natural residents. They cannot be managed to a considerable extent by the executive, and members of management are referred to as macroeconomic factors (Ngary *et al.,* 2014; Panda, Nanda & Panda, 2021). Macro-economic factors include onerous government regulations (tax and labour), relatively high-interest rates, unreliable water and electricity supply, high level of unemployment, excessive

bureaucracy, lack of governmental assistance and support, competition, excessive red tape and bureaucracy and inadequate development of infrastructure (Sitharam & Hoque, 2016; Cicea, Popa, Marinescu & Cătălina Ștefan, 2019).

Micro-economic and macroeconomic factors play a pivotal role in the development of SMEs. However, with the volatility of the economic environment, economic factors have become unpredictable and unmanageable for enterprises. This effect is indicated in the literature below, which illustrates economic factors' influence in developing and developed OECD nations.

2.3.1 SMEs in Developed Organisation for Economic Co-Operation Development (OECD) countries

A thirty-eight-member country intergovernmental economic organisation was founded in 1961 to stimulate and encourage economic progress, promote democracy, expand world trade and enhance intercontinental relations. The Organisation for Economic Co-operation Development (OECD) offers a forum for its members to discuss policy experiences, identify best practices, explore solutions to various challenges, and coordinate local and international policies and strategies (Berisha & Pula, 2015; OECD, 2019). The thirty-eight member countries of the OECD are high-income economies with relatively high Human Development Index (HDI). All thirty-eight member countries are considered high-income countries with a high quality of life, advanced technological infrastructure, and high gross domestic product (GDP) per capita. The OECD is widely regarded as a very prominent publisher of economic statistical data, being a statistical agency. Member country assessments and evaluations are conducted annually to ensure consistency in statistical reporting and analysis (OECD, 2019). OECD membership includes Denmark, Slovenia, Austria, Germany, Ireland, Belgium, Canada, Turkey, Iceland, Luxembourg, United States, Hungary, France, Sweden, Colombia, Netherlands, Latvia, Switzerland, United Kingdom, Italy, Slovakia, Spain, Norway, Greece, Portugal, Chile, Costa Rica, Estonia, Finland, Israel, South Korea, Lithuania, Mexico, Norway, New Zealand, Japan, Iceland and Ireland (OECD, 2020).

In most OECD countries, small and medium enterprises account for an estimated 60-70% of employment (Kosmas, 2020). SMEs' employment opportunities in Japan and Italy are significantly higher than in the United States (OECD, 2020). SMEs' new employment opportunities in OECD nations are relatively higher in well-established economies such as the United States and the Netherlands. SMEs account for a disproportionately large share of new jobs, especially in countries with solid employment records (OECD, 2020). Research conducted by OECD (2020) suggests that the number of years in existence, rather than the size of the enterprise, is the determinant factor in creating employment. New enterprises are highly likely to create new employment opportunities. However, less than half of new enterprises or start-ups survive or become fully operational in the first five years of existence. Only a tiny percentage evolve into high-growth enterprises contributing significantly to employment creation. High job turnover jeopardizes job security, and small and medium enterprises are frequently excluded from providing their employees' notice or termination of employment (Kosmas, 2020). Due to affordability and high-cost implications, small and medium enterprises also tend to invest little in training and rely on external recruits to increase competence.

However, a majority of OECD nations have programs to assist SMEs. "*One-quarter of all public support programmes reported to the OECD primarily target SMEs. Germany, Iceland, Japan, and New Zealand dedicated more than 50 per cent of their entire public support programmes to SMEs. Per annum, a total of US$3.75 billion of public money is paid to help start-ups acquire equipment, R&D, training and consultancy services through direct grants, tax concessions, low-interest rate loans, or loan guarantees*" (OECD, 2020). In developed economies, more than half of the small and medium enterprise programmes are managed locally, making coordination among authorities crucial. This results in better-coordinated programme outcomes as local authorities drive outcomes and results consistently and simultaneously.

In OECD countries, the onus is on governments to ensure that 70% of the programmes for small and medium enterprises are established to support and assist newly established SMEs. The programmes must ensure that small and medium enterprises continue operating

for over five years (Miković *et al.*, 2020; OECD, 2020; Toumi & Smida, 2018). The support results in stable and sustainable SMEs contributing to economic growth and employment creation. In high-income OECD countries, small and medium enterprises are pivotal in forecasting and expanding into new markets. Approximately 30 to 60% of small to medium enterprises are classified as innovative, with 10% operating in technology-based markets. In OECD countries, unlike giant corporations, small and medium enterprises are innovative and market-driven rather than research-driven, and they rapidly adapt to new possibilities and prospects (Alstete, 2014; Olatunji & Houghton, 2017). Programmes in high-income countries have evolved from a production focus to programmes that are designed to improve technology transfer by increasing the ability of SMEs ability to absorb technology. However, small and medium enterprises in OECD countries continue to face government-imposed challenges. Therefore, it is the responsibility of the government to eliminate uncertainties in the tax, regulatory, and macroeconomic environments; to ensure that business framework circumstances do not negatively affect the risk/reward ratio; and to facilitate the mobility of human resources and specialized service markets (Berisha & Pula, 2015). Even though these government-imposed challenges benefit the overall economy, they will benefit small and medium enterprises.

In numerous OECD nations, women-owned small and medium enterprises play an increasingly significant role in emancipating women and members of minorities (Sifumba, Mothibi, Ezeonwuka, Qeke, & Matsoso, 2017). Women-owned enterprises enable the capitalization of the abilities of educated and skilled women who would otherwise be barred from progressing in competitive corporate organisations. Women are continuously barred or hindered from progressing due to the barrier for women and members of minorities. Women-owned organisations enable women to contribute to household income whilst integrating career and family responsibility because of the additional freedom of running a business. However, the economic potential of women entrepreneurs remains partly untapped; measures are in place in OECD countries to ensure women-owned SMEs are financed and have adequate networks and innovative technology (OECD, 2020)

2.3.1.1 Employment and job creation

SMEs play a pivotal role in all OECD economies: they account for more than 95% of organisations in the economy and are responsible for approximately 60% to 70% of jobs in most OECD nations (Imran *et al.*, 2019; Kosmas, 2020; Scheuer *et al.*, 2021). However, in the manufacturing sector, the number of jobs created by small to medium enterprises is significantly lower, with only 40% to 80% of the jobs created by SMEs (OECD, 2020). Since establishments or enterprises in the service sector are often smaller than those in manufacturing, fewer jobs are created in the services sector. Small and medium enterprises dominate the wholesale, retail, restaurant, hotel and construction industries. Small and medium enterprises account for over 80% of the employment created (OECD, 2020).

Unfortunately, large industrial organisations that employ many people in the manufacturing and construction sectors have experienced a relative decline. The average establishment size in manufacturing and construction has fallen since the early 1980s in Canada, the United Kingdom and the United States, has remained constant in Germany and has risen in Japan (OECD, 2020). However, in OECD countries, the importance and impact of smaller enterprises in job dynamics are frequently examined using net employment changes. Small enterprises (employing less than 100 employees) expanded considerably faster than large established enterprises in all OECD countries from the mid-1980s to the early 1990s (Alstete, 2014; Berisha & Pula, 2015; Olatunji & Houghton, 2017). Unfortunately, less than half of the small enterprises survive the first five years due to the impact of productivity and technological transfer. Because of tough competition, only a fraction of these small enterprises expand to large, high-growth enterprises (Alstete, 2014; Lusiantoro, Purwanto & Rostiani, 2022). Few small enterprises contribute significantly to job creation and productivity growth.

2.3.1.2 Financing SMEs and Types of Financing

In OECD economies, financing enterprises is a considerably important factor leading to the establishment's growth, influencing employment and economic growth (Ika, Söderlund, Munro & Landoni, 2020a). Even in OECD countries, the likelihood of the survival of small enterprises is relatively lower than larger profit-generating enterprises, as financial

institutions perceive small enterprises as intrinsically riskier (Berisha & Pula, 2015; Guertler & Sick, 2021a; OECD, 2020). The survival rate of larger enterprises is a result of access to a multitude of sources of finance. Larger enterprises typically adhere to company regulations and disclosure requirements requested by financial institutions, thus allowing larger enterprises to access loans, equity and bonds (Sitharam & Hoque, 2016; Bongini, Ferrando, Rossi & Rossolini, 2021).

Financial institutions charge small enterprises considerably higher interest rates than larger enterprises to compensate for the increased risk of failure. Higher interest rates may not be in banks' interest as low-risk, low-return borrowers - those most likely to repay loans - are driven from the market (OECD, 2019). Financial institutions are likely to base the lending criteria on collateral, resulting in financing predicated on the availability of collateral rather than projected return. Additional funding opportunities besides bank loans and overdrafts include external equity, factoring, leasing, retaining earnings and private equity. These options are viable and sustainable options available to SMEs in OECD countries (Toumi & Smida, 2018). However, the utilization of funding strategies varies greatly between OECD nations.

The availability of financing for small and medium enterprises in the OECD also varies on how long they are in existence and the financial prospects of the enterprise. In some OECD countries, a clear distinction in funding availability exists, as a newly established SME could generate less profit than an existing established profit-generating SME (OECD, 2019). Funding opportunities increase when the enterprise has been in existence over a period. However, OECD countries are high-development index nations with higher incomes than developing countries; therefore, sources of finance also include personal savings. Personal savings are perhaps the most common source of capital for new firms, as financial institutions only account for one-third of all new enterprise loans (OECD, 2019).

2.3.1.3 SMEs and regulatory reform

The majority of the OECD countries have developed and advanced developing economic systems. The nature and status of the respective economic systems are significant factors

in the business environment, considering the governance aspects to manage the said business environment. In most of these OECD countries, the business environment and economy are highly regulated and managed to ensure efficiency and sustainability (Yoshino & Taghizadeh-Hesary, 2020). The enhanced regulation of the business and economic environment can essentially become an impediment to entry and sustenance by those not financially and regulatory resilient, given the impact of the highly regulated environment (Yoshino & Taghizadeh-Hesary, 2020).

Businesses that are established and enter some of the OECD countries' economic landscapes face significant challenges as the environment, to a certain extent, does not become conducive to their development and growth (Dijkstra *et al.*, 2019). A highly regulated business and economic environment impede SME development, growth and suitability, given the nature of the SME.

SMEs in OECD high-income economies operate in a favourable regulatory environment as the review of regulations is prioritised in the broader economic policy agenda of OECD countries. Technologically inclined enterprises are challenged to establish linkages between favourable government regulations and competitiveness as regulatory frames are favourable to some industries. However, some government regulations inhibit and restrict the formation of new innovative technology-based enterprises, which technology-based enterprises are critical for the creation of employment opportunities and technological innovation (OECD, 2019).

The objectives of the OECD countries' governments and regulatory frameworks in the business and economic sense are to protect, enhance and sustain their economies (Makalesi, Orhan & Yalçin 2022). In most instances, this is a challenge for the SMEs that are not adequately resourced and skilled to navigate the regulatory landscapes in their respective countries (Orhan *et al.,* 2022).

This has a significant adverse impact on the development and growth of the SME fraternity as they are deemed to be potential economic catalysts and generators of new innovative

ways and addressing critical aspects such as unemployment and economic development in their respective countries (Madrid-Guijarro, Garcia & van Auken, 2009; (Makalesi *et al*., 2022).

The provision of regulatory reforms for SMEs is deemed essential to enable development and growth but, most importantly, to facilitate entry and sustainability into the business and economic activities of the country.

Regulatory reforms are the concession or exceptions and exemptions made by a respective government or system to those deemed suitably qualified for the process. This means that, for instance, governments or systems make exceptions to their normal regulatory process and regulation for those considered qualifying for assistance for them to be involved and participate in the economic system effectively. In this context, the regulatory reforms made by OECD countries for the SMEs is understood as the exemptions or concession made to enable SMEs to participate effectively and contribute to the economic activities of the respective OECD country (Guertler & Sick, 2021a; Morina & Gashi, 2017; Sifumba *et al.*, 2017).

Most regulatory reforms related to economic and business regulations deal with the provision of exemptions and concessions on the legislation and regulations promulgated in the respective country. These exemptions and concessions are purely to enable SMEs to participate and grow their businesses to realise the plan set for SMEs.

Implementing reforms as part of economic stimulus packages as incentives to encourage business growth and development is a crucial concept, especially in the OECD countries. The reforms encourage businesses to contribute to overall economic growth and sustainability effectively. Although SMEs are not as large and have the financial muscle as already well-established corporates, they are also provided with support and assistance through tax relief, minimization of bureaucratic business regulations and other related processes (Pohekar & Ramachandran, 2004; Reynolds & Uygun, 2018).

This enables the business to effectively focus on the growth of the operations and sustainability so as not to fail in their respective area of operations. As SMEs are primarily the bridge between the informal and formal business and economic structures, they need to be provided with the necessary support and assistance to enable them to grow their business and operations as they are the catalysts to addressing some of the evident economic issues in the country such as employment and economic growth (Onaran, 2009; Rajapathirana & Hui, 2018).

The role of reforms in OECD countries has played a significant role in ensuring that SMEs in the respective countries strive and grow not only for the benefit of SMEs as businesses but the contribution to the overall economic growth of the respective economies. This is evident as most of the OECD countries' economies experience the progress and activities required, which is evident in their GDP and other measurements.

SMEs in OECD economies are confronted with several challenges. Challenges emanate from a higher variation in profitability, subsistence, and development of SMEs compared to larger, well-established enterprises. This is due to unique financing matters. Small and medium enterprises in OECD countries receive higher interest rates and credit restrictions from financial institutions due to a lack of collateral (Makalesi *et al.*, 2022; OECD, 2002). Financing challenges differ significantly between well-established large enterprises and newly established small enterprises. However, unlike developing economies, with high-income OECD economies, expanding private equity markets, including informal markets, has dramatically improved access to venture capital for start-ups and SMEs (OECD, 2020).

In OECD countries, regulatory costs remain a crucial impediment for SMEs, small and medium enterprises are often ill-equipped to cope with challenges emanating from regulations. Regulation information is available to small and medium enterprises at a relatively high cost. This poses an obstacle for newly established low-profit-generating enterprises. The lack of transparency and access to information is another challenge identified in OECD economies. Transparency and access to information for small and medium enterprises are crucial, and information technology offers enormous potential to

close the information gap. It would be highly beneficial for institutions and government bodies to establish a system in which all required information affecting organisational strategies is available in one location to mitigate this challenge.

2.4 SMEs in developing countries

Developing countries have a strategic agenda of growing their economies through interventions and initiatives that will lead to sustainable economic growth (Naidu & Chand, 2012; Chandra, Paul & Chavan, 2020). This strategic agenda is based on ensuring that their economies are suitable and able to be on the growth trajectory, thus enabling adequate participation and involvement for the inhabitants. Given the role of assisting the respective country in addressing economic and social challenges, SMEs must be accorded a conducive environment and support to attain the desired economic participation and growth.

The introduction or implementation of reforms for SMEs in developing countries is deemed to be a positive approach and an economically strategic one as it provides the necessary aid and support towards creating a conducive environment for SMEs to function (Dasgupta & Singh, 2005; Golini & Gualandris, 2018; Chandra *et al*., 2020). Reforms in developing countries are understood as those allowances or provisions made by the respective government or regulatory bodies and frameworks to allow for effective participation or support and relief for the SME in the operations and functioning of the business. The reforms are also viewed as privileges or formal exemptions and accommodations made by the regulatory framework or legislation of the respective country for SMEs to allow them to enter, participate and sustainably grow their business in the overall economic landscape of the respective country.

SMEs in developing countries emerge as businesses that ordinarily do not have significant capital available or possess big financial footprints in their respective economies (Kosmas, 2020; Kraja & Osmani, 2015; Manzoor *et al.*, 2021). In most instances, these SMEs are start-ups trying to break into the formal and mainstream economy through their businesses, aiming to contribute to the country's overall economic growth. As most regulations and legislative frameworks require or impose stringent compliance, it is, in most instances, a

challenge and impediment for SMEs to comply with the legislative and regulatory frameworks.

The approach by respective governments and legislators of the various developing countries to introduce reforms as a stimulus for SMEs is imperative. It contributes significantly to the growth and sustainability of the SME sector in the respective developing countries.

Reforms serve as a critical tool to enable SMEs to establish, develop and grow their footprint and participation in the economy as it allows them or exempts them from regulations and legislative requirements that are ordinarily designed for large cooperations and businesses that already have the capacity and muscle to comply with the regulations and frameworks effectively.

Implementing reforms by developing countries for SMEs emanates from the challenges and obstacles experienced by businesses. As part of harnessing and aiding economic development and growth, such reforms provide a conducive environment for SMEs to participate effectively and contribute to their respective economies (Guertler & Sick, 2021a; Haraguchi, Cheng & Smeets, 2017).

Implementing reforms does not outright remove SMEs from their respective regulatory and legislative obligations. However, it exempts them to a certain degree to allow them room to comply still and establish themselves as structured and formal businesses within the respective economies (Kraja & Osmani, 2015; Guertler & Sick, 2021a).

The exemption of SMEs from specific regulatory and legislative requirements further enables them to establish their capacity and capabilities within the formal and structured economy by being able to operate their businesses without the stringent burden of having to comply with the overall regulatory and legislative requirements ordinarily imposed on businesses operating in the respective economies.

Reforms are used in developing countries as a stimulus in the economy. Most developing economies must improve and promote business development and growth to effectively increase participation and address the other pertinent issues the developing countries must deal with. This includes the provision of employment, the introduction and access of women in the businesses and economic spheres, and youth development.

2.4.1.1 Support for SMEs

Establishing any business in society aims to address a need or provide goods or services required by the population and society in which the business operates or intends to operate. The establishment of a business is further aimed and contributing to the overall economy through the creation of employment, contributing to the fiscal of the country by virtue of complying with the applicable regulations and legislation (Kosmas, 2020).

SMEs play a significant role in the country's economy as SMEs tend to be more adaptable to changes and accommodating with respect to aspects such as the creation of employment as they are more accessible for the members of the population they operate in. The success of the SME is, however, largely dependent on the support and patronage gained from the society and communities SMEs operate in. In most instances, as SMEs are businesses that started to add value and provide goods and services required by the communities and environments they operate in, they are primarily supported and patronised by the society they operate in (The World Bank, 2017; Nizaeva & Coşkun, 2018).

Community support for SMEs is important for the development and growth of the SME as a business. SMEs provide the required patronage for the business to experience the development and growth that will enable the SME to become a sustainable business effectively. The structure of economies, which includes formal and informal economies, allows SMEs to develop and grow significantly purely based on their ability to be agile in providing services and goods to the different sectors and levels of the economy.

Developing economies tend to have more opportunities for SMEs as the economies still require the development of industries and businesses that must serve the population's needs

(Madrid-Guijarro *et al.*, 2009; Yoshino & Taghizadeh-Hesary, 2020). SMEs take the opportunity to develop goods and services deemed relevant and required by the economy and population. This benefits SMEs as these businesses are innovators and entrepreneurs who see the gaps within the economy and populations.

Overall, for SMEs to experience the desired and necessary development and growth, the businesses need to understand the environments they are operating in and further ensure they integrate themselves with those environments to experience the relevant and required support that will enable their development and growth (Guertler & Sick, 2021a; Haraguchi *et al.*, 2017). The engagement between the SMEs and the population or environment they operate in is vital. It sets the foundation for a fruitful and long-term relationship that will allow the SME to develop and grow as a business.

2.5 SME sector in South Africa: Statistical overview

The South African economy is one of the largest economies on the African continent. South Africa has a comparatively strong domestic market and open trade policies. In addition, the country has a well-developed infrastructure network and a buoyant financial sector (Fine and Rustomjee, 2018). These factors provide an environment conducive to effective and sustainable economic growth. South Africa has export demand, stimulated activity in the agriculture, mining and manufacturing sectors, and favourable climatic conditions that boosted yields in the horticultural industry in agriculture. The high prices of commodities such as gold, the platinum group metals, iron ore and coal grew the country's terms of trade. They provided substantial liquidity in the domestic money market (SEDA, 2021).

Nevertheless, South Africa continues to experience triple challenges of poverty, income inequality and unemployment (Van Der Westhuizen and Swartz, 2016). To mitigate these challenges, small and medium-sized enterprises (SMEs) must continue playing a significant role in the economy. These institutions are essential drivers of economic growth, employment creation and innovation (Bary, 2019; SEDA, 2016; Shava and Rungani, 2016; World Bank, 2019). The contribution of SMEs in creating employment for inhabitants and

citizens of the country is invaluable, as SMEs serve as a critical intervention for sustainable economic growth (Fine and Rustomjee, 2018).

SMEs in South Africa have been recognised as drivers and architects of sustainable development and economic growth (Maome & Zondo, 2022). The contribution of SMEs in South Africa is significant as SMEs assist in alleviating poverty and unemployment through employment-generating programmes that employ vulnerable and disadvantaged citizens of the country. Small and medium-sized enterprises in South Africa account for 91% of formalised businesses, employ around 60% of the labour force, and account for approximately 34% of overall economic production (SEDA, 2016; Shava and Rungani, 2016; Maome *et al.,* 2022). In their effort to contribute significantly to sustainable development and economic growth, SMEs foster diversification of new, underdeveloped, and unsaturated economic sectors. Furthermore, technology-based innovative SMEs provide a foundation for South Africa to trade and expand internationally, allowing the country to fully participate in Brazil, Russia, India, China, and South Africa (BRICS) economies.

In South Africa, the surge in unemployment continues to challenge the country's development. However, the continuous effort of institutions and government has provided linkages between small-medium sized enterprises and large, well-established organisations, as SMEs aid in developing systemic productive capacity and forming robust economic systems. SMEs provide labour-intensive production techniques, which increase employment and lead to equitable income distribution. In agriculturally based provinces, SMEs work with the government to employ primary value-added processing industries.

There is a need to encourage SMEs' sustainability, as SMEs significantly benefit the economy (Ithia, 2015; Sharma, Govindan, Lai, Chen & Kumar, 2021). In the 2021 financial year, 2.3 million small, medium and large enterprises serviced the South African economy. Some 667,111 small, medium, and large businesses operate in the formal economy, and over 1.5 million operate in the informal economy. The small, medium and large enterprises in South Africa have created a total of 9.7 million jobs. Some 37.6% of SMEs operate in the trade and accommodation sector, and 18.8% operate in the community services sector. A

further 14.7% of the SMEs operate in the construction sector and 13.7% in the financial and business services sector in South Africa. Black-owned formal SMEs constitute the most significant portion of enterprises in the formal economy, with 72.6% registered to black-owned individuals. The overall contribution of SMEs is 37.4%, not even including the contributions made by micro enterprises (Stević *et al.*, 2020; Szirmai & Verspagen, 2015; Žižovic *et al.*, 2020).

Table 2.6: SME key indicators 2020-2021

Key indicators	**2020 Quarter 1**	**2021 Quarter 1**	**Year-on-year change**
Number of SMEs and SMMEs	2 614 063	2 325 203	-11.1%
Number of formal SMMEs	755 265	667 111	-11.7%
Number of informal SMMEs	1 748 031	1 552 814	-11.2%
Number of jobs provided	10 406 070	9 757 287	-6.2
% Operating in trade & accommodation	38%	37.6%	-0.4 pts
% Operating in community services	14%	18.8%	0.8% pts
% Operating in construction	14.4%	14.7%	0.3% pts
% Operating in financial & business services	13.4%	13.7%	0.4% pts
% Black owners formal SMMEs	74.8%	72.6%	-2.2% pts
% Contribution of SMEs* to turnover of all enterprises	37.5%	37.4%	-0.2% pts

Source: (SEDA, 2021)

The sustainability of SMEs in South Africa is crucial; however, the decline in the number of enterprises in the 2020-2021 financial period concerns private institutions and the government. The number of registered formal and informal enterprises has decreased by 11%; this indicates that the total number of SMEs no longer operating in the sector is 289 00 for the 2020-2021 financial year, a year-on-year decrease from 2.61 million to 2.33 million in

2021 as illustrated in figure 2.6. Despite the broader economic recovery, the decline in the total number of formal and informal SMEs and SMMEs is reflected in the pressure on the sector (Teresiene *et al.*, 2021).

2.5.1.1 SME expansion opportunities and provision of employment

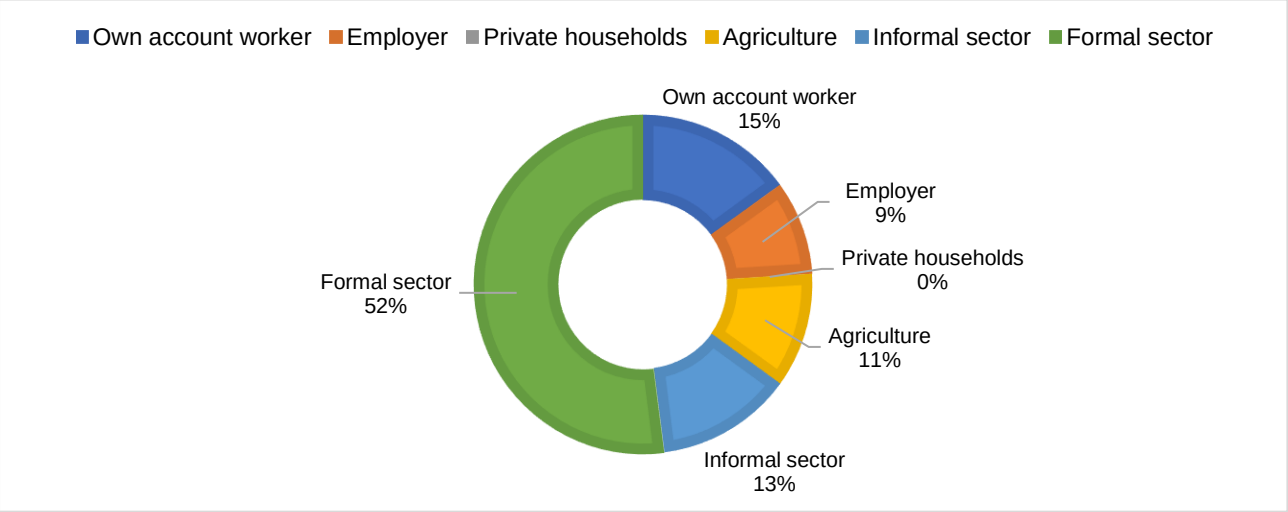
SME enterprises are economic engines in a developing economy such as South Africa, as two-thirds of the formal jobs in South Africa are provided by SMEs (Kraja & Osmani, 2015; Rubashkina *et al.*, 2015; Schroeder *et al.*, 1989). However, the decline in formal and informal SMEs impacts the number of jobs provided. In 2020 over 10 million jobs were created in the sector. However, this has decreased considerably to 9.7 million in one financial year, which indicated a 6.2% decline from 2020 to 2021 (Kosmas, 2020; Manzoor *et al.*, 2021).

Figure 2.2 illustrates the overall jobs provided by the SMEs, formal SMEs provide 52% of employment in the South African economy, and 13% of the SMEs in South Africa provide jobs in the informal sector. Over 11% of the jobs provided by the SMEs in the South African economy are in the agricultural sector.

SMEs in South Africa are vital to the national economy. In terms of employment, the SME sector is the most important. Small and medium-sized firms (SMEs) employ around 47 per cent% of South Africa's workforce, even though SMEs contribute almost 6% of corporate income taxes and account for only 20 per cent% of GDP (Moola, 2020).

The excessive contribution to employment and the employability of individuals and households has made SMEs a crucial component of the government's National Development Plan 2030 (NDP 2030). SMEs are vital sources, a national priority, and a provider and driver of employment and development in the South African economy.

Figure 2.2: Per cent of employment provided by SMEs (2020)



Source: Statistics South Africa, 2021

Relatively fledgling enterprises dominate the SME landscape in South Africa. The annual turnover and revenue generated by SMEs in the country pose a challenge, mainly because of the triple economic crisis. The South African economy is riveted with inequality, unemployment and poverty, and these socioeconomic issues will continue to challenge the economy's development (Kraja & Osmani, 2015).

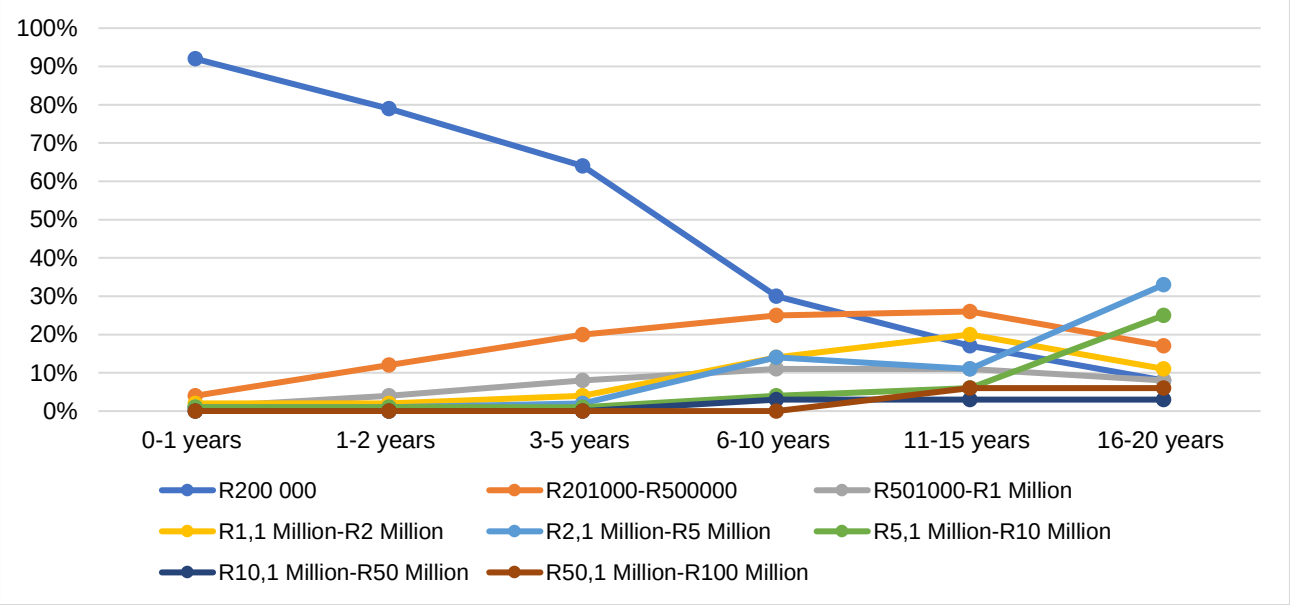
Various stakeholders nationally and internationally have illustrated that these socio-economic issues deserve immediate attention from South African authorities and leaders as SMEs will continue to play a crucial role in employment creation. As shown in Figure 2.3, the potential for employment generation increases when an SME evolves, develops and grows, demonstrating the critical need to ensure that SMEs get the required assistance early on (South African Market Insights, 2020).

South Africa has one of the lowest rates of established enterprises in Sub-Saharan Africa compared to other sub-Saharan African nations (SME South Africa, 2020). This is depicted in Figure 2.3. Most (71%) of SMEs and SMMEs run small firms with annual revenues of less than R200,000. Almost 60% of SMMEs have been in business for less than three years, so

it is natural (and pertinent in South Africa's high unemployment) that SMEs record relatively minimal employment (SME South Africa, 2020).

Figure 2.4 shows a direct correlation between years of existence and the number of workers employed by the respective firm. The number of years in existence is directly related to SMEs' income and, therefore, to the number of workers (Statistics SA, 2019; Statistics South Africa, 2019).

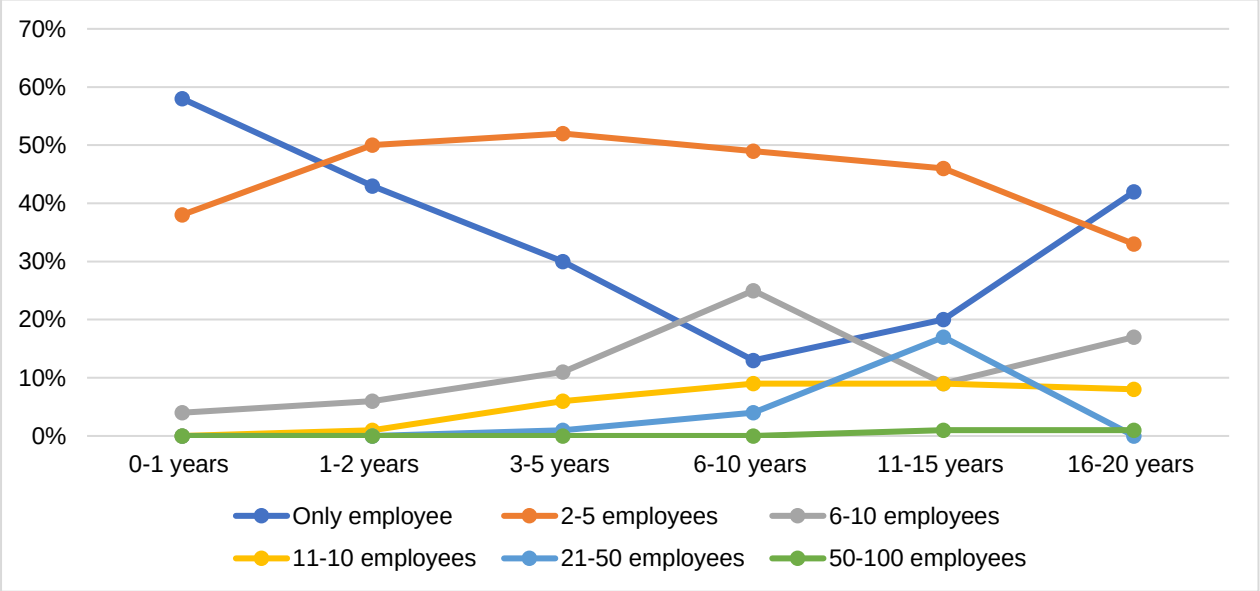
Figure 2.3: Age of Business vs Annual Turnover



Source: SME South Africa, 2020

Figure 2.3 and figure 2.4 illustrate that as a small business grows and develops, the possibility of creating more jobs rises (Statistics South Africa, 2021a). These findings show a realistic image of small businesses' contribution to job creation, demonstrating how important it is to ensure that small and medium-sized enterprises (SMEs) receive the necessary support early (i.e., in the first 3-5 years). This will allow SMEs to mature to the point at which they can contribute significantly to employment generation and economic growth (SME South Africa, 2020).

Figure 2.4: Age Business vs Number of Employees



Source: SME South Africa, 2020

Small and medium-sized enterprises (SMEs) in South Africa tend to have restricted market access. The present status of the South African economy and the high level of unemployment means that SMEs will continue to operate in complex and competitive business conditions for an extended period, and this will likely be the case for a long time (Kosmas, 2020). Regarding areas where assistance is required, 85% of SMEs need access to markets to expand and ensure financial, economic and sustainability through productivity.

The supporting structure and crucial component of the South African economy, which is responsible for creating over 60% of the country's job prospects, continue to face difficulties in its growth. In the South African economy, the SME landscape presents challenges for SMEs in various sectors, including mining, manufacturing, construction, trade and accommodation, transportation and communication, finance and business services, and the community.

Tables 2.7 and 2.8 represent the industry or sectors in which SMEs and SMMEs predominately operate. These tables also represent the number of active SMEs and SMMEs in each sector. The table further illustrates the overall percentage of each sector and the quarterly and yearly changes per sector (Statistics South Africa, 2021b).

South Africa's trade and accommodation industry represents the largest SMMEs (38.1%); however, community-based and manufacturing industries represent the most significant proportion at 27.7% and 19.3%, respectively. This industry provides over 50% of employment opportunities that exist in the SME landscape in the country.

This sector is closely followed by the construction sector (15.7%) in SMMEs, and the finance and business sector (13.5%: SMMEs and 15.7%: SMEs), the third largest sector for SMEs and SSMEs. The high proportion of SMEs and SMMEs in these sectors indicates that SMEs and SMMEs are businesses that operate in the services industry. In South Africa, the services industry employs workers with relatively low skills. The employment opportunities within this industry are classified as low-skilled occupations, for example, store salespersons, gas attendants, street sellers, and cashiers (Hutton & Ward, 2021; Rodríguez-López & Souto, 2016).

The services industry is currently encountering challenges, as Table 2.7 indicates a negative growth rate SMEs in sectors such as mining; manufacturing; construction; trade and accommodation; transportation and communication; finance and business services; and the community have encountered challenges that have resulted in negative growth in these sectors (table 2.7).

Small and medium-sized enterprises continue to contribute significantly to the country's GDP; the 39% share of the national GDP accounted for by SMEs is a strong indicator of their essential and considerable contribution to the economy. According to Table 2.7, SMEs' issues are evident (Statistics South Africa, 2021b,c). As shown by the percentage change in quarterly changes, which directly reflects the annual changes, most business sectors in South Africa are experiencing a negative growth rate.

The mining sector has been the most adversely impacted, with the industry seeing a negative 100% growth (Statistics SA, 2019). The electricity, gas, and water industry has had a 217% rise in recent years, indicating that the sector is experiencing favourable conditions and potential advantages in operating in the sector (Statistics South Africa, 2021c).

Table 2.7: SME by Industry

Industry	2020/Q1		2020/Q4		2021/Q1		Quarterly change		Yearly change	
	Number	Distrib.	Number	Distrib.	Number	Distrib.	Number	%	Number	%
Agriculture	85 889	3.3%	95 970	4.0%	89 216	3.8%	-6 753	-7.0%	3 327	3.9%
Mining	6 348	0.2%	2 194	0.1%	0	0.0%	-2 194	-100%	-6 348	-100%
Manufacturing	239 816	9.2%	184 473	7.7%	186 733	8.8%	2 260	1.2%	-53 083	-22.1%
Electricity, gas & water	1 676	0.1%	5 870	0.2%	5 321	0.2%	-549	-9.4%	3 645	217.5%
Construction	377 464	14.4%	373 295	15.7%	342 595	14.7%	-30 700	-8.2%	-34 869	-9.2%
Trade & Accommodation	992 190	38.0%	907 310	38.1%	847 253	37.6%	-33 057	-3.6%	-117 937	-11.9%
Transport & Comm.	170 343	6.5%	167 006	7.0%	147 179	6.3%	-19 827	-11.9%	-23 164	-13.6%
Finance & Bus. Services	349 816	13.4%	322 510	13.5%	319 454	13.7%	-3 056	-0.9%	-30 363	-8.7%
Community	365 159	14.0%	311 298	13.1%	344 390	14.8%	33 092	10.6%	-20 768	-5.7%
Other	25 361	1.0%	12 105	0.5%	16 061	0.7%	3 957	32.7%	-9 300	-36.7%
Total	**2 614 063**	**100%**	**2 382 030**	**100%**	**2 325 203**	**100%**	**-56 827**	**-2.4%**	**-288 860**	**-11.1%**

Source: Statistics South Africa, 2021

Table 2.8: Industry profile by firm size

Industry	Own account	Micro	Small	Medium	Large	SME/SMME Overall	Ratio of SMME to large
Agriculture	1.0%	5.7%	6.1%	6.1%	6.2%	5.2%	0.8
Mining	0.0%	0.2%	0.9%	0.5%	7.5%	0.4%	0.1
Manufacturing	10.4%	7.1%	7.5%	`0.8%	19.3%	9.5%	0.5
Electricity, gas & water	0.0%	0.3%	0.7%	0.7%	1.6%	0.5%	0.3
Construction	7.3%	16.3%	11.7%	0.1%	4.8%	10.6%	2.2
Trade & Accommodation	52.3%	29.1%	29.9%	24.6%	7.0%	30.4%	2.9
Transport & Comm.	6.5%	11.5%	6.8%	4.2%	10.4%	6.4%	0.9
Finance & Bus. Services	9.0%	10.0%	14.6%	16.3%	15.7%	13.7%	0.9
Community	13.4%	19.8%	23.9%	27.7%	27.7%	23.3%	0.8
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7

Source: Statistics South Africa, 2021

Small and medium-sized enterprises have played an essential role in the economic growth of most emerging nations. SMEs account for around 99% of all businesses in the United Kingdom (OECD, 2019). This clearly illustrates that SMEs play an essential role in economic development in developed and developing nations and should be regarded as the economic backbone (Haraguchi *et al.,* 2017). In South Africa, expanding small and medium-sized enterprises is seen as a means of accelerating and advancing the achievement of broader socio-economic goals, such as inequality, unemployment, and poverty alleviation.

The growth of SMEs may be a critical component of poverty reduction since SMEs contribute considerably to household income. Small and medium-sized enterprises are more efficient since they have chosen a flexible specialization strategy that allows SMEs to survive adverse business and economic conditions that would be detrimental to the survival of most formal businesses (Guertler & Sick, 2021a). It has also been demonstrated globally that a well-organized SME sector is conducive to accelerated industrial development and expansion.

One of the few methods that can be applied by civil society, leadership and governmental institutions to eliminate poverty in the long term is to support economic development, including income and employment opportunities. Small and medium-sized enterprises that are the primary source of revenue in developing nations and a source of employment can be the most significant source of income generation (Madrid-Guijarro *et al.*, 2009; Sifumba *et al.*, 2017; Yoshino & Taghizadeh-Hesary, 2020). Small and medium-sized enterprises in South Africa can contribute to economic advancement and technological improvement by outsourcing and supplying to the large-scale industrial sector, enabling economic regeneration, revitalization, and social development.

2.5.1.2 SMEs, the business sector in South African provinces

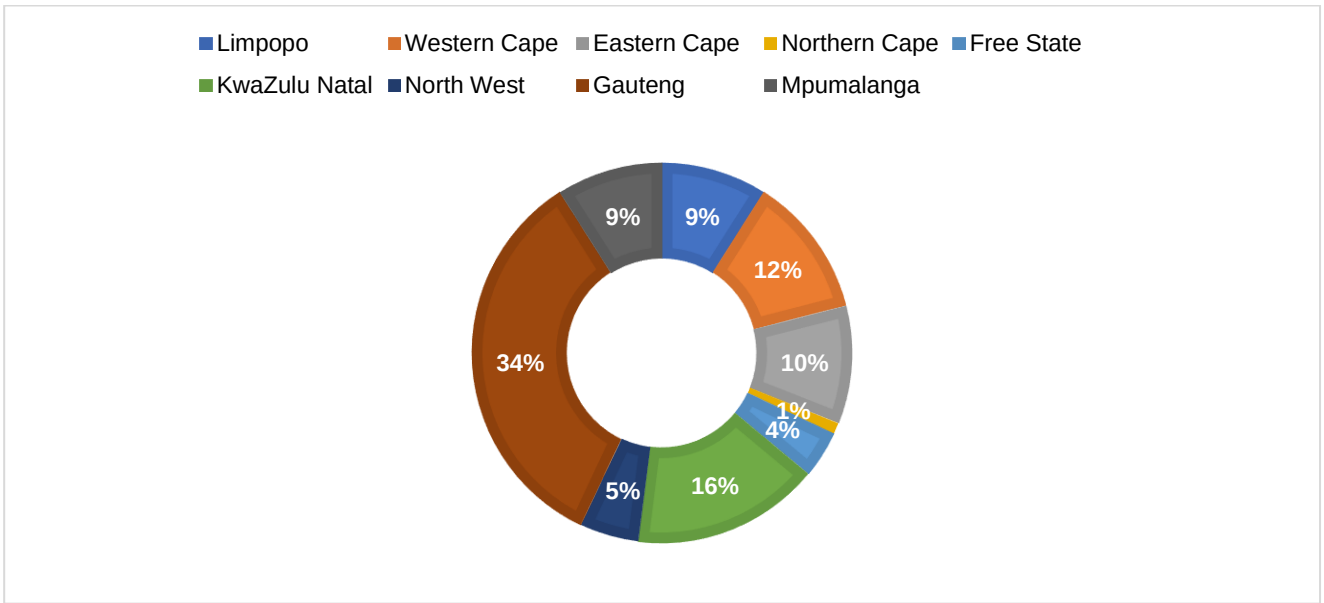
South Africa comprises nine provinces. SMEs in South Africa contribute significantly to the growth and development of each province. Small and medium-sized enterprises significantly contribute to the long-term viability of revenue, growth, and employment. SMEs are more likely to prosper in small towns and rural areas due to the nature of the

SME business being labour-intensive. As a result, they are more likely to contribute to a greater regional economic divide and prevent migration from small towns to major cities (Guertler & Sick, 2021a; Haraguchi *et al.*, 2017; Sifumba *et al.*, 2017).

Gauteng is the country's economic hub, including the most significant city globally. The country's main cities are found in the Gauteng province (Soweto, Johannesburg and Pretoria), and a high concentration of small and large firms operating in Gauteng is expected, given that the province is a significant economic hub in South Africa. The breakdown of South African enterprises by province is seen in Figure 2.5. A large percentage of South Africa's SMEs are concentrated in Gauteng province.

The provinces of Kwazulu-Natal and the Western Cape, in addition to Gauteng, also have a high concentration of SMEs and significant firms — which is not unexpected considering that these provinces include huge metropolises with substantial economic activity. A modest number of SMMEs and SMEs are found in the Northern Cape, the Northwest, the Free State, and other provinces since these regions usually have low economic activity and are centred on agriculture and mining (StatsSA, 2017).

Figure 2.5: Provincial profile by percentage



Source: Statistics South Africa, 2021

The Northern Cape, the Free State, the Northwest, and Limpopo are home to a relatively small proportion of SMEs (approximately 20 of the total SMEs are located in these four provinces), and these businesses may experience greater spatial and network challenges than SMMEs in areas with higher levels of economic activity and better infrastructure. Overall, South African SMEs are situated in locations comparable to those of big corporations and are typically clustered around the country's main economic centres.

Table 2.9 Provincial profile by firm size

Industry	Province								
	WC	GP	NC	EC	FS	KZN	NW	MP	LP
Construction	10.1%	11.7%	11.0%	16.57%	13.20%	10.02%	6.04%	(13.61%)	16.24%
Manufacturing	11.45%	9.27%	8.96%	6.06%	6.70%	11.02%	8.66%	(8.71%)	10.70%
Agriculture	2.64%	0.85%	19.33%	2.13%	4.19%	3.11%	5.07%	(3.00%)	3.94%
Transport and Comm.	8.22%	7.21%	4.15%	10.23%	7.78%	5.00%	10.83%	(4.11%)	5.10%
Trade and Accom.	30.1%	38.14%	33.9%	49.45%	50.91	45.37%	47.64%	47.86%	47.96%

Source: Statistics South Africa, 2021

Due to SMEs of their geographic dispersion and workforce, SMEs are thought to be able to encourage a more equal distribution of income than large corporations. Additionally, SMEs enhance the performance of the local markets and look for an innovative strategy to use limited resources and constrained capacity.

The provinces Gauteng and Western Cape have the highest concentration of SMEs. Construction, manufacturing, and commerce are the more prominent industries that employ most individuals in SMEs.

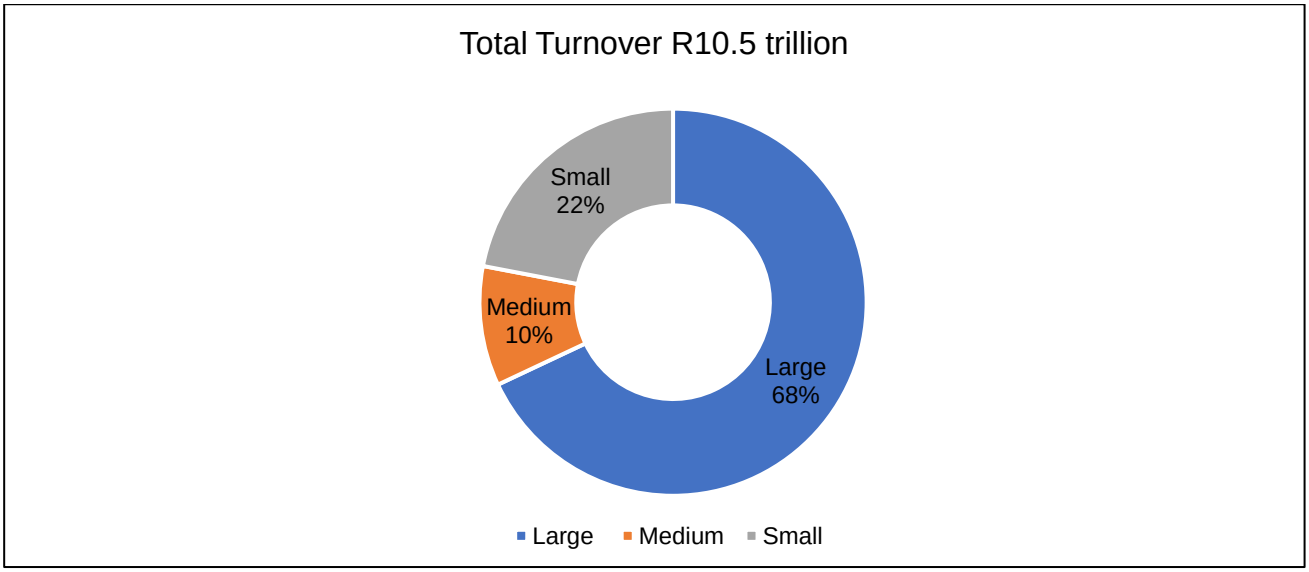
2.5.1.3 Turnover of SMEs in South Africa

During 2019, the South African government revised the National Small Business Act definitions. The new legislation aimed to provide much-needed support for SMEs and SMMEs. Figure 2.8 illustrates the substantial growth undertaken by the SMEs in South Africa as SMEs have continued to create inroads in the South African economy and formal

business sector. SMEs contributed approximately R10.5 trillion to the economy over the 2019-2020 financial period (Statistics South Africa, 2020)

The R10,5 trillion turnover generated by formal SMEs enterprise includes money received from services rendered and/or sale of goods, as well as hiring or leasing machinery, equipment, transport equipment, mineral rights and building and land. Figure 2.6 illustrates the percentage contribution to total turnover by enterprise size, small enterprises generated 22% or R2.3 trillion turnover in the 2019-2020 financial year, and medium-sized enterprises contributed 10% or R1.5 trillion, the large-sized enterprises contributed over two-thirds or 68% (R7.14 trillion) of the of total turnover in the formal business sector (Statistics South Africa, 2020).

Figure 2.6: Percentage contribution to total turnover by enterprise size, 2020



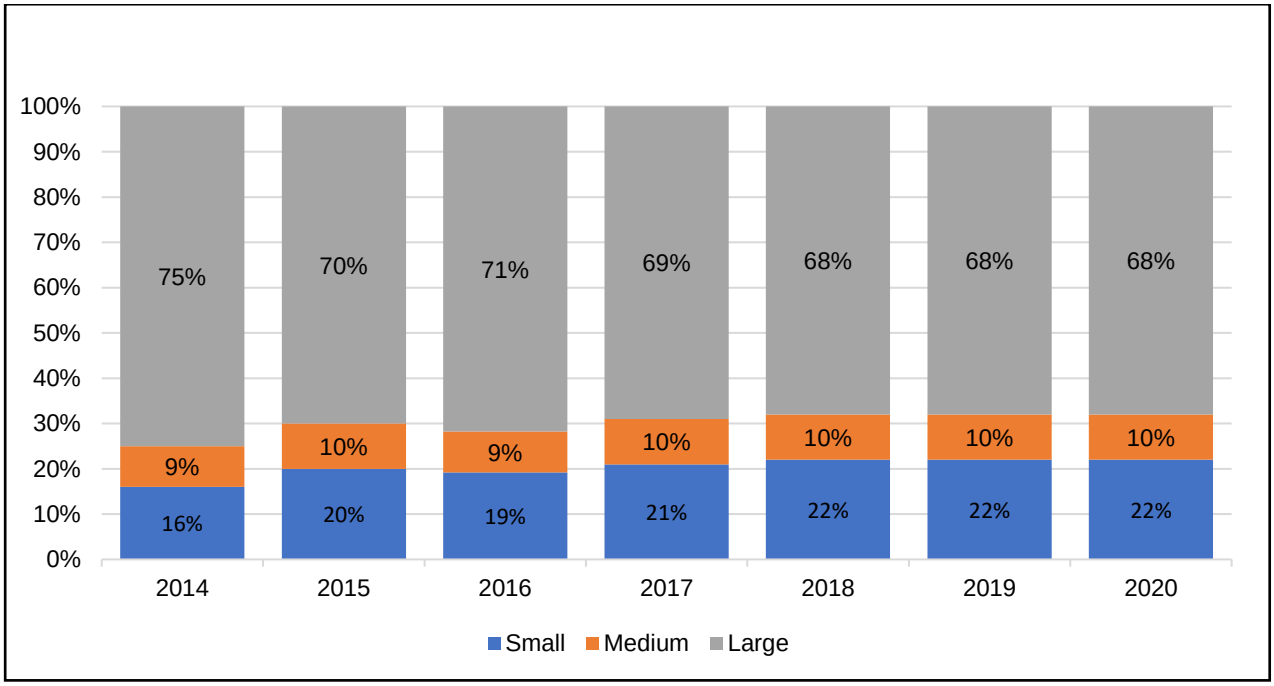
Source: Annual Financial Statistics (AFS), 2020

SMEs in South Africa continue to grow, create jobs and equality and are sources of innovation as potential drivers of the economy. Small and medium businesses, in the quest to develop opportunities, have shown substantial growth in the sector. Figure 2.7 illustrates that in 2014 small sized enterprises contributed 16% to the total turnover in the formal business sector in 2020. Small-sized enterprises account for 22% of the total turnover (Statistics South Africa, 2020). However, the contribution by large-sized enterprises has

decreased moderately from 75% in 2014 to 68% in 2020. This may be attributed to several challenges in SME development and growth.

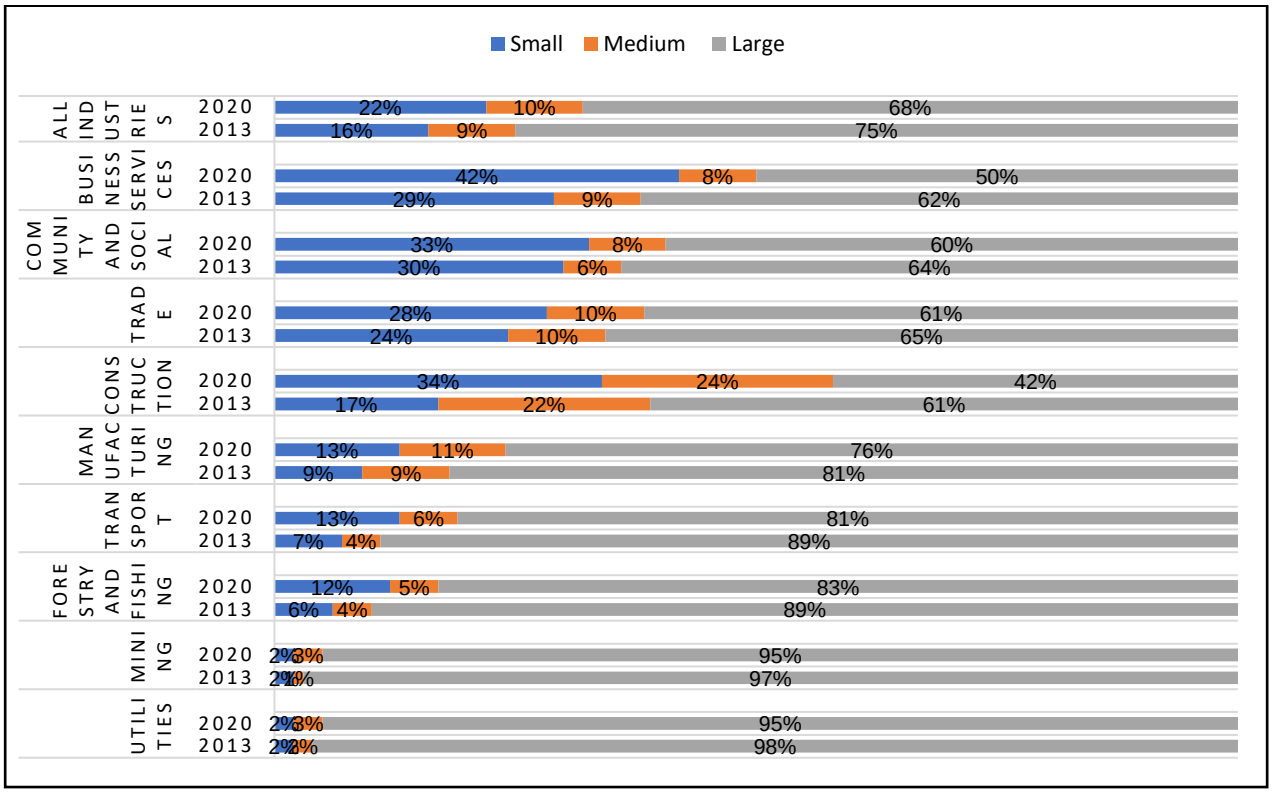
The total turnover generated by small, medium and large enterprises in South Africa has grown considerably from 2014 to 2020—an average annual growth rate of 7% on the overall turnover. The turnover was R7 trillion in 2014 to R10.5 trillion in 2020. Large-sized enterprises have grown at an average rate of 5.4% turnover per annum, while medium-sized enterprises grew on average 8.4% per annum. Small-sized enterprises have increased the annual rate turnover rate by an average of 12.3% per annum

Figure 2.7: Percentage contribution to total turnover in the formal business sector by enterprise size



Source: Annual Financial Statistics (AFS), 2020

Figure 2.8: Percentage contribution to total turnover in the formal business sector by industry and enterprise size, 2013 and 2019



Source: Annual Financial Statistics (AFS), 2020

SMEs in each sector contribute to the overall turnover generated by SMEs. SMEs in South Africa employ 25.8% of the workforce in South Africa and contribute 39% of the national GDP. However, because of financial challenges, the growth of SMEs sized enterprises is hindered in various sectors of the economy. In the mining and utility (electricity, gas and water supply) industry, SMEs' presence is minimal and did not realize any growth from 2014 to date. SMEs in this sector may be overwhelmed by the high entry barriers as large enterprises dominate the sector.

In sectors such as the infrastructure development, construction and business services industry, the growth of SMEs has been significant. However, in these sectors, large-sized enterprises have decreased considerably. This is attributed to a large organisation's challenges, such as weak economic growth, lower infrastructural investment, rising costs, or the pandemic's impact. The construction and business services sector has experienced

an overall decline for seven consecutive economic declines. "*With fewer large players generating turnover, small businesses have filled the gap. In 2014, SMEs accounted for 17% of total turnover in the construction industry, rising to 34% in 2019. Large companies contributed almost two-thirds to total construction turnover in 2013, falling to just over 40% in 2019. In terms of growth, small construction companies have tripled the turnover generated, from R53 billion in 2013 to R163 billion in 2019 (a rise of R110 billion). In stark contrast, large construction companies increased turnover by only R17 billion over the same period, from R187 billion to R203 billion*" (Statistics South Africa, 2020).

2.5.1.4 Characteristics of SMEs

SMEs contribute substantially to economic growth and development. Therefore, the need to fully understand and encapsulate the meaning of SMEs is imperative as this would assist institutions in enhancing the well-being and sustainability of SMEs, as these enterprises are an essential component of the economy. However, SMEs are significantly different from larger firms or organisations as these enterprises have several characteristics that distinguish them from larger firms. The international definitions do not necessarily include the characteristics of these enterprises, as some of the categories used to define SMEs only have the number of employees and annual turnover. The definitions do not fully encapsulate the meaning of SMEs. Other key characteristics related to the management of the enterprise and general operations of the enterprise exist as critical factors that characterise SMEs. Below is an outline of the characteristics of SMEs that assist in differentiating enterprises from large, well-established organisations.

One of the main characteristics of SMEs is that small and medium enterprises have limited access to resources (Olatunji & Houghton, 2017) and market access. SMEs have been shown to have limited resources compared to well-established large organisations. The unavailability of material and non-material resources hinders the facilitation of production and productivity, influencing SMEs' progress. Resources can be classified into four categories, namely: (1) material resources, (2) financial resources, (3) access to information, and (4) access to markets. Access to information is one of the most crucial resources for SMEs as it directly influences other categories (Imran *et al.*, 2019).

Access to information is a crucial component of SME development. The lack of information for SMEs could hinder growth, profitability, sustainability, and the ability to effectively contribute to sustainable and economic development (Bunyasi *et al.*, 2014). In emerging markets, a large number of SMEs operate in information-poor economies. This is due to the poor information infrastructure, lack of technology, and poor business support services. Access to information has not been a priority for governments and institutions as other resources have been prioritised, such as access to finance, markets, and training (Morina & Gashi, 2017).

SMEs are larger organisations than small and micro enterprises. SMEs have the potential, capital, and employment capabilities to grow into well-establish multinational organisations that can contribute to the sustainability of the economy (par 2.3.1). However, without the necessary support and lack of information, an SME could deteriorate or even diminish (Alstete, 2014; Berisha & Pula, 2015; Imran *et al.*, 2019). The lack of access to relevant business information continues to be an obstacle to the progress of SMEs. SMEs rely heavily on a variety of information sources. The sources differ based on the nature of the problem, the accrued incentives, and the restrictions involved in the operation and management of the enterprise (Moyi, 2000). The primary sources of business information relevant to SMEs include information on government, competitors, business associates, information broadcasted in the media, trade and industry associations, newspapers, magazines, publications, customers, business associates, information on government officials, libraries and information readily accessible using electronic source (Bunyasi *et al.*, 2014).

The process through which businesses get resources from internal and external environments is called resource acquisition. Access to organizational resources means more general managers working through smaller business units, more project teams with budgets, and unique resource pools of unallocated funds that people can tap to solve problems. In short, they make it easier for people to tap locally to what they need to get things done (Imran *et al.*, 2019). The lack of financial resources, materials and access to markets affects the growth and sustainability of SMEs. More than half of sustainable

businesses will disappear in the next five years due to poor management, poor business practices and a shortage of funds.

Powerlessness and dependence in an organisation may be created by the lack of necessary organisation resources required to support the team, as access to resources improves the enterprise's level of self-efficacy and provides a crucial tool for controlling environmental risks. Accessing resources has been revealed to be essential in the entrepreneurial process. SMEs' ability to access resources, for example, is said to have an impact on the sustainability of any SME. As a result, many researchers have focused on identifying and describing the essential role that resources provide in SME sustainability. According to the resource-advantage theory, resources are tangible and intangible entities available to the firm that enable it to produce efficiently and effectively (Imran *et al.*, 2019).

Flexibility and adaptability are essential characteristics found in SMEs. This is due to its scale and structure, as the enterprise has more adaptability to environmental changes. This is also subject to expansion in the business environment. For example, government policy or technology changes may significantly impact enterprises since immediate adjustments need extra resources or money. This might make it difficult for businesses to compete and survive in the market.

2.6 Role and Importance of Small and Medium Enterprises

The SME sector has significantly contributed to global socio-economic and economic growth by complementing larger multinational industries (Guertler & Sick, 2021a). SMEs contribute to economic growth in a variety of ways, including the creation of jobs in rural and urban areas, through the provision of desirable sustainability and the advancement of innovation in the economy as a whole (Alstete, 2014; Berisha & Pula, 2015; Imran *et al.,* 2019). SMEs create and produce various products, goods and services for domestic and international markets. This has assisted in the development of emerging economies and in the promotion and development of sustainable resources. SMEs have coordinated and worked with the relevant ministries, stakeholders, and state governments to improve rural regions, as many have played a critical role in creating job opportunities in rural areas (Olatunji & Houghton, 2017; The World Bank, 2017). SMEs continue to assist in developing

rural regions at a lower capital cost than larger multinational organizations, as small businesses are more efficient and effective since SMEs have implemented adaptable specialization approaches.

Globally developing and underdeveloped countries face several challenges that affect the development rate. Challenges such as extreme poverty, high unemployment and moderate economic growth impact the development of countries growing progressively (Kosmas, 2020). One of the methods that can be used to mitigate global challenges and sustainably reduce poverty is to promote economic growth through employment and wealth creation.

Unemployment is the most significant factor contributing to moderate economic growth as governments are continuously challenged by this as the surge of unemployment continues to increase significantly, as the global economic growth has slowed down (par 2.3). SMEs are characterized and defined by the respective countries based on the applicable legislation, which is cognizant of the economic factors, business nature, and operations outlined in their respective economic policies and strategic positions (Fatoki, 2018). Often ministries, stakeholders and state governments perceive SMEs as enterprises that have a certain number of employees and that generate with a certain number of employees and generating a particular revenue or threshold as determined by respective legislations of the individual county. SMEs need to be perceived as enterprises that effectively bridge the gap between large or mainstream businesses and small and micro enterprises that may be below the mainstream economic activities and mainstream economic activities and/or economic participation (Oni, Agbobli & Iwu, 2019; Scheers, 2018).

In most emerging economies, the role of SMEs is to solve difficulties in the economy predominantly. This includes employment, inequality in the business environment, technological challenges and monopolistic competitiveness of large organizations. SMEs significantly contribute to the GDP as SMEs contribute substantially to the country's export-import.

2.6.1.1 Role of SMEs in the Economy and the Creation of Jobs

Developing SME enterprises is imperative as these enterprises are strategically important in a country's economic growth. Most developing and underdeveloped countries rely on small, medium and large enterprises for economic development. There were 5.6 million SMEs in the United Kingdom in 2021, more than 99% of all businesses (Hutton & Ward, 2021). The participation of SMEs in the socio-economic and economic development of emerging and developing economies should be regarded as the pillar and support of the economic system. Employment in any economy is paramount, and SMEs' development is crucial (par 2.4). SMEs are found worldwide and employ more than 50% of the population worldwide (The World Bank, 2017; Higgs & Hill, 2019). The creation of employment opportunities in emerging economies is vital as inhabitants become economically active, thus contributing to economic wealth and inhabitants' well-being resulting in reduced poverty.

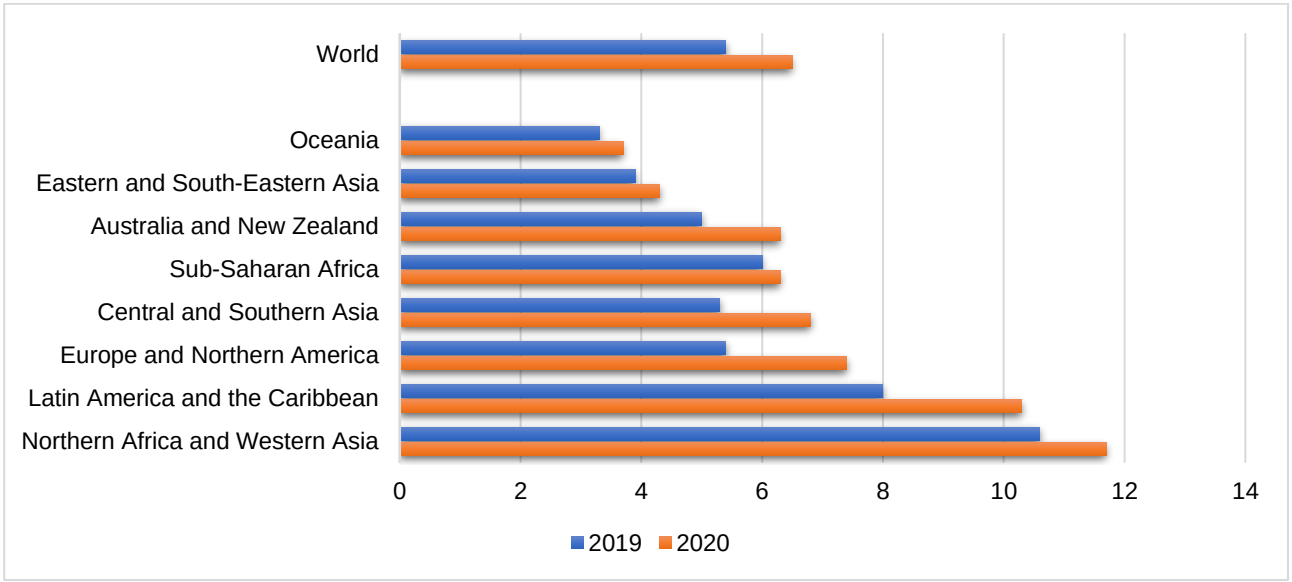
High unemployment rates exist in many developed and developing countries, and SMEs' formation, development and growth should be a governmental priority. However, several factors continue to affect SMEs' formation, development and growth in these economies, leading to high rates and lagging unemployment. Political instability, social and technological advancement delay, and government legislation hinder SMEs (Manzoor *et al.*, 2021; Morina & Gashi, 2017; Yoshino & Taghizadeh-Hesary, 2020).

The global insight and awareness of SMEs have reached notable importance in addressing the economic development issues that continue to persist. Globalization has placed small enterprises unswervingly in the limelight and attention. These are gradually and progressively the main strength of national economic development (Manzoor *et al.*, 2021). Worldwide entrepreneurs have received considerable attention from state-owned institutions, multilateral agencies, strategists and economists as this sector has beneficially contributed to developing urban, peri-urban and rural regions. This, in turn, has boosted economies and generated income whilst alleviating poverty.

The World Bank (2017) estimates that worldwide six million jobs are required by 2030 to alleviate poverty, hunger, and unemployment and to accommodate the growing global

workforce. SMEs' creation, development and sustenance are high priorities for governments worldwide. The global economy grew by an average of about 2 per cent from 2014 to 2018. In 2019, real gross domestic product (GDP) per capita increased by only 1.3 per cent globally and is estimated to have decreased by 4.6 per cent in 2020 (United Nations, 2021). As illustrated in Figure 2.9, in 2020, the unemployment rate was reduced by 1.1% to 6.5% globally. This alternately means that global unemployment has increased by 33 million people, bringing global unemployment to 220 million people who remain unemployed. Women and youth are hardest hit, as the global unemployment rate of women and youth increased by 3.7% from 5.0% to 8.7%, respectively.

Figure 2.9: Global Unemployment Rate, 2019 and 2020 (percentage)



Source: United Nations, 2021

The surge of unemployment globally is not a challenge that the government can mitigate in isolation but rather a challenge that both private and public institutions can minimise. The private sector's contribution is equally significant in the growth and development of the economy. The private sector plays a pivotal role as the sector comprises SMEs that generate a substantial portion of employment and income possibilities. In emerging markets, most formal jobs are generated by SMEs, which create 7 out of 10 jobs (World Bank Group, 2018). SMEs continue to create employment for the urban and rural labour force providing desirable sustainability for the global economy. The development of SMEs

could serve as a force for entrepreneurial growth and development, creating jobs and poverty alleviation for developing and underdeveloped countries. With government support, SMEs locked in isolation due to the competitive environment of the private sector can flourish and participate in the competitive production of goods and services by contributing new expertise, knowledge, and innovation. To create a sustainable economy, the government can aim to facilitate the development of SMEs in the private sector by ensuring that various role players in the sector consistently adhere to a competitive environment.

Small and medium-sized enterprises have the potential to make significant contributions to the development of the South African economy. As a vital intervention for sustained social and economic progress, small and medium-sized enterprises will continue to provide a significant contribution to the establishment of job opportunities for residents (Pathak & Tewari, 2014:35). Given the kind of enterprises that are generated through the SME sector as well as the number of job opportunities that are created, it is evident that the contribution of SMEs to economic growth is pivotal to the growth and success of the economy (Chiloane-Tsoka & Rasivhetshele, 2014; Masocha & Fatoki, 2018.).

2.7 Challenges Prominent in SMEs in South Africa

The importance of SMEs to the country's Local Economic Development (LED) is widely acknowledged (par 2.6.4). Small and medium-sized enterprises significantly contribute to job creation in developing countries (Guertler & Sick, 2021a). SMEs foster entrepreneurial skills, knowledge and attributes, which is vital because SMEs employ a country’s and province's inhabitants (par 2.4). As a result, this tends to decrease uncertainties and levels of crime. SMEs contribute to developing industrial structural output and establishing resilient economic structures through linkages between small and multinational organizations (Morina & Gashi, 2017). SMEs often use more labour-intensive production processes than multinational corporations, increasing employment and more equitable income distribution. SMEs continue to provide livelihood opportunities through simple, value-adding processing activities in agriculturally based industries. However, there are a variety of economic factors and variables that can have an impact on the potential attractiveness of SMEs globally. Economic variables such as government fiscal and

monetary policies, inflation, interest rates, and foreign exchange rates influence the demand for goods and services and the growth of new SMEs globally. This impacts these organisations' consumption patterns and profitability (Ehlers and Lazenby, 2013; Abisuga-Oyekunle, Patra & Muchie, 2020). As discussed below, small and medium-sized enterprises in South Africa further encounter many challenges. These challenges include, but are not limited to, the lack of access to markets, a lack of management skills, access to financial capital and bank loans and credit, lack of access and exposure to appropriate technology, a lack of recognition by multinational corporations, a lack of production capacity, lengthy bureaucratic processes. These challenges and lack of support, stimulation and enhancement of SMEs hinder the critical roles that SMEs can play in economic development and employment creation.

2.7.1.1 Rate of Inflation

Inflation can be defined as the rate at which prices increase over a certain period, generally a calendar cycle. Therefore, inflation is when products and services become more costly over time. Inflation is a measurement representing, for example, the cost of living in a nation. Still, it may also apply to micro measures, such as an increase in the price of raw materials (Ligthelm & Cant, 2012; Thompson Agyapong, Mmieh & Mordi, 2018; Pradesyah & Ardianti, 2021)). In an economic system, the money supply increases relative to the size of its economy, and the currency's value declines. Therefore, when the price of products and services increases, the value of a currency diminishes. Thus, the persistence of inflation will make it increasingly difficult for customers to obtain products and services at a reasonable price (Morina & Gashi, 2017).

For several reasons, inflation impacts SMEs; inflation results in financial instability and uncertainty, and consumers and purchasers are forced to limit spending on goods and services, resulting in the decline of demand for goods and services and, eventually, a fall in the market size. A rising inflation rate harms SMEs because the rate at which credit is made available to SMEs is also impacted by inflation, as central banks may have to increase interest rates to control inflation, which may result in high credit costs (Ligthelm & Cant, 2012:5; Viviers, Van Eeden & Venter, 2012:4). This has a direct impact on the wealth, which results in fewer opportunities for SMEs.

As a result of inflation, the costs of materials and services required to operate a firm may rise. Inflation could also increase the price of goods and services because of current labour shortages and supply chain challenges. Some SMEs may experience increased costs of items supplied (Viviers *et al.,* 2012; Thompson Agyapong *et al.,* 2018). If the cost of services, raw materials and supplies increases, SMEs can consider increasing the pricing of goods and services to offset the growing expenses of commodities. Increasing the price of goods and services harms profit margins. Profit margins will be constrained as a result of increased costs.

2.7.1.2 Interest rates

Interest rate indicates the amount of money a bank charges a lender in exchange for granting access to capital. The interest rate is represented as a percentage repo rate, which the Reserve Bank establishes, and impacts interest rates. The repo rate is the interest rate that a financial institution must pay to another financial institution to borrow money from the institution (Teresiene *et al.*, 2021). The Reserve Bank oversees the management of the money supply in the economy and sets interest rates for commercial lending. The Reserve Bank stimulates the economy by injecting money, lowering interest rates, and making loans to businesses more available. The Reserve Bank reduces or increases interest rates to maintain high employment levels maintain stable prices, and manage interest rates (Singh, Deep Singh & Deepak, 2021).

Increased interest rates have a significant impact on prime rates. The prime rate is the interest rate banks are willing to lend money at the lowest possible cost. The prime interest rate will increase (Rassier & Earnhart, 2015; Eggertsson, Juelsrud, Summers & Wold, 2019). An increased interest rate impacts loan repayments, credit card repayments and the ability and opportunity to get more financing. This has a direct impact on SMEs. An interest rate increase could mean that the SME must pay significantly more if interest rates continue to rise (Naidu & Chand, 2012; Blanchard, 2019). As an SME, an increase in the interest rate could be detrimental to the business as this could mean that the SME could pay a debt over an extended period. Taking out short-term loans to cover any unforeseen needs that may emerge and grow the SME, when necessary, will be more challenging due to these changes.

High lending rates negatively impact SMEs which most likely have restricted cash flow (Naidu & Chand, 2012; Blanchard, 2019; Allen, Qian, Tu & Yu, 2019). To be able to repay any loans or debt that limits the amount of revenue available to the firm, SME owners must put aside more money. High interest rates may also diminish the cost of assets, making it more challenging to sell them for money.

An increase in interest rates could affect consumers' discretionary income. This implies that the capacity to purchase goods and services will diminish, resulting in a fall in sales for enterprises (Aluko *et al.*, 2004; Hamdan & Cheaitou, 2017; Allen *et al.,* 2019). When interest rates are high, banks also provide fewer loans; this has a negative impact, not just on consumers but also on SMEs, as this reduces the expenditure on new equipment. SMEs that offer luxury goods or services may be the most adversely impacted since luxury goods and services are not a priority for consumers with less discretionary income. The interest rate fluctuates depending on the current economic conditions. When the economy is strong, interest rates will be high, meaning that loans will be more expensive (Merino, 2020). When interest rates remain low for an extended period, banks become more cautious about who they select for business loans.

2.7.1.3 Unemployment

Small and medium-sized enterprises are significant economic and broader business ecosystem participants. SMEs provide opportunities that make it possible for individuals to adapt and prosper. In developing and developed nations, small and medium-sized enterprises have an essential role to play in the achievement of the Sustainable Development Goals (SDGs), particularly in promoting inclusive and sustainable economic growth, providing employment and decent work for all, alleviating poverty and inequity advancing sustainable industrialisation and encouraging innovation. The unemployment rate in South Africa remains a significant factor as the adverse effect of the overall unemployment rate is also reflected provincially (par 2.7.1). The unemployment rate is used as an indicator to measure the total number of individuals who are not employed or individuals who are jobless in a particular region, country or economy (Department of Labour, 2021). The official unemployment rate in South Africa will be 32.6% in 2021. The

official unemployment rate slightly increased by 0.1% in 2021. This means that 46.3% of the individuals in the age category of 15 years to 34 years of age remain unemployed in South Africa. This is a significant concern to the national and provincial governments as the youth have the potential and the necessary skills that the government could use to ensure that the economy reaches its full potential.

A lack of support, stimulation and enhancement of SMEs hinders the essential roles that SMEs can play in economic development and the creation of employment as SMEs play a crucial role in the socio-economic development as SMEs employ a large proportion of the workforce from various levels. SMEs contribute to alleviating the unemployment problems that currently exist in a country such as South Africa, and the lack of support for SMEs could hinder their effectiveness, reducing their long-term viability and economic development (Chege & Wang, 2020). SMEs are considered effective in providing sustainable employment opportunities as multinational organisations require large capital investments, technologically advanced machinery and tools with reduced labour intensification, thus reducing unemployment in society. Multinational organisations also need specialized, sophisticated technical capabilities that are not readily available, particularly in developing countries. However, in South Africa, the challenge of a high rate of unemployment and consequently limited earnings has resulted in an increasing number of people opting for self-employment whilst spending power is limited (Ligthelm & Cant, 2012; Kimanzi & Gamede, 2020). This results in reduced growth or business failure because of the high unemployment rate and limited earnings.

2.7.1.4 Taxation

The taxation imposed on SMEs is an indispensable factor for policymakers to consider, as SMEs account for most firms and often account for most employment. The government must consider a comprehensive variety of SME tax problems, including the potential impact of taxes on the development, structure, and expansion of SMEs; arguments for and against tax incentives for SMEs; and ways to ease the relatively high tax compliance burden that SMEs must bear.

Small and medium-sized enterprises' growth and profitability are influenced by a country's taxation structure (Robertson *et al.,* 2013; Naicker & Rajaram, 2019) since increased taxes result in decreasing earnings for SMEs (Ahwireng-Obeng & Piaray, 2009). The expenses of corporate tax and value-added tax (VAT) in South Africa are among the highest in the world (Viviers *et al.,* 2012). The complexity of the South African tax system adds to the taxpayer's burden. The effect on the cost of conducting business is more significant since a considerable percentage of SMMEs struggle with managing tax returns or utilizing the tax return system and are thus forced to seek help from tax experts, which is expensive because most tax experts demand a fee (Luiz, 2012; Khan, 2022). Small and medium-sized enterprises also bear a vastly higher tax compliance cost burden than multinational organisations, necessitating changes in administrative approaches and/or policy to address the impediments to SMEs posed by tax compliance cost considerations, a critical element. They should be an indispensable factor for policymakers to consider.

2.7.1.5 Political-institutional factors and Political instability

A few variables that negatively influence and affect the business climate in South Africa include political instability in the country and the volatility of emerging market currencies. The movement of SMEs from different parts of South Africa into metropolitan centres such as Gauteng, Cape Town and Durban have increased competition for the local SMEs (Ahwireng-Obeng & Piaray, 2009, Tran & Pham, 2020). Since international organizations and local banks restrict access to capital, entrepreneurship is suffocated in a hostile political environment, further increasing business costs. This is considered a threat to the small and medium-sized enterprise (SMME) environment.

2.7.1.6 Access to Capital

The availability of financing is a critical aspect in the development and survival of SMEs. It is particularly vital when an SME is established to have a reliable source of income and funding. The inability to raise business funding for SMEs due to restricted access to finance from financial institutions is a negative factor impacting entrepreneurship. Established SMEs may be unable to purchase raw materials, access skilled labour, infrastructure, distribution and transport logistics or secure the necessary expertise to expand or survive

during adverse conditions. This could limit growth and competitivity (Wickham 2018; Robertson *et al.,* 2013).

The challenge that continues to exist is that SMEs may (theoretically) get financing from various sources, including the government and the private sector, which may assist SMEs to grow, including tax breaks, grants, equity financing alternatives and loans. However, a small number of SMEs may be a preview of such benefits. The challenge of acquiring additional information on financing continues to exist, hindering the growth and expansion of SMEs. Challenges that continue to exist range from the accessibility of information to how to obtain funding and additional advice on the prerequisites for securing financing. It also includes constructive criticism if the respective SME cannot get funding for businesses or does not qualify for funding. This enhances the likelihood of future grant applications being successful. Access to funding and capital for SMEs should also promote training, guidance and mentorship on various business matters and disciplines.

The ability of SMEs to acquire the finance needed to grow and expand is significantly constrained, with over half of the SMEs in developing nations illustrating access to finance as a critical limitation in business operations (Dalberg, 2011; Motta & Sharma, 2020). The absence of formal and organized methods for obtaining financial assistance continues to impede the development of SMEs. Most financial institutions firmly believe financing SMEs is more costly than lending to more extensive, established multinational organizations (Shane, 2018). SMEs may find it challenging to pay the increased interest rates demanded by banking institutions consistently. As a result, SMEs must have a significant amount of money available for investment instead of relying on banking institutions for finance. This is not always achievable.

SMEs face several obstacles, including access to markets and capital, technological advancement, and management. SMEs are also essential engines of innovation and competition. SMEs enable the government and citizens to integrate local economies and regional development. The ability to support SMEs through finance, tax, and subsidies and ensure and enhance the availability of information could benefit SMEs by improving the lively business and entrepreneurial culture in South Africa.

In South Africa, the National and the Gauteng Provincial Government has begun to invest a lot of resources in developing policies, legislation and strategies to assist SMEs par 2.5.1). This is encouraged by the positive contribution toward employment opportunities created by SMEs (TeSai, 2018:4). The deliberate and intentional action by the government is in response to the ever-increasing unemployment rate, inequality, and poverty (par 2.8). It is based on the fact that SMEs have emerged as one of the most critical drivers of economic growth and development (Dalberg, 2011; Kimanzi & Gamede, 2020). The government is tasked to investigate alternative avenues for employment development, poverty eradication, and the long-term viability of the country's natural resources (par 2.3.1.3). Private entrepreneurial activity, particularly in Small, Medium, and Micro Enterprises, must be encouraged to provide employment, promote economic growth, and relieve poverty (Akinboade & Lalthapersad-Pillay, 2009; Chege & Wang, 2020). The contribution made by SMEs to the South African labour market is substantial since it contributes to reducing the unemployment rate by creating new jobs (Chiloane-Tsoka & Rasivhetshele, 2014).

Although statistical information worldwide has shown that SMEs contribute significantly to employment in the formal economy, SMMEs create over 2 million informal businesses. The Gauteng government has only recently begun to recognize the potential impact that small businesses could have on the economy (Chiloane-Tsoka & Rasivhetshele, 2018). Data on employment from various countries have shown that small and medium-sized enterprises substantially influence the labour market (TeSai, 2014). All spheres of government must work together to promote economic development as this will ensure the development process contributing to the acceleration of SMEs is enhanced. According to the National Strategy for the Development and Promotion of Small Business in South Africa, creating an enabling environment for the development of SMEs must take place at both a national and a local level says the National Strategy (TeSai, 2014; Hamdan & Cheaitou, 2017; Allen *et al.,* 2019).

Small and medium-sized enterprises (SMEs) are becoming increasingly important as the link between mainstream business and developing businesses across a wide range of

industries, as SMEs continue to ensure an innovative approach not only in the management of businesses but also in the introduction of new goods and services into the economy (The Banking Association South Africa, 2018). The worldwide trend of empowering small and medium-sized enterprises to improve economic activity is developing a suitable interactive global market in which new ideas, enhanced procedures, and technologically oriented initiatives may be adopted for successful business operations. This may be witnessed in South Africa and the economies of Brazil, Russia, India, and China (BRICS) (The Banking Association South Africa, 2016). A fundamental component of the efficiency of SMEs in different economic sectors is SMEs' capacity to engage in their specialized settings while being well-structured and operationally oriented.

2.8 Chapter conclusion

This chapter reviewed literature focusing on the SME sector in South Africa and in the Gauteng province. This chapter also explored an overview of SMEs (par 2.2.1), their definition and various characteristics. The role and contribution of SMEs in relation to economic development and job creation were also explored in this chapter. SMEs have the potential to contribute to the growth of the South African economy effectively. The continued contribution of SMEs in creating employment for inhabitants is valuable as it serves as a critical intervention for sustainable social and economic growth (par 2.7.1). Considering the nature of businesses developed through the SME process and the number of employment opportunities that manifest, it is evident through various research that SMEs' contributions to economic growth are imperative.

However, the importance of SMEs is affected by business regulations promulgated by the government as it tends to create obstacles that require extensive resource input on the part of SMEs which in most instances is not available on their part (par 2.8). On the contrary, as part of the government's support of SMEs, certain conditions have been set to privilege these businesses through government processes. The conditions ensure that SMEs are provided preservation and privileges when conducting business with the government. The government has noticed that sustaining a business is challenging for SMEs (par 2.8.3). Therefore, the government has devised interventions such as making it

compulsory for tenders awarded to large organisations to subcontract a minimum of 30% of the tender's value to predominately black, women-or youth-owned SMEs.

2.9 Chapter Summary

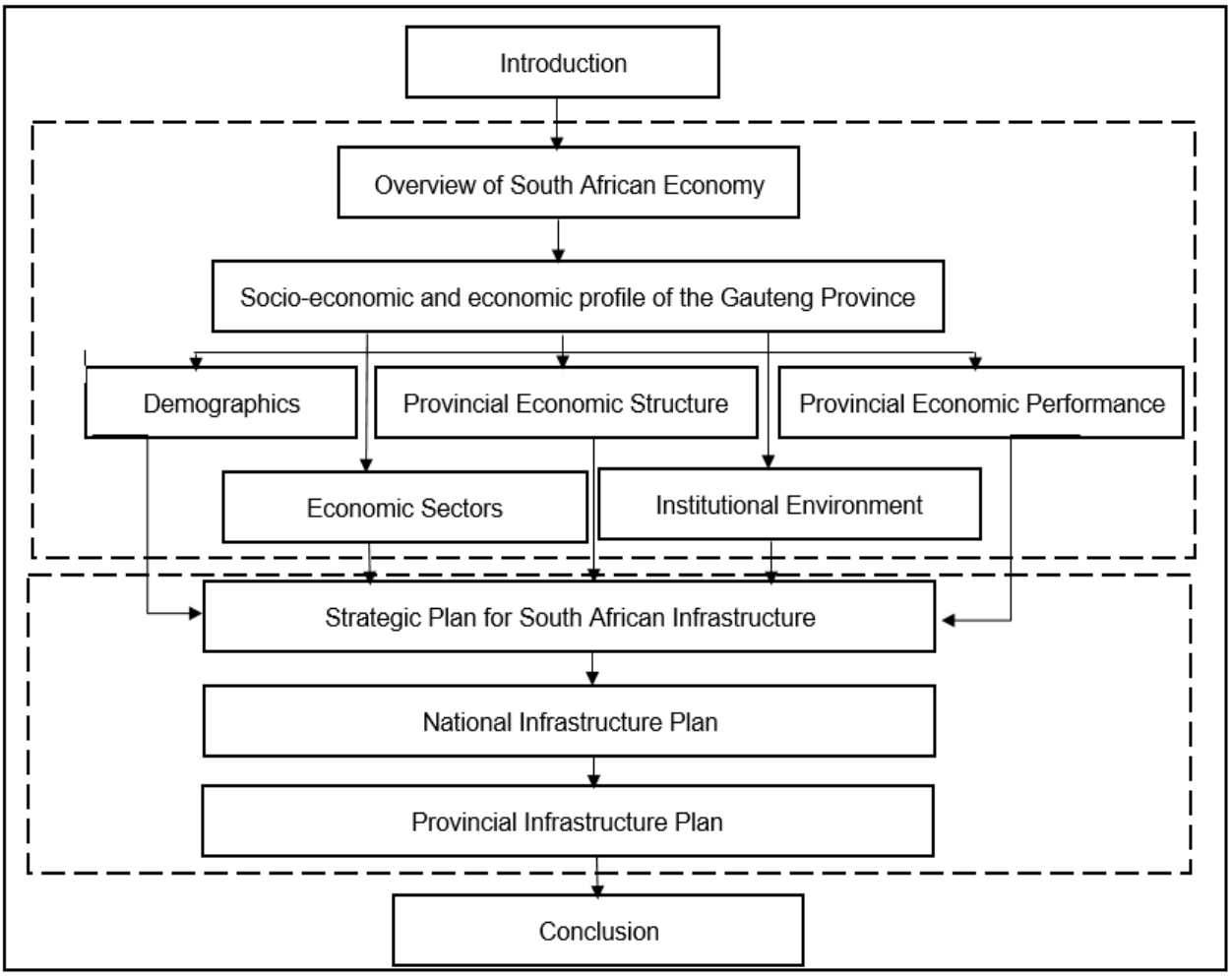
Chapter two deliberated the literature focusing on the SME sector in South Africa and the Gauteng province, respectively (par.2.2.1). The chapter provided an overview of SMEs, the definition and various characteristics of SMEs were explored in this chapter and challenged prominent SMEs (par 2.9) were discussed in chapter two. This chapter also deliberated on the various economic factors and variables that may have direct and indirect influences and effects on the potential attractiveness, consumption patterns and profitability of organisations, particularly SMEs in the economy. Economic variables such as monetary and fiscal policies of the government, interest rates, foreign exchange rates and inflation influence the demand for goods and services and the growth of SMEs as well as the role that institutions play in ensuring the stability and prominence of the enterprises in the economy were deliberated in this chapter (par 2.8.5).

Chapter three will provide a brief overview of the South African economy and the socio-economic and economic profile of the Gauteng province. The outline in chapter three is critical for this study as it establishes the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles currently existing in the province. This is imperative for the development of the study framework. The Gauteng province’s current socio-economic and economic profile and status will be explored in chapter three and will offer contextualisation of the province's level of development. Furthermore, the province's socio-economic and economic review will provide valuable information on the condition of the province, challenges, and difficulties that exist in the province, assisting in holistically understanding the various industries that exist and the impact that infrastructure development projects have within the province. The contribution of this chapter is to outline the importance of SMEs in South Africa, as SMEs make significant contributions to job creation. In this chapter, the first secondary objective of the study is addressed, namely, describing the environment where SMEs involved in infrastructure development projects operate and the nature of SMEs operating in South Africa

3. CHAPTER 3: THE SOUTH AFRICAN ECONOMIC LANDSCAPE

3.1 Introduction

Figure 3.1: Structure of Chapter 3



The previous chapter provided a detailed analysis of Small and Medium Sized Enterprises (SMEs). The study included the definition and characteristics of SMEs globally and in developing countries. The chapter further highlighted the role of SMEs in the South African economy and the contribution SMEs have in creating jobs in South Africa and provincially. Challenges prominent in SMEs were also discussed in chapter two, as institutions' role in ensuring the stability and prominence of the enterprises in the economy. Chapter three provides a brief overview of the South African economy (par 3.2) and the socio-economic and economic profile of the Gauteng province.

The overview provided in chapter three is critical for this study as it establishes the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles currently existing in the province (par 3.3). This is imperative for the development of the study strategy. The Gauteng province's current socio-economic and economic profile and status explored in this chapter will contextualise the province's level of development. Furthermore, the province's socio-economic and economic review will provide valuable information on the condition of the province, challenges, and difficulties that exist in the province (par 3.4.1), assisting in holistically understanding the various industries that exist and the impact that infrastructure development projects have within the province.

3.2 Overview of South Africa

South Africa is a diverse country with nine provinces; the country is a multi-ethnic society with various cultures, religions and languages. The upper-middle-income economy is one of Africa's largest technologically advanced and industrialized economies. South Africa is the second largest economy in Africa, with a GDP value representing 0.27% of the world economy (World Bank, 2021). South Africa is highly burdened with relatively high unemployment rates, inequality and acute poverty, and poverty is consistently highest among black South Africans, the less educated, the unemployed, female-headed households, large families, and children (World Bank Group, 2018).

The poverty rate in South Africa saw a relative decline between 2006 and 2011; the lower-bound poverty line declined from 66.6% to 53.2%9 (BusinessTech, 2021). In the post-2015 era, an increase of 55.5% in the poverty rate affected the depth of poverty in South Africa. The Living Conditions Survey (LCS), which illustrates the income and expenditure patterns in South Africa, indicates that 49.2%, approximately half of the adult population, are living below the poverty line (Eskandari, Brojakowska, Agnieszka, Bander, Naga, Garikipatiid, & Fishid, 2021; Levin, Hanage, Owusu-Boaitey, Cochran, Walsh, & Meyerowitz-Katz, 2020; Pillay-Van Wyk, 2020). Poverty in South Africa is greatly affected by various demographic factors such as age, race, gender, income levels, employment and level of education and geographic factors such as the impact of climate, location, resources and stability.

Psychographic factors such as lifestyle, habits and interests contribute significantly to the depth of poverty.

South Africa is a constitutional democratic country with a three-tier system of government and an independent judiciary. The three-tier system of government is divided into a national government, provincial government, and local levels of government, which have executive and legislative authority in their individual spheres. The South African constitution has defined the levels of government in South Africa as interdependent, distinctive and interrelated.

The improvement and gains made in the first 15 years of the democracy after the end of the apartheid regime 1994 contributed substantially to addressing inequality, poverty and social exclusion. However, the impact and effects of the COVID-19 pandemic, child malnutrition, household food security, exceptionally high rates of youth unemployment, natural disasters (e.g. droughts, floods, hailstorms, tropical cyclones and wildfires), economic, political and social unrest have undermined the early gains that were made by the democratic state (Karmakar, Lantz & Tipirneni. 2021; Kosmas, 2020). A country with one of the most diverse and dynamic economies has expansive social assistance and social welfare systems as mechanisms that the government uses to address current economic challenges.

The South African economy is one of the world's dynamic and multifaceted economies with a mixed economy. This economic system combines the elements of a market economy and the elements of a planned economy. It is a synthesis of socialism and capitalism, containing both private and public enterprises (Pawley, 2017; Assouad, Chancel & Morgan, 2018). The South African Constitution requires the government to promote the general welfare by providing essential welfare services that contribute toward economic activity and participation by inhabitants.

A mixed economy is one of the most flexible economic systems as it protects private property ownership whilst limiting government interference in business operations (Freeman, 2018). This is a beneficial factor to South Africa's mixed economy as it promotes

innovation. This, in turn, encourages initiatives by the private sector resulting in employment and job security, equal distribution of income and progressive economic growth in the market economy (Amadeo, 2021). A mixed economy also ensures that the public and private sectors prevent monopoly or monopolistic practices because of joint participation in economic activities. In a diverse economy, the government is involved in planning the use of some resources and can exert control over businesses in the private sector. Governments may seek to redistribute wealth by taxing the private sector and using tax funds to promote social objectives (Amadeo, 2021).

A mixed economy as an economic system has limitations, challenges and inadequacies as prevalent in South Africa. The most significant challenges emanate from the lack of strict regulations and enforcement in managing private and public sector financial resources. These challenges are also perpetuated by the high levels of corrupt activities that are seldom addressed and eradicated. These challenges and inadequacies deter the growth of the South African economy, leading to reduced economic activity and participation, increased unemployment rate, poor service delivery and dysfunctional welfare provision by the government as mandated by the constitution (do Doanh, 2017).

The prominence of profit and revenue at the expense of the welfare and well-being of South African citizens has resulted in the exploitation of the labour force, as wealth is not equitably distributed, and there is a gap between the rich and the poor. Notwithstanding the challenges that the country with the most robust economy in Africa is encountering, South Africa continues to be the human rights advocate of the world (do Doanh, 2017).

The diverse country represents the variety and abundance of African animal and plant wildlife (as shown in Figure 3.2). The country has nine provinces: the Eastern Cape, North-West, Free State, Gauteng, KwaZulu-Natal, Western Cape, Limpopo, Mpumalanga, and Northern Cape, with each province varying in size compared to the other. The country has three capital cities, namely: Cape Town in the Western Cape, home to the country's parliament; Bloemfontein in Free State, home to the Supreme Court of Appeal and Pretoria in Gauteng, which is home to the Union Buildings.

Figure 3.2: Map of South Africa

Source: Statistics South Africa, 2019

3.3 Overview of the socio-economic and economic profile of the Gauteng province

The Gauteng Province is one of the nine South African provinces, the smallest province covering an area of 18 178 km^2 or approximately 1.4% of the total surface area of South Africa (Gauteng City-Region Observatory, 2021). Gauteng is located on the highest part of South Africa's central plateau, on the undulating plains of the Highveld. The Northwest,

Limpopo, Free State, and Mpumalanga provinces border the landlocked province. The Gauteng province is an interconnected collection of cities, towns, and urban hubs forming South Africa's economic core.

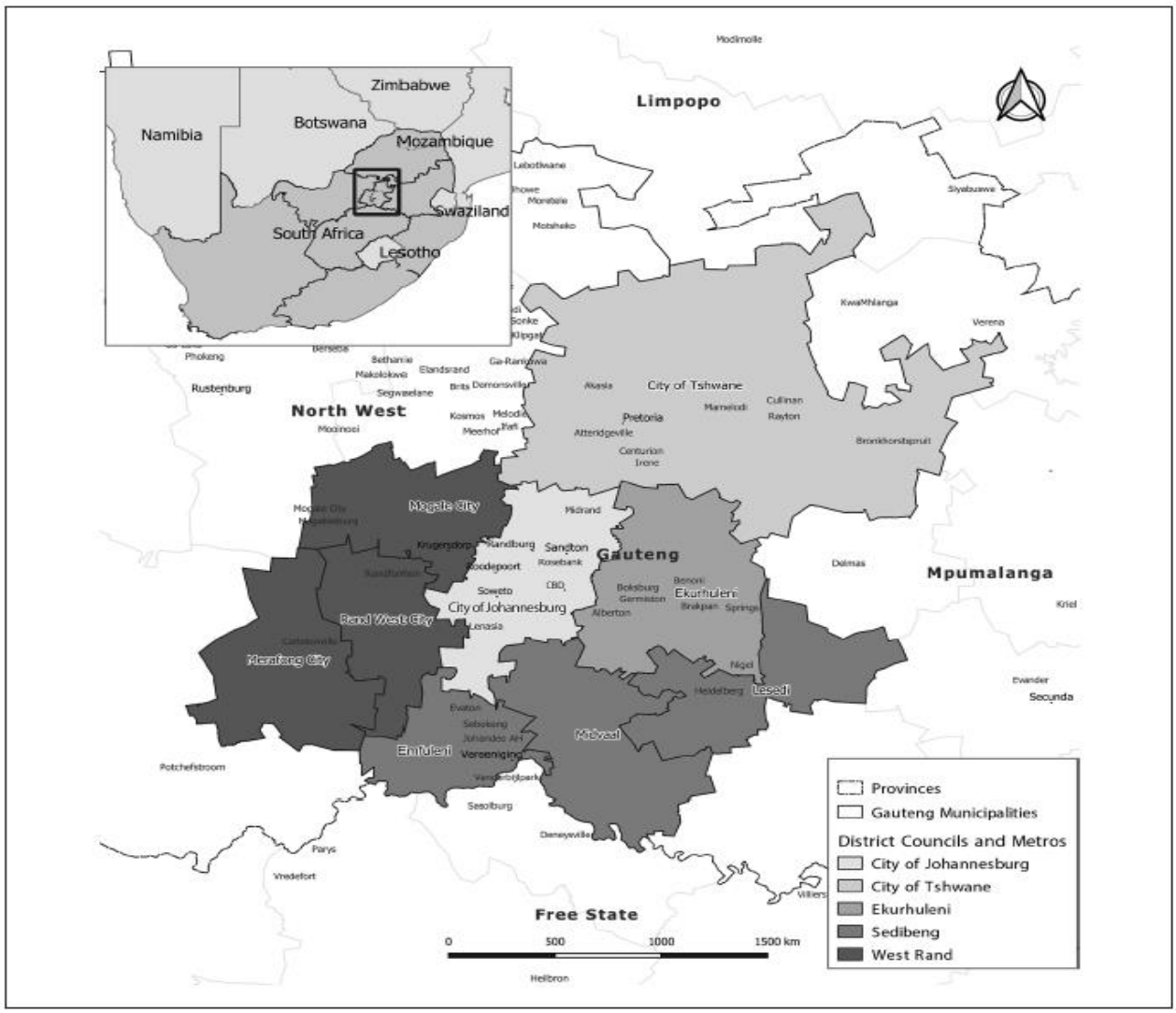
Gauteng comprises cities such as Johannesburg, previously the world's most important centre of gold production and is one of the largest cities in the world with the fastest-growing economy. This makes it South Africa’s economic hub and Pretoria’s administrative capital. It also includes mining, commercial and industrial centres such as Randfontein, Germiston, Krugersdorp, Alberton, Vanderbijlpark, Boksburg, Springs, Vereeniging, Benoni and Westonaria (Britannica, 2019).

The highly urbanised and densely populated province accounts for nearly a quarter of South Africa’s population. This province is home to approximately 15,8 million people accounting for 25.8% of the total South African population. The GDP per capita of Gauteng is the highest in all the provinces in South Africa, illustrating a higher standard of living compared to the rest of the eight South African provinces respectively.

The Gauteng province, previously known as the Pretoria-Witwatersrand-Vereeniging after the first democrat elections in 1994, has since been called the Gauteng province post-December 1994. Before the democratic elections, the province was known as the Transvaal Province. Although the gold-bearing city is highly urbanized, a large number of agricultural activities take place, namely the farming of peanuts (ground nuts), sorghum, corn (maize) and dairy farming (Britannica, 2019).

The landlocked province of Gauteng, as shown in Figure 3.3, is popularly known for the significantly large amount of gold in the south of the province, and large reserves of chromite, platinum, iron ore and uranium can be found in the north of the province. Gauteng has become South Africa's economic centre and most densely inhabited province due to its diverse mining, commercial, industrial and financial activities resulting from its tremendous mineral riches (Gauteng City-Region Observatory, 2021).

Figure 3.3: Context map of Johannesburg with South Africa and Gauteng province



Source: Gauteng City-Region Observatory, 2010

The Gauteng Provincial Legislature governs the province, comprising three metropolitan municipalities – Johannesburg, Ekurhuleni, and Tshwane. The province also includes two district municipalities – Sedibeng district municipality and West Rand district municipality. The two district municipalities have been divided into six local municipalities – Emfuleni local municipality, Merafong City local municipality, Lesedi local municipality, Rand West City Local Municipality, Mogale City local municipality and Midvaal Local municipality. Tables 3.1 and 3.2 show the district and metropolitan municipalities, the local and metropolitan municipalities, the area size of each municipality, and its population.

The tables below are an imperative element for the study, as they will show how many people will be impacted or affected by an infrastructure development project when referring to a particular municipality and the area size of each municipality.

Table 3.1: District and metropolitan municipalities

Name	Area (km2)	Population
City of Ekurhuleni Metropolitan Municipality	1 975	3 970 000
City of Johannesburg Metropolitan Municipality	1 645	6 065 000
City of Tshwane Metropolitan Municipality	6 298	2 921 000
Sedibeng District Municipality	4 173	957 528
West Rand District Municipality	4 087	922 000

Source: Statistics South Africa, 2021

Table 3.2: Local and metropolitan municipalities

Name	Area (km2)	Population
City of Ekurhuleni Metropolitan Municipality	1 975	3 970 000
City of Johannesburg Metropolitan Municipality	1 645	6 065 000
City of Tshwane Metropolitan Municipality	6 298	2 740 000
Emfuleni Local Municipality	966	733 445
Lesedi Local Municipality	1 484	112 472
Merafong City Local Municipality	1 631	188 843
Midvaal Local Municipality	1 722	111 612
Mogale City Local Municipality	1 342	383 864
Rand West Local Municipality	1 115	265 887

Source: Statistics South Africa, 2021

Beyond the Gauteng provincial borders (as illustrated in Figure 3.2) lies more significant metropolitan regions with small regions and relatively large population concentrations. Rustenburg, a global epicentre of platinum mining, is located in the northwest part of Gauteng. The small town has developed extensively since platinum mining operations have expanded, and the demand for platinum has surged over the last decade (Gauteng City-Region Observatory, 2021).

The coal-based oil extraction town of Sasolburg is located in the south of Gauteng, and the historic gold mining towns of Klerksdorp and Potchefstroom are situated on the southwest borders of the province. As their gold-mining economy has stalled, these cities have witnessed modest population growth in recent decades. Witbank, Secunda and Middleburg are located in the east of the province. The relatively medium-sized town's economies are based on the steel and iron, coal and mining, and energy generation industries (Gauteng City-Region Observatory, 2021).

The Gauteng Province, the country's economic and population centre, was severely impacted by a global pandemic. In response to the pandemic, the province implemented a plan built on six pillars, including increased public spending to boost the healthcare system's capacity and mitigate the effect of diminishing economic activity on vulnerable communities and companies (Schäffler & Abrahams, 2021).

The pandemic and other economic disruptors such as economic, political and social unrest, natural disasters (e.g. drought, floods, storms, tropical cyclones), and the Russia-Ukraine conflict have substantially influenced the province's financial outlook. Given that the city is the country's economic centre, the lockdown and other limitations imposed, notably in the second quarter of 2020, have nearly eliminated the economic gains made before the outbreak. According to the data, Gauteng's GDP decreased by approximately ZAR80.9 billion in 2020 to ZAR1 035.7 billion. "This level was last recorded in 2012, when the province's economy was valued at ZAR1 012.1 billion" (Statistics South Africa, 2021b). It is also anticipated that if the province continues its present track with no substantial policy interventions, its GDP will take about four years to reach the levels before COVID-19.

The real GDP Growth Rate is expected to have contracted by 7.2 per cent, surpassing the contraction experienced in 2009 during the global financial crisis (Statistics South Africa, 2021b). The province's GDP growth contracted by 50.5 per cent quarter-on-quarter on an annualised rate in the second quarter, and every year, the contraction was 17.6 per cent. Before the pandemic, the province's economy had experienced three consecutive quarters of a contraction in GDP, highlighting that the economy was already in recession before the pandemic outbreak (Statistics South Africa, 2021b).

During the previous ten years (2010 to 2019), the economy of Gauteng has increased by an average of 1.9% each year. This has proved insufficient in addressing the socio-economic difficulties the province is now confronting. The breakout of the pandemic increased natural disasters, and socio-political unrest have heightened the severity of these problems, making it more difficult for the province to deal with them. The GDP-R is predicted to recover by 3.2% in 2021 before stabilizing at around 1.9% between 2022 and 2024, assuming the present trend of economic growth continues. While the limits placed to halt the spread of the pandemic have had a substantial effect on the economy, they have had a significant impact on activities in several sectors of the economy that were previously deemed non-essential. For example, some industries within the manufacturing and commerce industries were considered non-essential, as were sectors such as transportation, construction, and telecommunications. This resulted in a total suspension of activity within these sectors, notably at lockdown levels 5 and 4 in the second quarter (Schäffler & Abrahams, 2021; Statistics South Africa, 2021b).

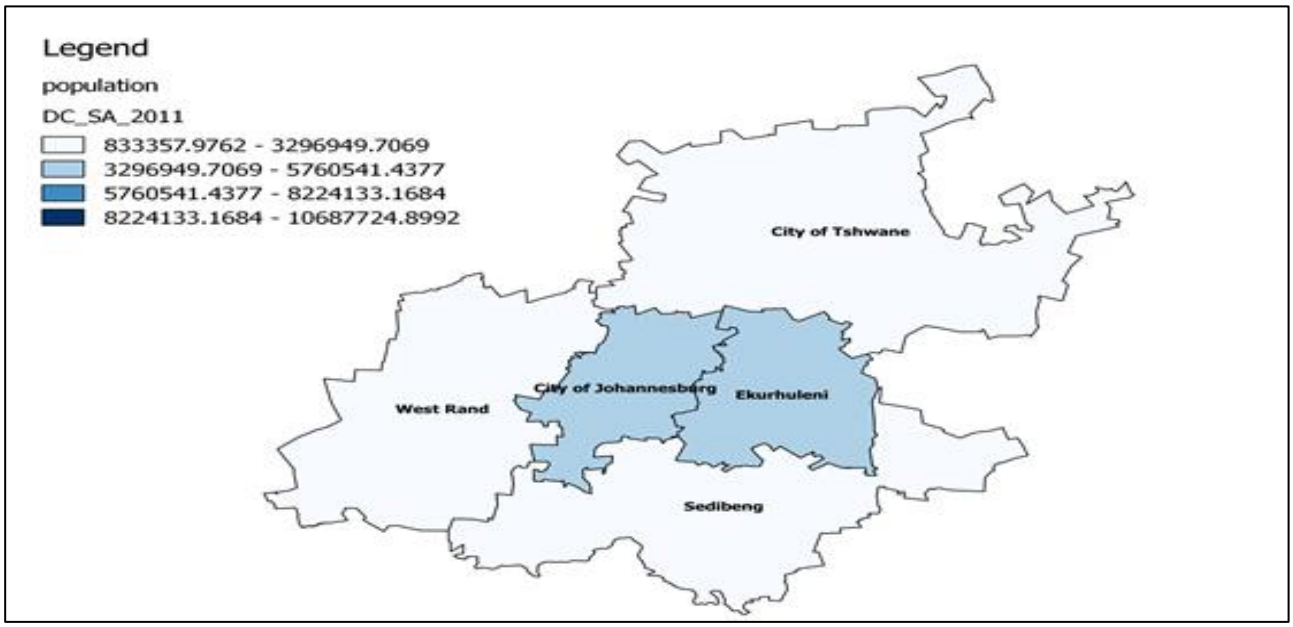
3.4 Socio-economic demographics of the Gauteng province

Understanding the sociodemographic factors is imperative for the study, as this will form a foundation for understanding the reasons for the development or underdevelopment of the province's infrastructure development concerning the economy. The brief demographic structure, examined below, shows the province's population, health, social security statistics and poverty levels.

3.4.1.1 Population profile

The estimated total population of the Gauteng province is between 15.4 million and 15.8 million (Gauteng City-Region Observatory, 2021). This population growth has drastically increased over the last 20 years, particularly between 2001-2021. The 2001 South African census indicated that within the borders of the Gauteng province and the estimated population for 2001 was 9.7 million. This number increased significantly to 12,2 million in 2011 (Gauteng City-Region Observatory, 2021).

Figure 3.4: Geographic representation of the population of Gauteng province, 2020



Source: HIS Markit Regional eXplora, 2021

The Gauteng province population is South Africa's most densely populated region, with an estimated population of between 15.4 million and 15.8 million. The province accounts for over 25% (quarter) of South Africa's population. Figure 3.4 demonstrates that the City of Ekurhuleni and the City of Johannesburg account for the largest proportion of the Gauteng province's total population. The City of Johannesburg and the City of Ekurhuleni account for approximately 38% and 27%, respectively (Statistics South Africa, 2021b). The City of Tshwane is the third most populated municipality in the province, accounting for over 3,6 million people in the region. This is approximately 25% of the province's population.

Table 3.3**:** Population of the Gauteng Province (2001-2021)

2001 Census		**2011 Census**		**2016 Community Survey**		**2021 Mid-Year Estimates**	
Population	**Percentage**	**Population**	**Percentage**	**Population**	**Percentage**	**Population**	**Percentage**
8 837 178	19.7	12 272 263	23.7	13 399 724	24.1	15 810 388	26.3

Source: (Statistics South Africa, 2001, 2011, 2016, 2021b)

The population of the Gauteng province can be estimated using several methods. One of the methods used to estimate the population is to assess the total number of individuals residing within a commutable distance of the epicentre of Gauteng. In 2011, 13,4 million people were living within a radius of 100 km from the Johannesburg city centre, the region's core urban node (it was 10,2 million in 2001). 16,8 million lived within the wider radius of 175 km (it was 13,0 million in 2001) (Gauteng City-Region Observatory, 2021).

Table 3.4: Population growth and size in metropolitan municipalities in Gauteng

Regions	Population Numbers			Average Growth		
	2010	2020	2024	2010-2015	2016-2020	2021-2024
City of Ekurhuleni	3 061 259	3 847 990	4 135 538	2.5%	2.1%	1.8%
City of Johannesburg	4 212 167	5 548 724	6 002 104	3.2%	2.5%	2.0%
City of Tshwane	2 801 430	3 630 620	3 919 725	3.0%	2.3%	1.9%

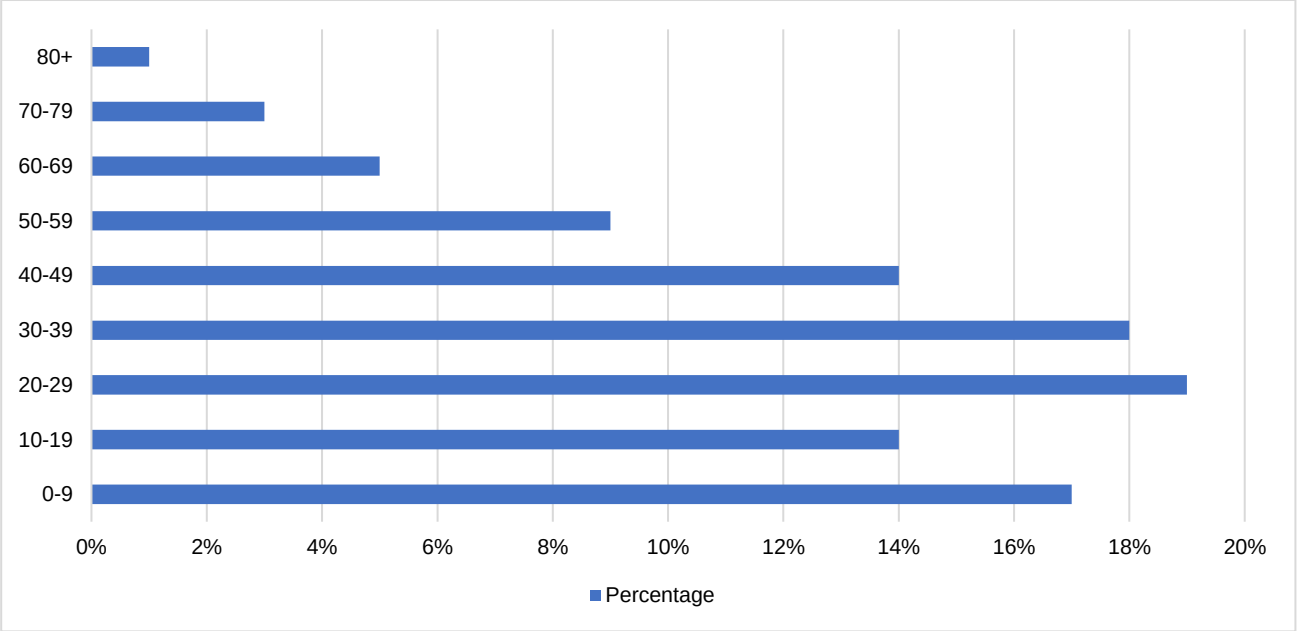
Source: HIS Markit Regional eXplora, 2021

The table above also illustrates historical population data collected from two of the three censuses (2001 and 2011) that occurred since the democratic elections in South Africa in April 1994, and these elections saw the country's division into nine provinces (Statistics South Africa, 2001, 2011).

The table also includes the 2016 community survey (Statistics South Africa, 2016) and the recently updated Gauteng provincial mid-year population estimates provided by Statistics South Africa (2021) to show the population growth and percentage of the increase compared to the overall population growth in the South. Figure 3.4 illustrates the population in various age categories in the Gauteng province.

The 20-29 age category is the highest (19%), followed by the 30-39 age category (18%) and the 0-9 age category (17%). Figure 3.3 is a confirmation that the Gauteng province has an expansive population. The graph clearly illustrates an expanding population pyramid with “high birth rate and low life expectancy” Statistics South Africa, (2021b)

Figure 3.5: Population by age range in the Gauteng Province



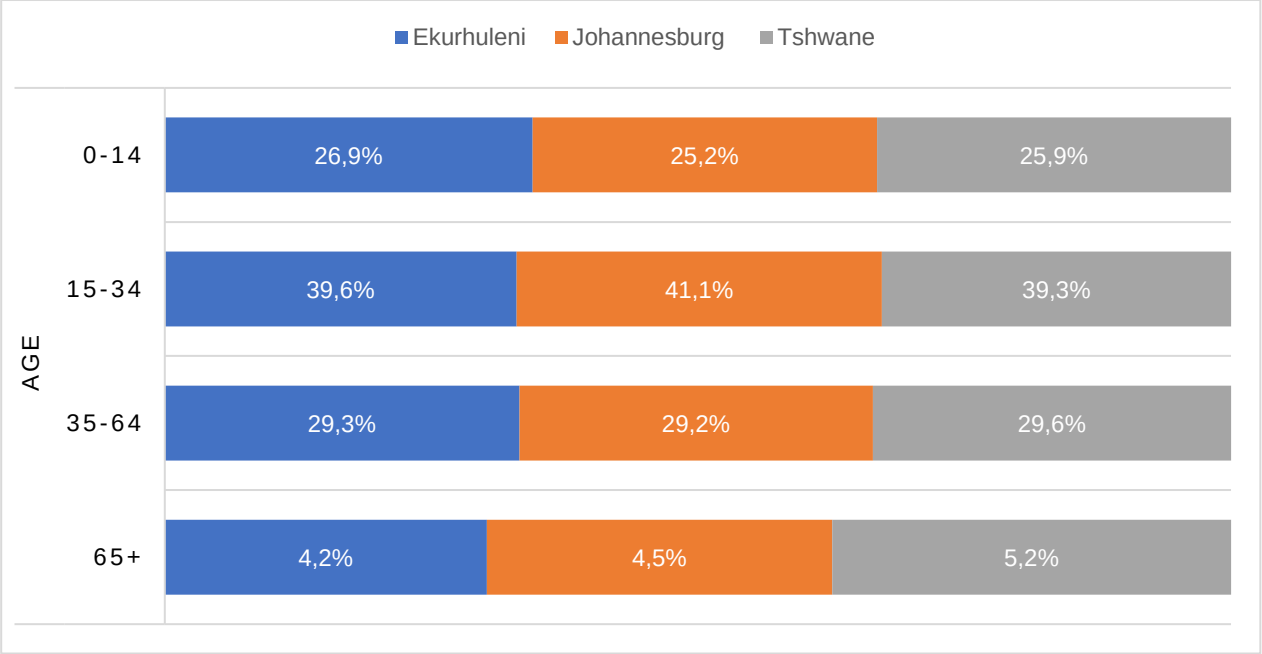
Source: (Statistics South Africa, 2021b)

According to Figure 3.5, there has been a considerable change in the distribution of different age categories across all three metropolitan municipalities in the Gauteng province. This trend is consistent with the overall ageing of the population and, to some extent, with immigration between 2007 and 2020.

Figure 3.5 and Figure 3.6 shows a comparison of the population age distribution in metropolitan municipalities (2007 and 2021). Figures 3.4 and 3.5 show a notable change in the 15-34 age category. An overall decrease was evident in this category in 2021. The percentage decreased proportionately across metropolitan municipalities in 2021. An increase in the population is evident in the age category of 35-64 years.

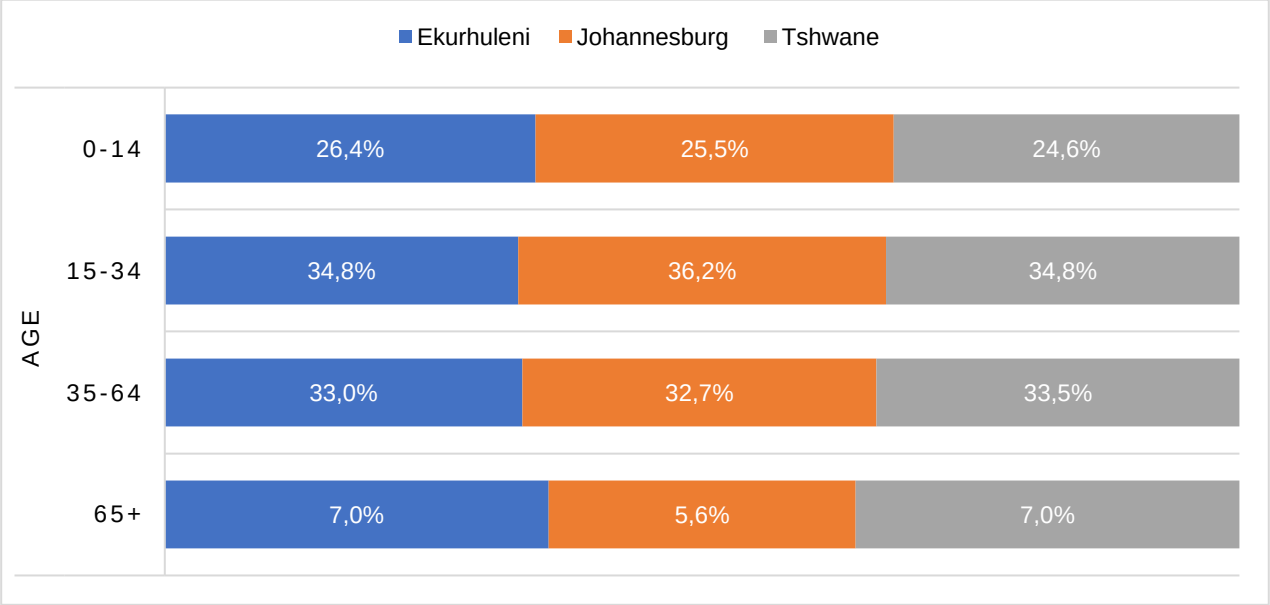
During 2007 and 2020, an increase in the percentage of the senior population (65+ years) is evident in all three metropolitan municipalities. In all three metropolitan municipalities, the age category of 15-34 years constitutes the most significant percentage of the metro's overall population.

Figure 3.6: Population Age Distribution of Metro, 2007



Source: HIS Markit Regional eXplora, 2020

Figure 3.7: Population Age Distribution of Metro, 2021

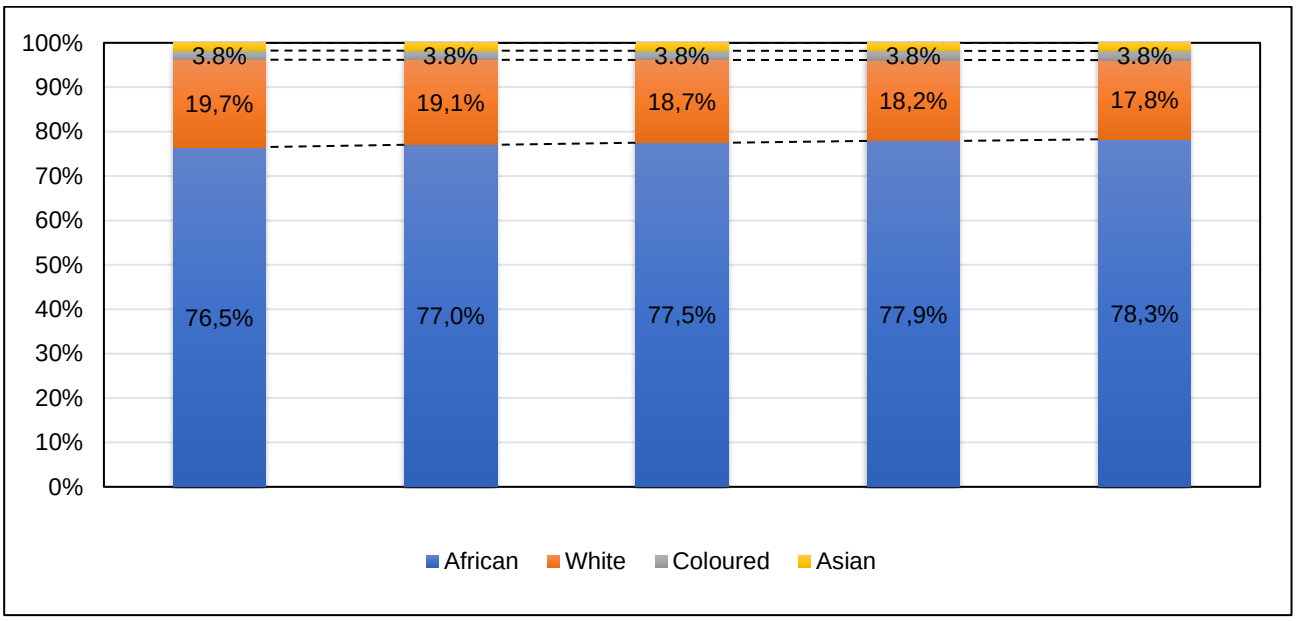


Source: HIS Markit Regional eXplora, 2020

Figure 3.7 illustrates the total contribution of each demographic group (percentage) from 2017 to 2020. In the figure, the African population accounts for most of the population in Gauteng. The total number has increased at a constant rate from 76,5% in 2017 to 78,3% in 2020. This is consistent with the changes in the overall population of the Gauteng province.

Between 2017-2020, the White population group accounted for approximately 19.7% (2017) of the total population. However, the number has decreased significantly to 17,8% (2020). The Asian and Coloured population groups combined accounted for approximately 3.8% of the total population in the Gauteng province. This number has been consistent.

Figure 3.8: Percentage contribution of Gauteng province population groups 2017–2020



Source: HIS Markit Regional eXplora, 2020

3.4.1.1 Socio-economic and regional implications of the Pandemic

The Coronavirus 2019 (COVID-19) is an infectious communicable respiratory disease that is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) (African Union, 2020; World Health Organization, 2019). The first few cases of this virus were detected in China in Wuhan, in the province of Hubei. The virus has affected more than 213 countries and territories with significant morbidity and mortality and thus was declared a pandemic by the World Health Organization in March 2020 pandemic (Eskandari *et al.,* 2021). The pandemic has spread to multiple countries, continents, regions, and communities; citizens and the population are holistically affected. The total population of Gauteng has been dramatically affected and impacted by the pandemic.

COVID-19 is not only a worldwide pandemic and public health calamity. The pandemic has significantly impacted the global economy and financial markets (Ika *et al.*, 2020a), both in Gauteng and globally. COVID-19 has resulted in significant revenue reductions and unemployment and has caused severe disruptions in industrial organizations, manufacturing and transportation services. The pandemic has also impacted

psychological, social, and demographic factors (Karmakar *et al.*, 2021; al Mutair, Id, Alhumaid, Abdullah & Al-Omari, 2021).

The pandemic's impacts are extensive, even disrupting the very makeup of society. When taken in combination, key demographic trends in fertility, mortality, and migration are responsible for shifts in the overall structure of any population (Friedman & Parker, 2021). These three components are the principal determinants of population growth and will be analysed for the study. Covid-19 has significantly affected these three demographic components, influencing the population.

3.4.1.1.1 Fertility, mortality rate and Migration in the Gauteng Province

A fertility rate is a fundamental aspect of demographic components, as correctly determining and estimating the total fertility rate can assist authorities in estimating how a population may expand, contract or stabilize over a period in Gauteng and globally. The total fertility rate (TFR) may also be used to forecast other demographic trends, such as the population age distribution of a particular country or region in the future. The total fertility rate in a specific year is defined as the number of children born to each woman if she lives to the end of her childbearing years and gives birth to children aligned with the prevailing age-specific fertility rates (OECD, 2019). An overall total fertility rate of 2.1 is required, assuming no immigration or emigration occurs to maintain population stability in a particular area (Britannica, 2019).

The economic disruptors have greatly affected the fertility rate globally. An increase in economic uncertainty and the impact that economic disruptors and prominence have had on the economy directly impact conception. It has been predicted that the number of births in 2021 will likely decrease (Pillay-Van Wyk, 2020; Statistics South Africa, 2021b). According to the literature, when the economy is experiencing an economic downturn, individuals become more risk-cautious or risk-averse (Luy, di Giulio, di Lego, Lazarevič, & Sauerberg, 2020; Matysiak, Sobotka & Vignoli, 2021). This illustrates that among the economic indicators influencing fertility, unemployment and the deterioration of the labour market are associated more with negative fertility dynamics (Statistics South Africa, 2021b).

Gauteng's fertility decrease is further illustrated in the Statistics South Africa (2021a) Mid-year population estimates in the figure below. Table 3.6 below shows the Gauteng province fertility estimates for the following periods: 2001–2006; 2006–2011; 2011–2016; and 2016–2021. 2006–2011, figure 3.3 highlights an increase in TFR in the province, shaping the 2011 Census population structure. However, from 2011 to 2021, there was an overall decline in TFR. This is a clear indication of the lower levels of fertility in Gauteng. A decrease in fertility levels affects the population size. However, not in all age categories but only amongst the younger population, low fertility produces an age structure that creates momentum for future population decline (Friedman & Parker, 2021), as a population with a reduced fertility rate can decline rapidly. If low fertility levels persist in an economy, it is more difficult to reverse the population decline.

Table 3.5: Gauteng average fertility rate (2001-2021)

Province	**2001-2006**	**2006-2011**	**2011-2016**	**2016-2021**
Gauteng	2.20	2.25	2.11	1.92

Source: Statistics South Africa (2021a)

The pandemic, socio-political unrest and natural disasters have also affected the mortality rate in Gauteng and globally, and the economic disruptors significantly raised the mortality rate in numerous nations in 2020 and 2021 (Aburto *et al.,* 2021; Kalinsky and Kobak, 2021). The age mortality profile of the disease indicates that older people and those with co-morbidities, specifically diabetes and hypertension, face a higher mortality risk (Statistics South Africa, 2021c).

Excess deaths are defined as the difference between observed deaths in specific periods and expected deaths in the same periods. The estimates of excess deaths can provide information about the burden of mortality potentially related to the COVID-19 pandemic, including deaths directly or indirectly attributed to COVID-19 (Centres for Disease Control and Prevention, 2021). Table 3.7 below illustrates the excess deaths in Gauteng and the three metropolitan municipalities in Gauteng.

Table 3.6: Estimated number of excess death rate in Gauteng (May 2020- Jan 2022)

Province	Excess deaths May 2020 – Jan 2020	Excess deaths per 100 000 population	Age-standardised excess death rate per 100,000 population
Gauteng	57 725	370	407
Metropolitan Municipality			
Ekurhuleni	14 178		
Johannesburg	19 552		
City of Tshwane	10 962		

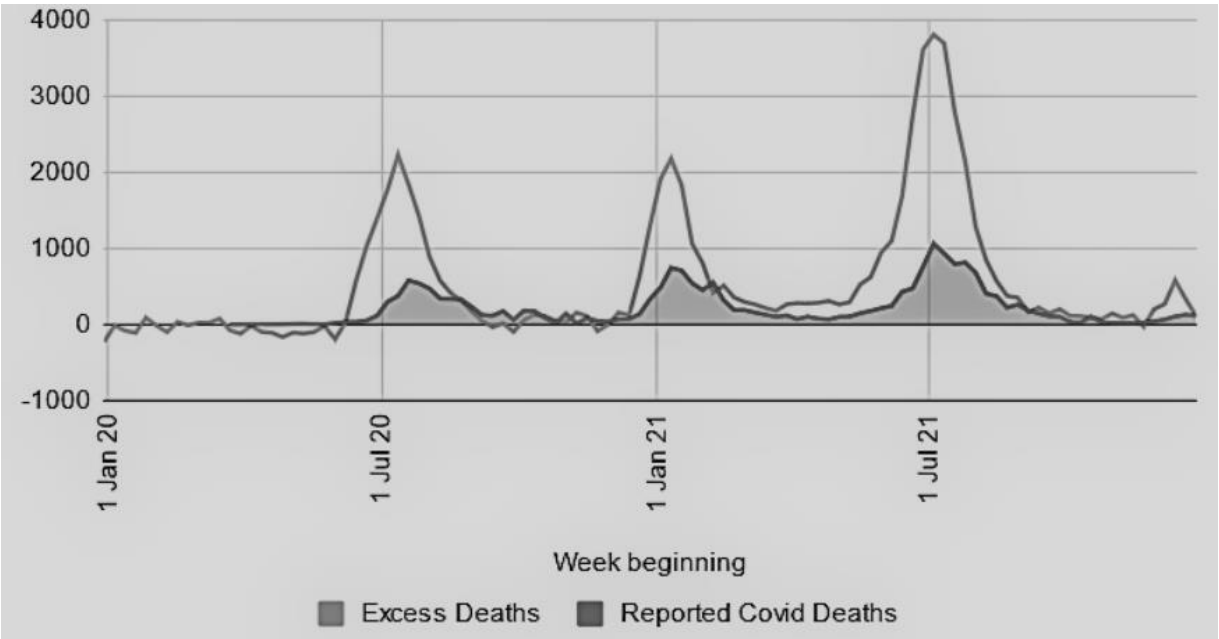
Source: SAMRC, 2021

To correctly determine if the increase in mortality rate is due to the pandemic, it is imperative to compare the excess deaths in Gauteng and the Covid-19 deaths. Figure 3.8 below indicates that although the number of fatalities in Gauteng has increased. The figure shows a correlation between natural ends and Covid-19 deaths in the province. The figure below indicates that the number of estimated excess deaths has begun to decrease, consistent with the trend in confirmed COVID-19 deaths. Although more data are needed on the underlying causes of death, this observation is strongly supportive that a significant proportion of the current excess mortality being observed in Gauteng is likely to be attributable to COVID-19 (SAMRC, 2021)

In response to the pandemic and the negative effect on the overburdened South African health system, the South African government and provincial governments accelerated various infrastructure healthcare programmes to address the impact of Covid-19 on the overburdened healthcare system. Healthcare facilities, clinics and Covid-19 module facilities were constructed to increase healthcare faculties in many provinces, including Gauteng. The statement by the Premier of the Gauteng Province is an indication of healthcare facilities that were built in response to the surge "*Several clinics and healthcare facilities were constructed as a part of Gauteng government's plan to revitalise health*

infrastructure and improve the quality of health care services in the province" (Makhura, 2021).

Figure 3.9: Gauteng province excess deaths and reported Covid-19 deaths



Source: SAMRC, 2021

In South Africa, the province of Gauteng and KwaZulu-Natal (KZN) collectively account for over 50% of the national GDP. Socio-economic interferences in either province respectively result in an impact on the national GDP. In 2021, KZN suffered the brunt of a socio-political disturbance, which negatively contributed 16% of the nation's gross domestic product. The South African Property Owners Association (SAPOA) estimated the costs of the disruption at approximately more than R20 billion in losses in KwaZulu-Natal and an R50 billion total effect on the national GDP (Carrim, 2021).

National Treasury emphasized that the socio-political unrest in Gauteng and KwaZulu-Natal had an impact on the development of the national gross domestic product. In addition, several sectors were impacted by the turmoil, including the agriculture, transport, manufacturing, mining, construction, and infrastructure development sector. However, the disturbance had a ripple effect on all related and unrelated sectors and the economy as a whole (Madubela, 2021). Due to societal upheaval, National Treasury indicated that the

South African risk premium increased substantially, and the rand weakened respectively. The socio-political unrest destroyed more than 200 shopping malls and 1,787 retail businesses. This had an adverse impact not only on the economy but also on unemployment, as the retail industry is the most significant employment multiplier (Giventash, 2021).

The socio-political turmoil had the worst effect on the transport and agriculture industries through restricted market access and transportation difficulties. Consequently, input prices and food supply were affected, resulting in food price inflation (Mlaba, 2021).

The destructive effects of natural catastrophes in South Africa (such as droughts, floods, hailstorms and wildfires) have resulted in significant social and economic losses, expected to worsen due to climate change (Tandon, 2022). From 1900 to 2022, more than 100 disasters were recorded, resulting in over 2 500 fatalities, 21 million people impacted and losses of approximately $4.5 billion (OCHA, 2022). Unexpected heavy rains caused floods in KwaZulu Natal and Eastern Cape provinces in 2011. The unexpected severe rains brought floods that killed 91 people and cost more than $100 million in damages. In 2022, at least 123,808 people were severally impacted, 448 lost lives, and more than 30,000 were displaced (le Roux, 2022; Tandon, 2022; The World Bank Group, 2021). As temperatures rise, severe weather is anticipated in South Africa and the respective provinces. In addition to substantial economic losses, natural disasters such as flooding are known to increase the occurrence of water-borne illnesses such as cholera.

Flooding in the country has damaged approximately 12,500 houses, 66 health institutions were impacted, and 600 schools were destroyed. In addition, infrastructure for companies, roads, bridges, power, and water have been damaged or destroyed. Most deaths and damage happened in the most vulnerable and exposed peri-urban regions (Tandon, 2022; The World Bank Group, 2021).

The prevalence of HIV/AIDS is another factor that has greatly influenced the moderate growth of the Gauteng province population. HIV/AIDS in Gauteng is one of the most predominant factors in the province as South Africa continues to struggle with a high

number of people infected by the virus; an estimated number of 7.7 million citizens are currently living with HIV in South Africa. The country has the fourth-highest HIV prevalence rate in the world (Id *et al.*, 2019). The Gauteng province infection rate of 13.05% clearly indicates the high HIV prevalence rate in the province. However, the infection rate has significantly declined in Gauteng and other provinces as both public and private sectors have initiatives to prevent HIV amongst younger individuals. The initiatives have had a particular focus on the youth. This includes initiatives focused on voluntary male circumcision and particularly on young women, especially teenage girls, who remain an essential component of the Gauteng population (Nuh, 2021).

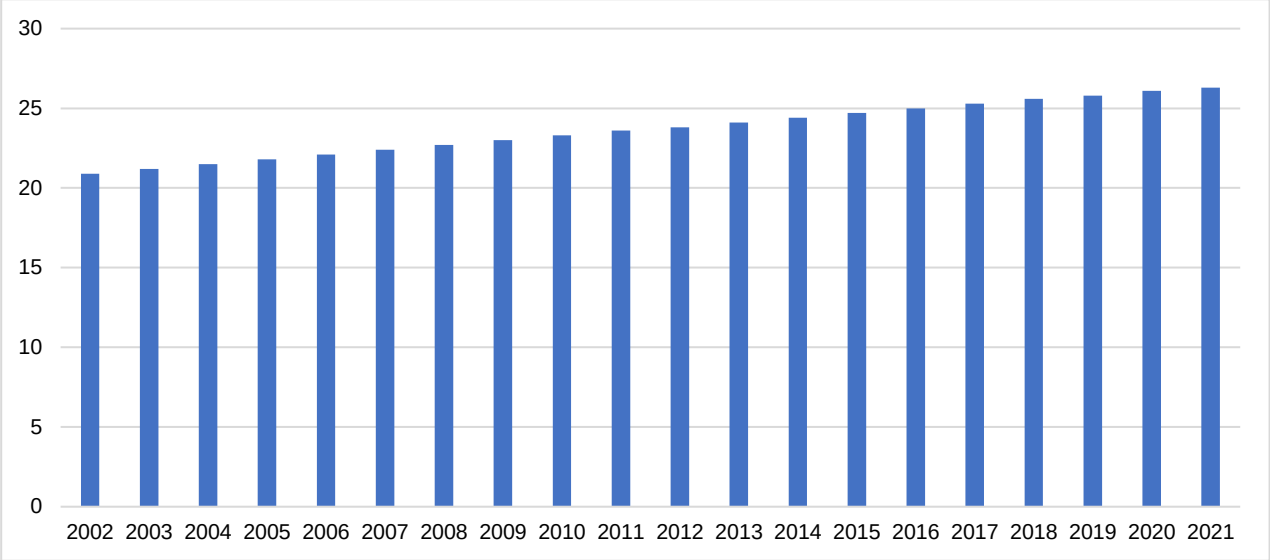
The impact of the pandemic has also resulted in many countries, including South Africa, imposing border control and COVID-19 travel restrictions. This has dramatically affected local and international migration, reducing international migrants in provinces such as Gauteng (al Mutair *et al.*, 2021). Between 11 March 2020, when the WHO declared COVID-19 a pandemic, and 22 February 2021, nearly 105 000 movement restrictions were implemented worldwide (IOM, 2021). *COVID-19* restrictions and protocols, combined with increased logistical burdens around travel, limited the movement of people across international borders (Statistics South Africa, 2021c). Migration and the relocation of inhabitants is an essential demographic process as it influences and affects the entire provincial population's distribution and age structure.

Between 2006 and 2020, the province of the Western Cape and Gauteng are expected to have the highest inflows of migrants. This inflow of migrants is estimated at 1 564 861 migrants for the province of Gauteng and 470 657 migrants for the Western Cape province (Statistics South Africa, 2021c). However, given the far-reaching effects of an infectious disease like COVID-19 on travel and mobility, it is natural to expect global migration to decline.

In-migration and international migration have contributed significantly to the province's population growth. However, between March 2020 and December 2021, as indicated in Figure 3.9, a surge of interprovincial migration occurred, particularly in the Gauteng and

Western Cape Province Provinces, such as Limpopo and Eastern Cape, which experienced a significant outflow of migrants.

Figure 3.10: Percentage distribution of the projected provincial share of the population, 2002-2021



Source: Statistics South Africa, 2021

The three demographic components influencing the Gauteng population have served as the key determinants of population growth. In 2021 the total population was estimated to be between 15.4 million and 15.8 million. Of that, the Black or African population group accounted for 77.4%, and the White population for 15,6%. The Coloured population follows this at 3.5%, and the Indian or Asian population accounted for 2.9% of the Gauteng province population.

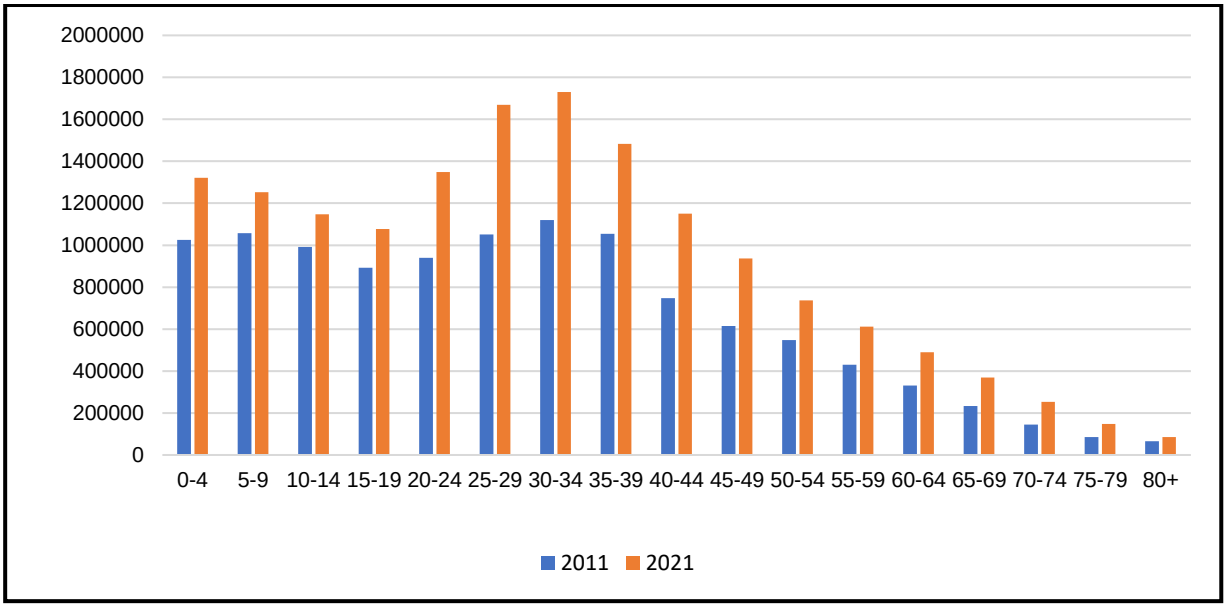
3.4.1.2 Age distribution and economically active

The age structure in an economy is a critical element of economic growth as an ageing population adversely affects the economy's growth. An ageing population may, firstly, result in a decrease in labour force growth or expansion, which may directly impact the GDP. Secondly, a strain could be felt by the employed population as working-age individuals may be required to contribute more to the economy to support and assist the elderly (International Monetary Fund, 2017). A youthful population can be defined as a

population with a more significant number of young individuals due to high birth rates and a drop in infant mortality. This may be a result of improved medical treatment, education and nutrition. In contrast, a youthful population may also harm the economy.

A youthful population may also cause a strain on the economy, as a dependency will be employed, working-age population would be required to contribute more to the economy to support and give assistance to the children as food, education, and shelter are a priority for a youthful population. In Gauteng, an ageing or young population may result in the provincial and local government being greatly burdened by the exorbitant cost of services for the youth and elderly.

Figure 3.11: Total population by age group (2011-2021)



Sources: Statistics South Africa (2011; 2021a)

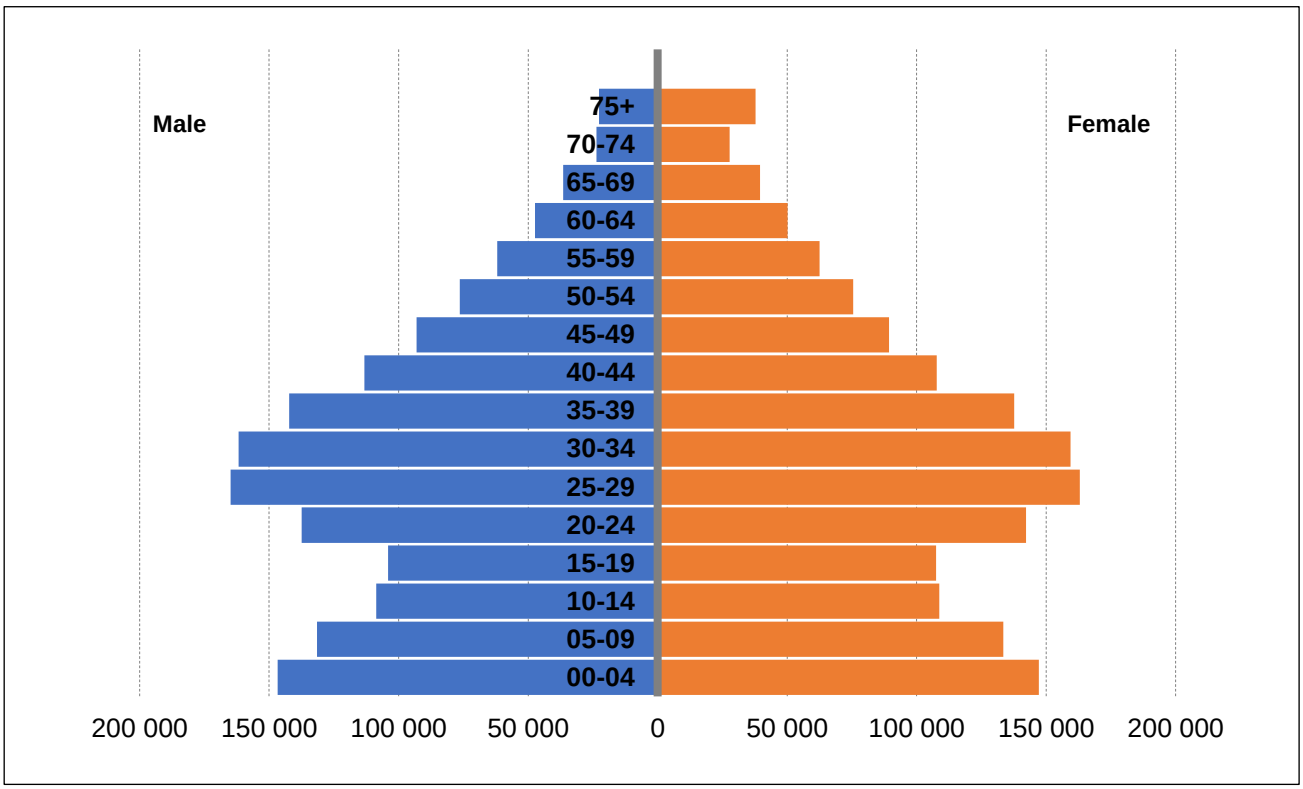
Figure 3.10 above depicts a breakdown of the entire population of the Gauteng province by age group. A comparison of 2011 and 2021 was conducted to show the changes in population growth within ten years from 2011 to 2021. The figure below clearly illustrates that the Gauteng province had a high proportion of individuals in the age range of 30 years to 34 years in both 2011 and 2021.

However, the growth in population in this age category has increased significantly from 2011 to 2021, from an estimated 1,1 million in 2011 to 1,7 million in 2021 (Statistics South Africa, 2021b). A moderate increase in population is illustrated in the age categories of 0 to 29 years. The province, however, has the highest number of children (ages 0-17 years) compared to other provinces. As a province, Gauteng has the fastest-growing child population in South Africa. 21% of the Gauteng population comprises children, which has grown by 42% since 2002 (Scheuer *et al.*, 2021). In the age range of 40 years to 80+ years, a moderate increase is illustrated in the graph from 2011 to 2021.

The Gauteng population is a youthful dependent population as a significant proportion relies on the working-age population for support and assistance (Kim *et al.*, 2021). The working age population is defined as the total number of individuals between the age category of 15 years to 64 years (Kreitner, 2009). Figure 3.11 below also clearly depicts an age category of 15-64 years. The total working-age population in Gauteng was 7,7 million in 2011 and 11,2 million in 2021. This represents a relative increase in the ten years. However, the working-age population does not describe the economically active population (EAP).

EAP can be defined as the total number of individuals aged 5 to 64 years who are willing to work and can work (Department of Labour, 2021). This category includes individuals who are employed. These individuals may be used in the formal economy or informal economy. Self-employed and unemployed individuals are included, are also included in this definition (OECD, 2002).

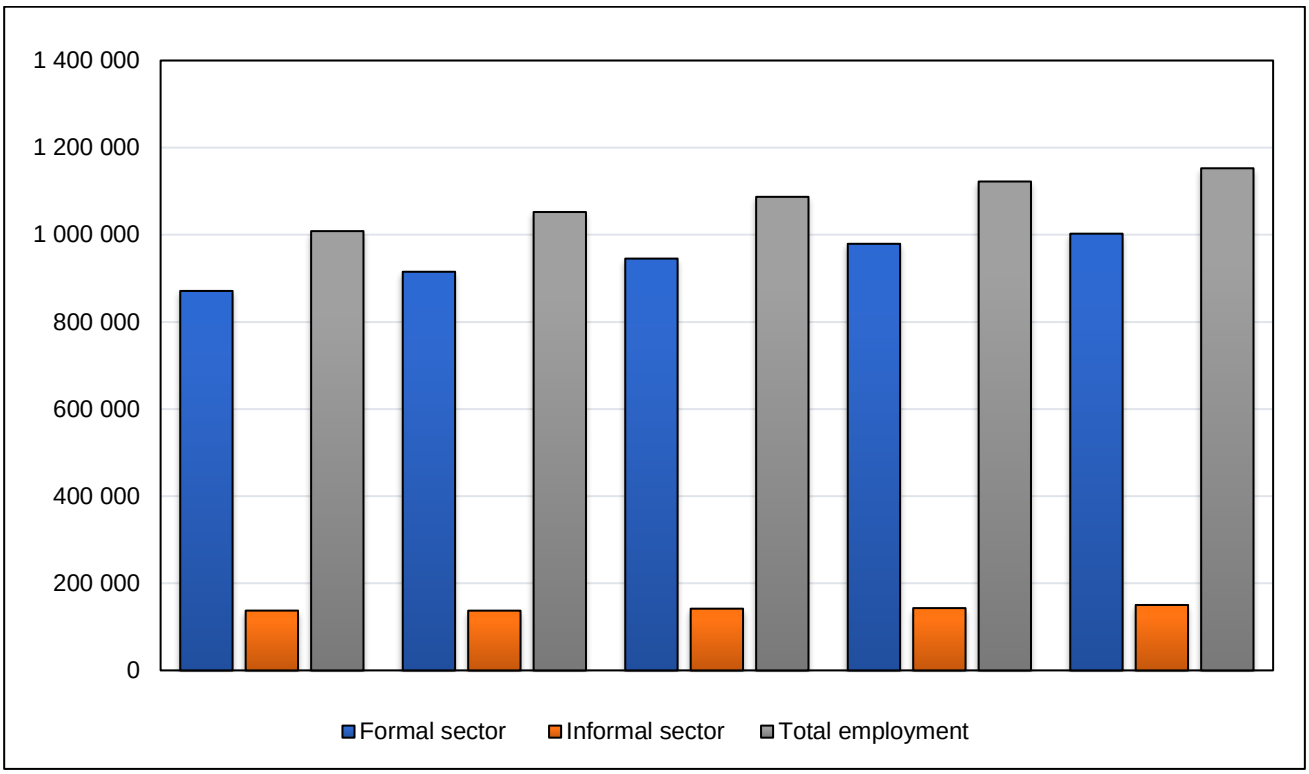
Figure 3.12: The Gauteng province population pyramid, 2020



Source: HIS Markit Regional eXplora, 2020

As defined by OECD (2017), the employment rate is the total number of employed individuals of working age in a population. Overall, in 2021, South Africa has had a moderate increase of 0,4% (144 000 individuals) in the employment rate. However, this is a substantial decline from 2020, when the employment rate increased by 1.5% (581 000). This overall decline is reflected in Gauteng as the number of employed persons has decreased (see Figure 3.12). In 2020, 5.1 million individuals were employed, compared to 4.6 million in 2021. This reflects a 9.9% decrease in overall employment. Gauteng shows the highest decline in employment rate in South Africa (Statistics South Africa, 2021a).

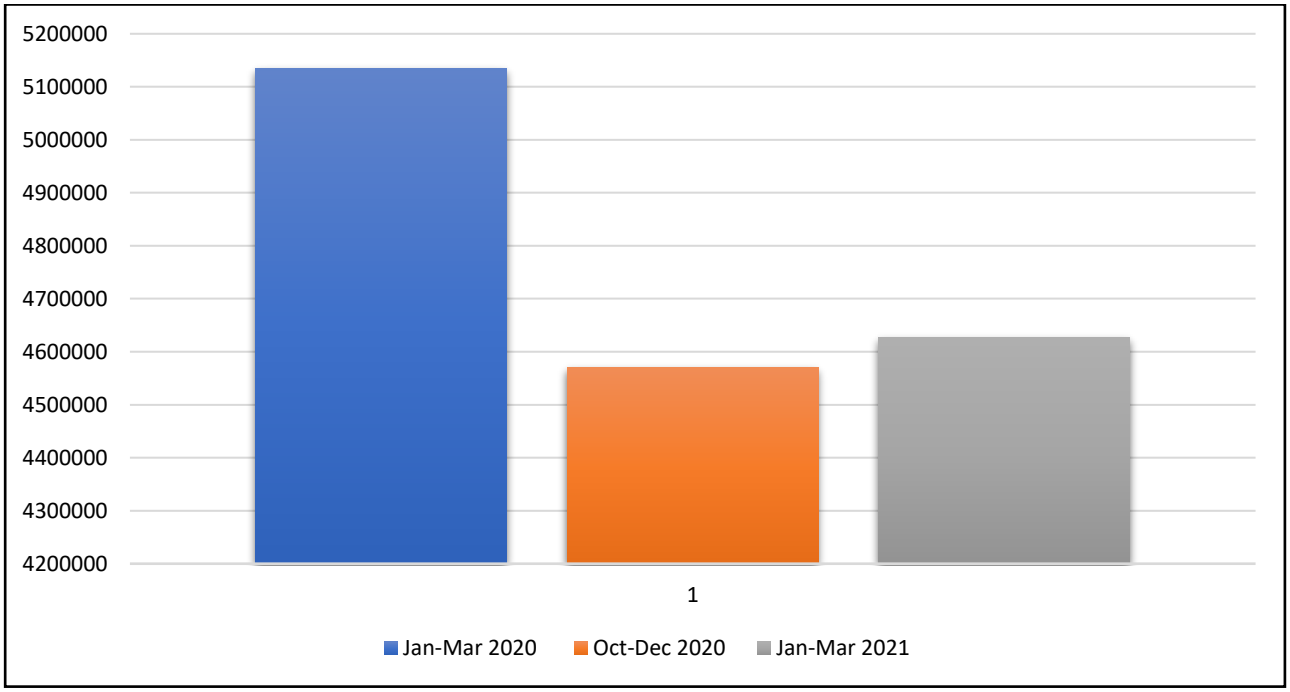
Figure 3.13: Gauteng rate of employment (2016 -2020)



Source: (Statistics South Africa, 2021a)

Figure 3.13 depicts a significant formal and informal sector increase from 2016 to 2020. Employment in the Gauteng province had increased significantly in both categories, as seen in the graph. This trend continued through the beginning of 2020. Many people were employed in Gauteng at the end of 2016, and the figure climbed. Employment in the formal sector expanded in 2016 and grew at the beginning of 2020. As one would imagine, the growth in formal sector employment accounts for most of this growth's composition.

Figure 3.13: Gauteng rate of employment (2020 -2021)



Source: (Statistics South Africa, 2021a)

On the other hand, the informal sector has seen a rise in employment from 2016 to the beginning of 2020. The increase in employment was greatly affected from March 2020 to March 2021 (figure 3.13) as the unemployment rate in South Africa continues to remain a significant factor, and the adverse effect of the overall unemployment rate is also reflected provincially. The unemployment rate is used as an indicator to measure the total number of individuals who are not employed or individuals who are jobless in a particular region, country or economy (Department of Labour, 2021).

The official unemployment rate in South Africa is 32.6% in 2021. The official unemployment rate slightly increased by 0.1% in 2021. This means that 46.3% of the individuals in the age category of 15 years to 34 years of age remain unemployed in South Africa. The Gauteng provincial official unemployment rate also reflects a slight decrease of 3% from 31.4% in March 2020 to 34.4% in 2021. This is a significant concern to the national and provincial governments as the youth have the potential and the necessary skills that the government could use to ensure that the economy reaches its full potential.

The expanded unemployment rate in Gauteng reflects a higher increase in numbers as the expanded unemployment rate for 2020 was 36.3% as opposed to 41.6% in 2021. The year-on-year change is 3.7%, significantly higher than the year-on-year change in the official unemployment rate. Tables 3.8 and 3.9 compare the labour force characteristics in Gauteng and Gauteng metropolitan municipalities. The tables below compare Quarter 1 2020 to Quarter 1 2021. The following categories have been compared provincially and in the three metropolitan municipalities in Gauteng: the population (15-64 years); the labour force has been broken down to the employed, unemployed, not economically active, and discouraged work-seekers.

The unemployment rate, employed/population ratio and labour force participation rate have also been included in the analysis. The analysis conducted in the tables clearly illustrates the information above when comparing the three metropolitan municipalities: City of Johannesburg, Ekurhuleni and City of Tshwane, respectively. The table demonstrates that the City of Johannesburg has a larger population of 3,9 million in 2020 and 4,035 million in 2021 and a relatively substantial labour force of 2.8 million in 2020. However, in 2021, a decrease of 9.9% is reflected in the labour force; the unemployment rate has increased in the City of Johannesburg.

The changes in the composition of the labour force from 2020 to 2021 in Gauteng closely resemble the changes in the composition of the labour force in South Africa. The year-on-year change in the working-age population in South Africa was 1.5%, and 1.9% in Gauteng. The year-on-year labour force in South Africa declined -5.2% and -5,8% in Gauteng. The unemployment rate year-on-year change in South Africa is 2.5% and 3% in Gauteng. The employment or population ratio year-on-year change is -4.1% in South Africa and -5.7% in Gauteng. The labour force year-on-year change in South Africa is -3.9% and -5.4% in Gauteng, respectively.

Table 3.7: Labour force characteristics of Gauteng and metro's

	Jan-Mar 2020	Apr-Jun 2020	Jul-Sep 2020	Oct-Dec 2020	Jan-Mar 2021	Qtr-to-qtr change	Year-on-year change	Qtr-to-qtr change	Year-on-year change
	Thousand	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Per cent**	**Per cent**
Gauteng									
Population 15-64 yrs	**10 508**	**10 557**	**10 607**	**10 634**	**10 704**	**70**	**196**	**0.7**	**1.9**
Labour force	**7 488**	**6 081**	**6 797**	**6 935**	**7 052**	**117**	**-436**	**1.7**	**-5.8**
Employed	5 134	4 473	4 506	4 570	4 626	56	-508	1.2	-9.9
Unemployed	2 354	1 608	2 291	2 365	2 426	61	73	2.6	3.1
Not economically active	3 020	4 476	3 810	3 699	3 652	-47	632	-1.3	20.9
Discouraged work-seekers	453	509	490	622	676	55	223	8.8	49.3
Other	2 567	3 967	3 320	3 077	2 975	-102	408	-3.3	15.9
Rates (%)									
Unemployment rate	31.4	26.4	33.7	34.1	34.4	0.3	3.0		
Employed/ population ratio (absorption)	48.9	42.4	42.5	43.0	43.2	0.2	-5.7		
Labour force participation rate	71.3	57.6	64.1	65.2	65.9	0.7	-5.4		

Source: Statistics South Africa, 2021(a)

Table 3.7: Labour force characteristics of Gauteng and metro's (continued)

	Jan-Mar 2020	Apr-Jun 2020	Jul-Sep 2020	Oct-Dec 2020	Jan-Mar 2021	Qtr-to-qtr change	Year-on-year change	Qtr-to-qtr change	Year-on-year change
	Thousand	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Per cent**	**Per cent**
Gauteng – Non-metro									
Population 15-64 yrs	**1 360**	**1 362**	**1 364**	**1 369**	**1 369**	**0**	**9**	**0.0**	**0.7**
Labour force	**895**	**706**	**716**	**742**	**820**	**78**	**-75**	**10.6**	**-8.4**
Employed	627	543	535	542	572	31	-55	5.7	-8.7
Unemployed	268	163	181	201	248	48	-20	23.8	-7.5
Not economically active	464	656	648	627	548	-78	84	-12.5	18.2
Discouraged work-seekers	117	117	166	231	187	-44	71	-18.8	60.7
Other	348	539	482	396	361	-35	13	-8.8	3.9
Rates (%)									
Unemployment rate	30.0	23.1	25.2	27.0	30.2	3.2	0.2		
Employed/population ratio (absorption)	46.1	39.9	39.2	39.6	41.8	2.2	-4.3		
Labour force participation rate	65.9	51.8	52.5	54.2	59.9	5.7	-6.0		

Source: Statistics South Africa, 2021(a)

Table 3.7: Labour force characteristics of Gauteng and metro's (continued)

	Jan-Mar 2020	**Apr-Jun 2020**	**Jul-Sep 2020**	**Oct-Dec 2020**	**Jan-Mar 2021**	**Qtr-to-qtr change**	**Year-on-year change**	**Qtr-to-qtr change**	**Year-on-year change**
	Thousand	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Per cent**	**Per cent**
Gauteng – Ekurhuleni									
Population 15-64 yrs	**2 613**	**2 621**	**2 630**	**2630**	**2647**	**17**	**34**	**0.7**	**1.3**
Labour force	**1 918**	**1 460**	**1 677**	**1 739**	**1 789**	**50**	**-129**	**2.9**	**-6.7**
Employed	1 297	1 090	1136	1 173	1 174	1	-123	0.1	-9.5
Unemployed	621	370	541	567	615	49	-5	8.6	-0.9
Not economically active	695	1 161	953	890	858	-33	163	-3.7	23.5
Discouraged work-seekers	127	129	130	150	192	42	66	27.8	52.0
Other	568	1 032	823	740	665	-75	97	-10.1	17.1
Rates (%)									
Unemployment rate	32.4	25.3	32.3	32.6	34.4	1.8	2.0		
Employed/population ratio (absorption)	49.7	41.6	43.2	44.6	44.3	-0.3	-5.4		
Labour force participation rate	73.4	55.7	63.8	66.1	67.6	1.5	-5.8		

Source: Statistics South Africa, 2021(a)

Table 3.7: Labour force characteristics of Gauteng and metro's (continued)

	Jan-Mar 2020	Apr-Jun 2020	Jul-Sep 2020	Oct-Dec 2020	Jan-Mar 2021	Qtr-to-qtr change	Year-on-year change	Qtr-to-qtr change	Year-on-year change
	Thousand	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Per cent**	**Per cent**
Gauteng – City of Johannesburg									
Population 15-64 yrs	**3 940**	**3 964**	**3 988**	**4 005**	**4 035**	**30**	**95**	**0.8**	**2.4**
Labour force	**2 891**	**2 367**	**2 583**	**2 649**	**2 614**	**-35**	**-277**	**1.3**	**-9.6**
Employed	1 947	1 677	1 718	1 719	1 722	3	-225	0.1	-11.6
Unemployed	945	691	865	930	892	-37	-52	-4,0	-5,5
Not economically active	1 049	1 597	1 405	1 356	1 421	65	372	4.8	35.5
Discouraged work-seekers	78	135	154	178	218	40	140	22.5	177.9
Other	970	1 462	1 252	1178	1 203	25	233	2.2	24.0
Rates (%)									
Unemployment rate	32.7	29.2	33.5	35.1	34.1	-1.0	1.4		
Employed/population ratio (absorption)	49.4	42.3	43.1	42.9	42.7	-0.2	-6.7		
Labour force participation rate	73.4	55.7	63.8	66.1	67.6	1.5	-5.8		

Source: Statistics South Africa, 2021(a)

Table 3.7: Labour force characteristics of Gauteng and metro's (continued)

	Jan-Mar 2020	Apr-Jun 2020	Jul-Sep 2020	Oct-Dec 2020	Jan-Mar 2021	Qtr-to-qtr change	Year-on-year change	Qtr-to-qtr change	Year-on-year change
	Thousand	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Thousand**	**Per cent**	**Per cent**
Gauteng – City of Tshwane									
Population 15-64 yrs	**2 596**	**2 610**	**2 624**	**2 631**	**2 653**	**22**	**57**	**0.8**	**2.2**
Labour force	**1 783**	**1 547**	**1 821**	**1 805**	**1 828**	**23**	**45**	**1.3**	**2.5**
Employed	1 263	1 163	1 117	1 136	1 158	22	-105	1.9	-8.3
Unemployed	520	384	704	669	670	2	150	0.2	28.9
Not economically active	813	1 063	804	826	825	-2	12	-0.2	1.5
Discouraged work-seekers	132	129	41	62	79	16	-53	25.8	-40.3
Other	681	934	763	764	746	-18	65	-2.3	9.5
Rates (%)									
Unemployment rate	29.2	24.8	38.7	37.0	36.7	-0.3	7.5		
Employed/population ratio (absorption)	48.7	44.6	42.6	43.2	43.7	0.5	-5.0		
Labour force participation rate	68.7	59.3	69.4	68.6	68.9	0.3	0.2		

Source: Statistics South Africa, 2021(a)

Table 3.8: Gauteng economically active (EAP) population group and gender

Province	Gender	African	Coloured	Indian	White	Total
Gauteng	Male	46.0%	1.5%	1.9%	7.2%	56.6%
	Female	34.8%	1.5%	1.3%	5.7%	43.3%
	Total	80.8%	3%	3.2%	12.9%	100%

Source: (Department of Labour, 2021)

In the Gauteng Province, the composition of the economically active (EAP) population closely compares to the overall population of the Gauteng Province. The table illustrates that 56.6% of the male population in Gauteng is economically active, with 46.0% represented by the Black (African), followed by the White population (7.2%), Indian (1.9%) and Coloured (1.5%) population groups. The economically active female population closely resembles the male population groups, with 34.8% of the Black (African) population being economically active, followed by the White (5.7%), Coloured (1.5%) and Indian (1.3%) population groups. The overall composition of the economically active population illustrates that 80.8% of the Black (African) population is economically active, followed by the White (12.9%), Indian (3.2%) and Coloured (3%) population groups (Department of Labour, 2021).

The Gauteng Province is a significant contributor to the overall economy, with an estimated contribution of 45% of the total economic output of South Africa (StatsSA GDP-R, 2019). The province produces substantial South Africa's economic output, with various regions contributing to manufacturing, business services, mining, financial innovation, and commerce. All sectors contribute to operating together to establish a dynamically interconnected urban economy.

The contribution of the Gauteng Province to the overall economy has created prevalence over the other provinces in South Africa. The Gauteng Province is continuing to project a greater perception of employment opportunities, educational prospects, access to housing, essential household infrastructures, greater proximity to urban amenities, and generally

better standards of living (Gauteng City Region, 2018) and thus drawing an influx of migrants from other countries and other South Africa's rural and metropolitan areas. The entrance of newcomers gives it an increasingly cosmopolitan character and vibrant social and economic life. This, in turn, adds continuously to its dynamism and attractiveness to opportunity seekers (Gauteng City Region, 2018). However, this eventually leads to a densely populated province with high rates of high employment and poverty, as the overall economy of Gauteng cannot accommodate the population influx.

3.4.1.3 Overview of Poverty in the Gauteng Province

Poverty in the Gauteng Province is a significant hindrance to the growth and development of the province. The province continues to be riddled with high levels of unemployment, poverty, inequality and social exclusion; this province is a representative of the overall state of South Africa. The influx of migrants contributes substantially to the poverty in Gauteng, affecting other interrelated issues such as disparities between urban and rural residents, household income, employment level, education levels, and access to basic services such as health care, water and electricity.

Poverty, as defined by the World Bank, is a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information, depends not only on income but also on access to services (World Bank, 2021) is instigated by several factors. Factors such as a scarcity of decent employment, a lack of employment growth, or the inaccessibility of jobs are significant contributors and instigators of poverty. The unavailability or shortage of household income may directly result from the decent employment opportunities within the Gauteng province.

A lack of quality education is another contributing factor identified by the World Bank (2021), as the lack of quality education results in a vicious cycle of poverty. Without access to quality education, inhabitants of the province may find it challenging to improve their circumstances. In the Gauteng province, the scarcity of food and water and lack of

infrastructure development are critical factors to the high poverty rate within the province. Infrastructure development is crucial and is the government's national priority as it serves as a foundation for social and economic activities. Economic infrastructure development, such as transportation, water and electricity supply, communication, and social infrastructure (hospitals, schools, and universities), are critical to sustaining GDP growth and expanding the labour market (Statistics South Africa, 2021c).

Measuring poverty in the province is a crucial element of poverty alleviation. Since 1994, several South African government departments and government agencies, as well as academics and civil society organisations, have recommended a variety of poverty metrics, measures and approaches. The measurement of poverty by civil society, academics and South African government departments varies from total assets acquired and generated household income to total calorie consumption to understanding the various approaches to sustainable livelihoods. All these factors are considered to be measurements of poverty and focus on the poor's capacities, abilities, and potential rather than the lack of household income and assets. These are essential considerations for measuring poverty (Alexander, 2021).

South Africa has since developed three national poverty standards based on income. These are the food poverty line (set at R531 per person per month in April 2017), the lower-bound poverty line (R758) and the upper-bound poverty line (R1,138) (Alexander, 2021). Therefore, an inhabitant of South Africa is deemed to live in poverty if the total income earnings are less than a specific amount.

Table 3.10 below illustrates the percentage of households living in poverty in Gauteng, the people in poverty based on the population in Gauteng. The table also displays the total number of people living in poverty based on households and the intensity of poverty in the Gauteng province.

Table 3.9: Poverty in the Gauteng Province

Households	Average household size	Percentage of people living in poverty	People in poverty (based on population)	People in poverty (based on households)	Intensity of poverty
4,951,137	2.7	45% - 55%	616,387	614,387	44.1%

Source: Alexander (2021)

Approximately 45% to 55% of the population is impoverished in the Gauteng Province. The extent, intensity and severity of poverty in the province are far worse and excessed the impoverishment of other provinces even though it is one of the wealthiest provinces in South Africa (OECD, 2020). This is a real cause for concern since it indicates that poverty-reduction policies, measures and initiatives enacted over the last decade have not fulfilled the province's poverty-reduction objectives.

3.4.1.4 Overview of Education and Literacy in the Gauteng Province

Global education is viewed as a fundamental human right, a necessity and not a privilege (TISO Skills Fund, s.a.), literacy, according to the United Nations Education, Science, and Cultural Organization (UNESCO), is a vital aspect, integral component, and the cornerstone of lifelong learning as literacy and education is a catalyst of sustainable growth and development. Literacy and education empower individuals and communities, resulting in the economic participation of societal structures. This has a supporting effect in improving livelihoods, family and child health and nutrition, decreased infant mortality and a lower rate of poverty and inequality due to increasing labour market participation (Khuluvhe, 2021). Low levels of societal literacy and education result in the inability to fully participate in the political and societal discourse, inhabiting the ability to make sensible and informed decisions that influence policies in respective communities.

In the Gauteng province and numerous provinces throughout South Africa, the education system and the challenges encountered by the Department of Education continue to question the level of education in South Africa (Cloete, Ellington, Jansen van Vuuren, Marais, & Masinga

2021). The Gauteng provincial education system continues to endure the effects imposed by the apartheid error. These effects experienced, particularly by impoverished families, have been evident throughout the province as families are challenged with the difficulty of sending children of school going to school (Moodley, Seerane & Gravett, 2022).

In various parts of the Gauteng province, pupils are required to assume the responsibility of parents in the household by taking care of younger siblings due to the absents of parents and guardians. In the province, the unaffordability of school fees, school uniforms, and basic school essentials also imposes a challenge for poverty-stricken families, as families cannot afford to take children to school, resulting in a cycle of poverty and inequality mirrored throughout the province, country and the continent (Gumede & Badriparsad, 2022).

Inconsistencies in the quality of education continue to be a significant factor that is reflected through the schools in the province as statistics reveal that a vast majority of pupils who attend schools in townships and peri-urban regions perform well below the average pupils in suburbs and well-established affluent areas thus leaving pupils with below-average skills upon completing matriculation (Khuluvhe, 2021). The non-performance continues to create a state of crisis for the province. The intervention provided by several non-governmental organisations and non-profit organisations continues to provide much-needed support to the provinces ailing educational system through various educational programmes, sponsorships and excursions that assist in solving the multiple issues in the public and private school system (Meiklejohn *et al.*, 2021).

Early childhood education programmes contribute significantly to the development of children, as through these programmes, children continue to develop crucial emotional and social skills that amplify and enhance the relationship between the parents, teacher and child. If implemented correctly, the early childhood development programme establishes a foundation throughout the child's education. In the province, the total percentage of 0-3-year-olds attending Early Learning Programmes decreased considerably from 63.2% in 2014 to 44.6%

in 2019. Similarly, a decrease is reflected in the 4-year-olds attending Early Learning Programme, from 88.1% in 2014 to 84.2% in 2019.

The importance of early childhood education is reiterated by UNESCO (United Nations Educational, Scientific and Cultural Organization) (2021). Early childhood care and education (ECCE) is more than preparation for primary school. It aims to holistically develop a child's social, emotional, cognitive and physical needs to build a solid and broad foundation for lifelong learning and well-being. ECCE can nurture caring, capable, responsible future citizens. Therefore, the increase in 5-6-year-olds attending Early Learning Programmes could respond to the provincial government's awareness drive on the importance of early learning programmes in preparation for primary school education.

Completing secondary education is an imperative priority and a fundamental aspect of the betterment of the social progression and development of the country. In the province, many 16-18-year-olds (96.8% in 2014 and 96.9% in 2019) have completed grade 7. However, this number contrasts with 22-25-year-olds who have completed grade 12 (65%). This number remained consistent from 2014 to 2019.

Table 3.10: Gauteng province level of education (2014-2019)

Indicator	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	Percentage					
0-3-year-olds attending Early Learning Programme	63.2	60.1	48.0	47.7	51.3	44.6
4-year-olds attending Early Learning Programme	88.1	83.4	80.3	83.8	82.3	84.2
5-6-year-olds attending Early Learning Programme	90.7	94.0	93.0	94.5	92.1	91.8

Indicator	2014	2015	2016	2017	2018	2019
	Percentage					
7–13-year-olds attending educational institution	99.2	99.7	99.6	99.6	99.1	98.7
14–18-year-olds attending educational institution	91.6	90.9	89.2	90.5	91.8	91.1
19–23-year-olds attending educational institution	32.9	33.7	33.4	34.8	31.7	35.0
16-18-year-olds who have completed grade 7 or above	96.8	98.3	97.9	98.2	98.0	96.9
19-21-year-olds who have completed grade 8 or above	95.7	92.7	93.5	93.9	95.4	95.5
22-25-year-olds who have completed grade 12 or above	65.0	63.4	62.3	64.0	64.0	65.6
Learners attending school who are orphans	3.5	3.0	3.3	3.2	3.3	2.1

Source: Statistics South Africa, 2019

Secondary education and literacy should be a fundamental priority for the Gauteng provincial government, as indicated in Table 3.11 concerning secondary education statistics. Table 3.12 below shows the repetition rate of grade 10 pupils, 18.7%. This implies that 18.7% of households in Gauteng indicate that a grade 10 pupil within the household is repeating grade 10, 15.4% of grade 11 pupils are repeating grade 11, and 7.2% of grade 12 pupils are repeating grade 12.

In the Gauteng province, 85.4% of 16–18-year-olds attend educational institutions, and 2.2% of children with special needs aged 7-15 are not enrolled. The lack of household income and financial constraints in the province is evident in the high number of learners in public education not being able to pay school fees. Some 55.9% of learners in public schools do not pay school fees, and 46.6% of learners in schools receive social grants. The high rate of learners earning social grants in the province reflects the lack of income in households.

Table 3.11: Education indicators in the Gauteng province (2020)

Indicator	Gauteng
Age-specific Enrolment Ration (ASER) expressed in percentage	
Primary	99.7
All	96.1
Repetition rate (RR) Grade 10	18.7
Repetition rate (RR) Grade 11	15.4
Repetition rate (RR) Grade 12	7.2
% of 16-18-year-olds who attend any institution	85.4
% of children with special needs aged 7-15 NOT enrolled in educational institutions	2.2
% of learners in public schools that do not pay school fees	55.9
% of learners in school receiving social grants	46.6
Numbers of learners enrolled (16-18) in any institution N ('000)	531

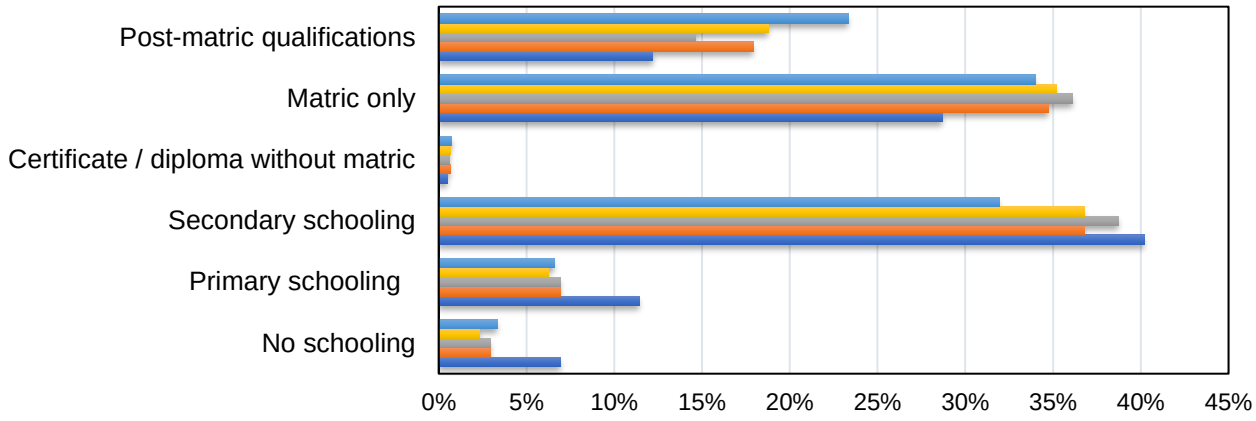
Source: Statistics South Africa, 2020

The exorbitant cost of tertiary education significantly impacts pupils' inability to attend tertiary institutions after completing secondary education, as 61% of youths aged between 18-24 years in the Gauteng province do not have the financial means to continue with education. This is significantly higher than in other provinces throughout South Africa (South African Market Insights, 2020).

The exorbitant costs of tertiary education and acquiring a tertiary qualification do not necessarily result in employment. Research reveals that individuals aged between 22 to 29 who have completed tertiary education struggle to find jobs in the province. In the Gauteng province, education doesn't guarantee a job, money, or a "better" life. It also doesn't mean those students will leave the townships and shacks where they grew up. If a university graduate gets a good job and makes money, they might add to the shack they dwell in or improve it (TISO Skills Fund, s.a.).

Education in Gauteng is fundamental to the growth and development of individuals, the provincial socio-economic status, and the nation. The statistics of early childhood learning programmes, primary, secondary and tertiary education exemplify the mammoth task encountered by the provincial government responsible for managing the province's educational system and providing basic education to learners across the Gauteng province.

Figure 3.14: Levels of education for the population aged 20 years and older in Gauteng



	No schooling	Primary schooling	Secondary schooling	Certificate / diploma without matric	Matric only	Post-matric qualifications
City of Tshwane	3%	7%	32%	1%	34%	23%
City of Johannesburg	2%	6%	37%	1%	35%	19%
Ekurhuleni	3%	7%	39%	1%	36%	15%
Gauteng	3%	7%	37%	1%	35%	18%
National	7%	11%	40%	0%	29%	12%

Source: IHS Global Insight, Regional eXplorer, 2020

A population with a low level of education has fewer alternatives and is more likely to be unemployed. Figure 3.14 is a breakdown of the metropolitan municipalities and levels of education. City of Tshwane has the most significant percentage of the 20-year-old population with post-matric qualifications (approximately 23%), compared to the national average (about 12%), Gauteng (about 18%), City of Johannesburg (about 19%), and Ekurhuleni (approximately 19%). Inadequate education also limits the population's ability to engage meaningfully in society. This is evident in 65.6% of 22-25-year-olds who have completed grade 12 or above. The reduced number of people who have completed grade 12 or above diminishes the portion of the population eligible for university education, leading to increased inequities in the distribution of wealth and opportunities. A reduced level of education increases individuals' difficulty in securing professional jobs and receiving associated pay, increasing the reliance on social security.

3.4.1.5 Overview of food security in the Gauteng Province

The Gauteng province, one of the smallest but wealthiest provinces in South Africa with a thriving, highly urbanised economy, is Africa’s economic and financial hub (par 3.2). The City of Johannesburg is one of the world's largest cities and the province's central city (par 3.3). The progressive province is riddled with inequality, poverty and hunger, with over two-thirds of the Gauteng province’s population being vulnerable to food insecurity and malnutrition, with the marginalized, excluded, disadvantaged and neglected urban poor bearing the brunt of the burden imposed by the densely populated province (South African Market Insights, 2020). Food insecurity is a significant contributing factor to poverty in the province, as malnutrition and food insecurity are coupled with urbanisation (par 3.4.1). In addition, changes to the global climate continue to exacerbate the province's significant social, health and economic conditions causing a further burden on the province that cannot afford to absorb the economic burden (Schäffler & Abrahams, 2021).

The highly urbanised province is home to millions of South Africans. The rapid rise and inflow of migrants from other provinces, countries and continents has led to an increased prevalence of food insecurity. Between 57%-70% of the population in the Johannesburg region suffers

from malnutrition due to the unavailability and scarcity of food. Similar patterns of food insecurity may be seen throughout the Gauteng province. Over 10% of Gauteng's population lives below the food poverty line. This significantly increased from 7% in 1995 (Schäffler & Abrahams, 2021). This is a direct result of the increased population growth experienced by the urban poor who reside in informal settlements on the outskirts of the urban areas in Gauteng. Three-quarters of the urban poor in Gauteng said that they eat less than three meals a day, with 20% of households missing a meal for more than a year because they lack the financial means to purchase food (Alexander, 2021).

Changes in the global climate, socio-political and socio-economic factors continue to play a significant role in the scarcity of food in Gauteng, as climate change, which has had a negative impact on vulnerable and susceptible farmers, causes a reduction in output and critical food distribution infrastructure, is a crucial contributor to food supply constraint in Gauteng. More than 70% of Johannesburg households source food from informal markets at least once a week, 94% of Gauteng respondents do not have access to natural resources - trees for fruit production and/or water for irrigation and fishing and 99% of Gauteng residents do not have access to communal land for farming (Kraja & Osmani, 2015).

By expanding access to local communal land designated for agricultural purposes through urban food landholding, several families may be able to produce their own food and supplement their meals. This would encourage and stimulate subsistence farming(Statistics South Africa, 2021b). Creating room for informal food merchants in urban areas might help lessen dependence on more costly substantial supermarket chains. Socio-political and socio-economic factors are also crucial contributors to the deterioration of underprivileged vulnerable, and marginalized communities, contributing to food insecurity in the province. This is evidence of a cascading effect of the consequences of food insecurity on public health, human development, economic growth, and social stability.

The effects and impacts of food insecurity have a detrimental impact and a negative effect on public health, causing greater resistance and vulnerability to infectious diseases such as

tuberculous and human immunodeficiency virus (HIV/AIDS) and several other high-risk non-communicable diseases such as heart disease, hypertension, diabetes and cancer (Statistics South Africa, 2021c). Food poverty and hunger severely affect human development, resulting in delayed mental and physical development (Statistics SA, 2019). Low employability, productivity, and low educational attainment are direct consequences of early childhood malnutrition. These consequences have been evident at provincial and national levels for over 30 years. Food insecurity and hunger also significantly impact social instability, creating a volatile social and political environment likely to intensify civil unrest and crime.

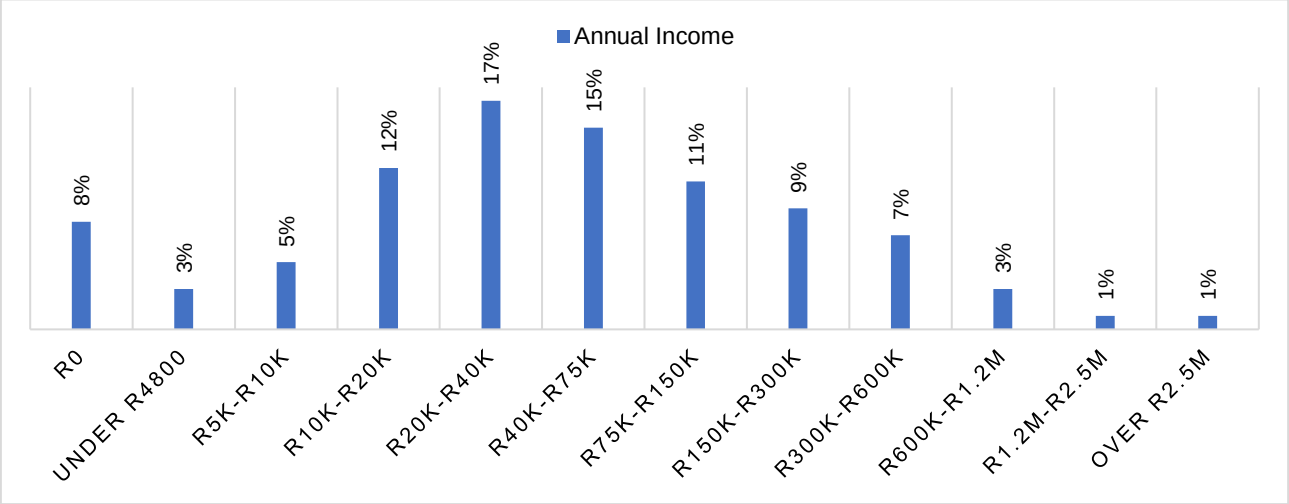
3.4.1.6 Overview of annual household income in Gauteng Province

Annual household income in the Gauteng province is a fundament contributing factor and risk measurement tool. Household income is a valuable economic measurement used to measure the level of life in a specific location. The median household income is a commonly cited economic statistic (Szirmai & Verspagen, 2015). The primary determinants of household income include the age and gender profile of the household, the size and composition of the household, the health, education, social capital and social status of the members of the household, as well as the current endowments, assets, retirement accounts, welfare payment and investment returns of the members within that household. The annual household income also includes the level of employment, wages, salaries, commissions, shares and director's fees in the household. These primary determinants are some of the most important elements influencing household income (Szirmai & Verspagen, 2015).

In the Gauteng province, the average annual income, as depicted in Figure 3.12, is R57 500. This figure is almost twice as much as the South African annual income of R30 000. Figure 3.15 indicates that over 8% of the Gauteng province population does not earn an income, and 3% of the population in Gauteng earns an annual income of less than R4800. 4% of the population in the province earn between R5 000 and R10 000, and 11% earn R10 000 to R20 000. Most (20%) of the Gauteng province population earn between R20 000 and R40 000. A tremendous percentage decrease in the annual income between R300 000 to R1.2 million,

and only 1% of the total population earn between R1.2 million and R2.5 million, and another 1% of the population in Gauteng earns over R2.5 million in the province.

Figure 3.15: Annual Income (Gauteng Province)



Source: (Statistics South Africa, 2021c)

Inequalities in income levels between various income groups are evident in Figure 3.15. This further illustrates the inequalities in the province, and the average annual income depicted in the figure has a direct relationship with poverty rates. This may also be seen in the province's Gini coefficient, which has been reported to be higher than 0.62, which is relatively equal to the Gini coefficient of South Africa (0.63). A Gini coefficient 0.62 is among the world's highest rankings (OECD, 2002). Based on the research conducted by Taljaard (2007), the Gini coefficient of the province ranges between 0 and 1, with countries or regions with a low degree of inequality typically falling between 0.2 and 0.3 and countries or regions with a high degree of inequality falling between 0.55 and 0.7 (OECD, 2002).

Significant income discrepancies exist among the three metropolitan municipalities in the Gauteng province. The larger Johannesburg metropolitan municipality is often believed to be the nation’s economic capital and financial powerhouse, with higher earnings than any of the other two metropolitan municipalities. However, this may not be the case as Ekurhuleni, in particular, demonstrates a surprisingly high concentration of wealth (Rani, Mishra,

Krishankumar, Ravichandran & Kar, 2021; Statistics SA, 2019). The statistics below describe how each metropolitan municipality has its own distribution pattern and earnings trend despite their closeness to one another.

According to the research, an estimated quarter or 25% of the employment opportunities in Tshwane compensate workers approximately R3,300 to R6,500 per month. This is the highest salary band compared to the adjacent metropolitan municipalities in Gauteng (Statistics South Africa, 2021b). However, the City of Johannesburg accounts for over 23% of the positions in the Gauteng province. Tshwane's salary distribution is skewed somewhat, suggesting that a slightly bigger proportion of work possibilities exist in the upper-income bands. This is expected since many Diplomatic Missions, National Government Departments, Parastatals and Non-government organisations have headquarters and offices in the City of Tshwane. According to the research, Ekandustria has been designated as the region with the highest median household income. Areas such as Akasia, Mabopane, and Roodeplaat are all within striking distance of this location and closely resemble similar annual incomes (Statistics South Africa, 2021c). Many middle-income households characterise centurion, whereas lower-income households are living in and around Ekangala, Hammanskraal, and Mamelodi.

The distribution in the City of Johannesburg is considerably more skewed, with more than half of the population earning more than R51,200 per month. The City of Johannesburg has the most significant percentage of workers in all upper salary categories. This is likely a representation of the city’s prominence as South Africa's economic epicentre, as seen by many corporate headquarters – where employees would be compensated significantly more causes employees are located in the city. The highest median income is found in the corridor from the City of Johannesburg’s central business district to Sandton and Rosebank. In general, median incomes are higher in the northern section of the City of Johannesburg, specifically focusing on Midrand and Waterfall, sections of Witkoppen, Modderfontein, Florida and surrounding areas, and the Bryanston area. In the City of Johannesburg, sections of Orange Farm, Sydenham, the surrounding area of Soweto, and substantial sections of Roodepoort have much lower median incomes (Statistics South Africa, 2021b,c).

The City of Ekurhuleni accounts for a fourth (25%) of the employment opportunities in Gauteng. The metropolitan municipality compensates workers between R6,500 and R12,900 per month, much more than the national average. This is a larger percentage than in any other major metropolitan municipality in Gauteng. The City of Ekurhuleni illustrates a higher concentration of employment opportunities with salaries over R12,900. Workers are compensated between the R25,600-R51200 salary bracket, whereas the City of Johannesburg has the greatest proportion of workers (Biney *et al.*, 2020). This is predominately due to the industries operating in the City of Ekurhuleni and the compensation attributed to those industries.

The research by Statistics South Africa (2021b) discusses that the airport and sections of the Kempton Park central business district have the highest median incomes in the country. The Germiston central business district's median income in Midstream and Wadeville areas have significantly higher income levels. Nevertheless, the median income in the remainder of the metropolitan municipalities is consistent across all regions (Statistics South Africa, 2021b). This indicates that the wealth distribution patterns in the three metropolitan municipalities differ significantly.

3.5 Overview of economic sectors in the Gauteng province

The province of Gauteng is the largest contributor to South Africa's GDP (par 3.2), with industries such as communication, financial service, logistics and mining attributing a significant portion to the GDP of Gauteng and South Africa, respectively. The province's manufacturing industry comprises approximately 10 000 business that employs more than half a million people.

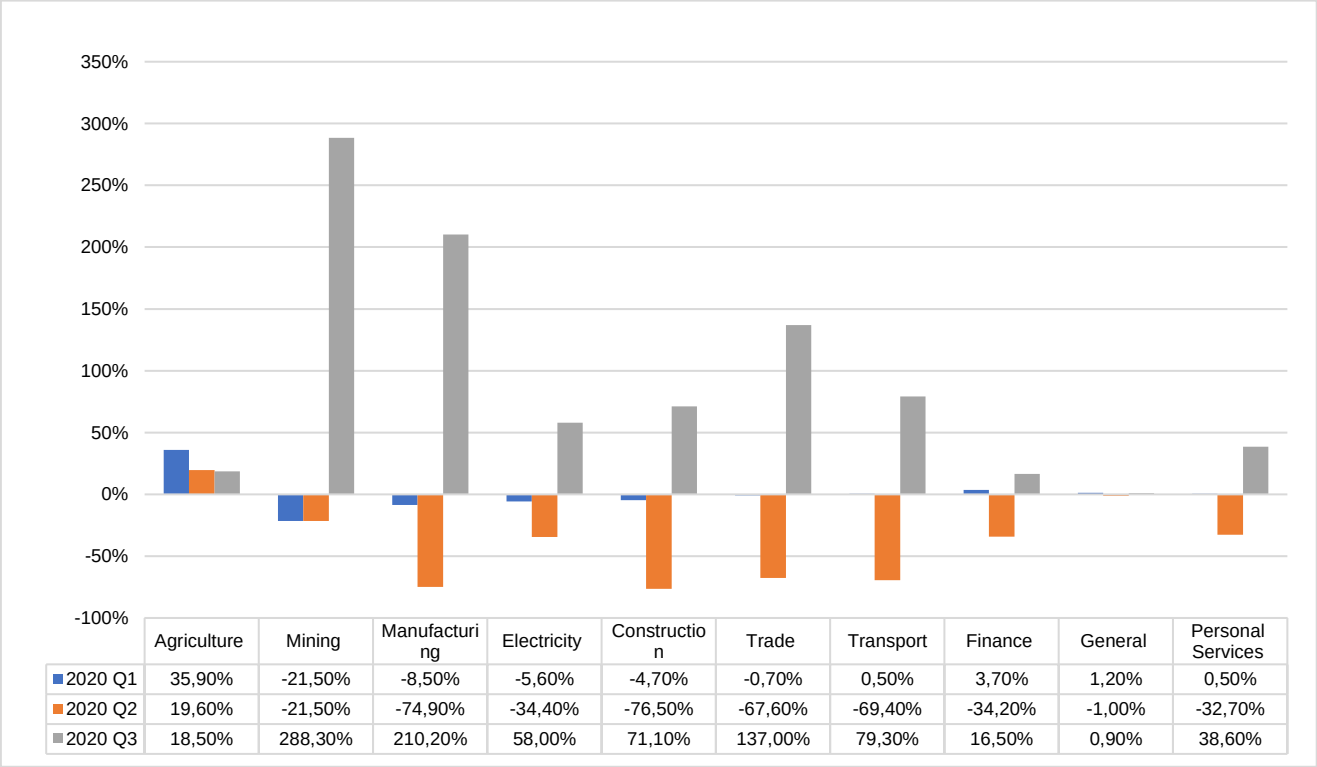
Electrical supplies and appliances, chemical goods, basic steel and iron and fabricated and metal products, machinery, food, motor vehicle components and accessories, and electrical equipment are some of the most prominent industries in the country. The province's economy is transitioning from conventional heavy manufacturing sectors to low-value-added manufacturing in support of specialized high-value-added production, such as telecommunications, information technology, and other high-tech sectors. The

Johannesburg Stock Exchange, the largest stock exchange on the African continent, has its headquarters in the Johannesburg suburb of Sandton.

The province remains the country's and the subcontinent's economic powerhouse and financial capital, accounting for approximately 34.8% of the nation's gross domestic product (par 3.2.1). The province continues to serve as the focal point for South Africa’s industrial and commercial sectors. The real estate, financial and business services industries, general government services, and manufacturing are some of the most prevalent industries contributing significantly to the province and continent.

South Africa's Gauteng province is often recognized as the Financial Services and Investment Management Capital of Africa. This results from the province being home to approximately 70 international financial institutions, stockbrokers, banks, and insurance mega-corporations. The Gauteng proGauteng's mineral production output is dominated by gold mining, which accounts for 80% of the total production. Gauteng is home to the main diamond and gold mining companies, including De Beers and Anglo-American. All have headquarters in Johannesburg, the largest being the Anglo-American Gauteng mine (Statistics South Africa, 2021b).

Figure 3.16: Sector Output Growth 2020Q1-2020Q3



	Agriculture	Mining	Manufacturing	Electricity	Construction	Trade	Transport	Finance	General	Personal Services
2020 Q1	35,90%	-21,50%	-8,50%	-5,60%	-4,70%	-0,70%	0,50%	3,70%	1,20%	0,50%
2020 Q2	19,60%	-21,50%	-74,90%	-34,40%	-76,50%	-67,60%	-69,40%	-34,20%	-1,00%	-32,70%
2020 Q3	18,50%	288,30%	210,20%	58,00%	71,10%	137,00%	79,30%	16,50%	0,90%	38,60%

Source: Quantec EasyData, 2020

Figure 3.16 and Table 3.13 illustrate the sector output growth in the first and third quarters 2020. Several of South Africa's economic sectors have seen a decline in production for several quarters. The mining sector has been declining for a comparable period. This trend could be attributed to the losses or declines incurred in extracting gold and platinum (National Treasury, 2021). The pandemic has significantly impacted various sectors of the economy. The global pandemic severely affected mining, manufacturing, commerce, transport, and construction sectors, particularly in the second quarter of 2020. In Figure 3.13, contractions between 67.6% and 74.9% quarter-on-quarter are evident during the second quarter of 2020.

Output recovered in the third quarter; the largest rebound was experienced in the manufacturing, mining, and trade industries. The manufacturing industry rose at an annualised rate of 210.2 per cent, driven mainly by increased production of basic metal products, petroleum, vehicles, and food and beverages. The mining industry expanded at a rate of 288.3

per cent. Trade and industry increased at a rate of 137.0 per cent. However, industries are performing below the levels of production seen before the pandemic (National Treasury, 2021).

Table 3.12: Sector Output Growth (2019-2020)

Sector	Share of total GVA (2020)	Size of Sector (ZAR billion)		Growth Rate	
		2019	2020	Change	2020
Agriculture	0.5%	4.2	4.7	0.6	16.6%
Mining	2.1%	23.7	22.3	-1. 4	-16.5%
Manufacturing	14.8%	155.9	135.2	-19.6	-10.0%
Electricity & Water	1.8%	20.4	18.6	-1.8	-17.2%
Construction	3.4%	35.9	31.3	-4.6	-10.4%
Trade	13.0%	139.9	120.0	-19.8	-11.7%
Transportation & Communications	9.9%	103.3	91.2	-12.1	-9.1%
Finance	29.3%	282.5	269.9	-12.6	-1.7%
Government Services	25.3%	251.4	233.1	-18.3	-4.7%

Source: IHS Markit, 2020

The transmission of the virus has had a considerable influence on operations in various sectors of the economy, particularly for those who were regarded as non-essential in their operations. For example, some manufacturing and commerce industries were deemed non-essential, as were the construction, transportation, and telecommunications sectors. Activity in these industries was effectively suspended as a result of this situation.

The industries that were most vulnerable to a fall in demand and closure limitations are the ones that are expected to have experienced a significant reduction in production in 2020. According to calculations, manufacturing production, which accounts for around 15% of Gauteng's total gross value added (GVA), is predicted to have declined by 10% in 2020.

According to current estimates, production in the commerce industry is expected to have declined by 11.7%, or ZAR19.8 billion, between 2019 and 2020. Agriculture is the sole industry whose production is expected to have increased by 16.6% in 2020, partly due to excellent weather conditions. Among the most hard-hit industries are construction, transportation, and telecommunications.

3.6 Overview of the National Infrastructure Plan 2050

The development of infrastructure is crucial to the achievement of South Africa's long-term social and economic objectives. Public administration must take the initiative whenever a developing nation seeks major structural transformation. Infrastructure delivery is expected to be the most prominent contribution to South Africa's shift from a traditionally closed resources economy to an internationally and provincially linked one. South Africa aims to be an inclusive country that supports dynamism in emerging sectors with considerably low carbon emissions, and infrastructure investment is crucial for eradicating geographic and regional socio-economic inequalities whilst improving the productive capacity and ensuring radical innovation and the creation of new job-creating industries. In this regard, infrastructure development is one of the non-negotiable pillars of change and inclusive growth and development. The creation of infrastructure development creates sustainable jobs and provides opportunities for broad-based black economic empowerment. This contributes eminency to greater achievement of the National Development Plan's (NDP) objectives.

The National Development Plan aims for a 30 per cent (%) investment-to-GDP ratio. The local, provincial and national government's resources will generate a third of that amount. Provincial and municipal governments and state-owned corporations (SOEs) are the primary service delivery methods. Approximately 10% of all expenditure channels are through the national government. Between 2016-2040, it is predicted that the cost of providing infrastructure to satisfy NDP development targets would surpass R6 trillion, with the transportation and energy sector expenditure contributing approximately 72% of total spending.

According to the in-depth detailed evaluation of state-owned institutions and the public sector's infrastructure delivery and performance, the National Planning Commission (NPC) published the 2020 Review of Economic Progress report. During the evaluation process, it was discovered that the delivery of public sector infrastructure falls short of the level necessary to achieve the NDP's goals. The National Planning Commission gives constructive and specific suggestions for course correction. The NPC National Infrastructure Plan 2050 (NIP 2050) is intended to provide the groundwork for realising the vision of equitable development. The plan aims to provide the strategic vision and direction that will translate into achievable initiatives and intermediate achievements. Recognizing and removing institutional obstructions and deficiencies preventing long-term performance and achievements from fostering innovation in infrastructure projects is essential. It is also necessary to continue providing guidance and direction on establishing strategic institutions capable of delivering on NDP goals, objectives and targets.

The National Infrastructure Plan 2050 continues to emphasise the most significant activities that national, provincial and local governments will take to achieve sustainable improvement in public infrastructure delivery.

3.6.1.1 Background on Gauteng Infrastructure Development

Following the introduction of democracy in South Africa, the country became an active global state that had to be developed to world-class standards in order to accommodate global patriots and various businesses that have the potential to invest in the country. The South African government embarked on numerous infrastructure development projects and programmes to ensure the standard of the South African infrastructure and the country's whole (Zingoni, 2020) is elevated. This resulted in several infrastructure development projects and programmes being introduced to develop the infrastructure (Liedtke, 2018) so that it may be sustainable and utilized not only by the citizens but also to form part of economic development and provide social upliftment in the country.

In the South African government's plight to address economic challenges and empower SMEs, they adopted a National Infrastructure Development Plan in 2012. The plan intends to transform the country's economic contribution and landscape whilst implementing significant infrastructure development programmes composed of three components: (1) renovation of existing buildings, (2) the building of new building construction, and (3) initiation of civil engineering projects. Through the provision of the National Infrastructure Plan adopted by the government, approximately 850 billion Rands would be invested annually to improve healthcare facilities, schools, water, housing, sanitation and electrification.

Infrastructure development programmes are one of the most significant contributors in the South African economic sectors, these programmes contribute approximately 9% to the overall South African GDP, and this is significant because it is a percentage of the GDP of South Africa that is important given the number of jobs created and the economic activities that infrastructure development programmes contribute. Infrastructure development programmes continue to contribute to and empower individuals with different skill sets and employ approximately 1.3 million people (Zingoni, 2020). The contribution of this programme dramatically impacts a country that battles with challenges of poverty, unemployment and inequality. Many SME and construction companies have been co-opted into developing and assisting in various infrastructure programmes. As a result, a company may employ many South Africans by providing them with sustainable and proper employment and skills that align with the National Infrastructure Development Plan and National Skills Development Plan.

The impact of the pandemic has resulted in the effectiveness of the delivery of projects and the national agenda regarding employment creation and economic growth, as infrastructure development programmes are predominately dependent on human resources used to deliver projects. However, economic disruptors such as the pandemic, natural disasters, socio-political and the Russia-Ukraine conflict that has impacted the entire globe have resulted in some South African infrastructure development projects and programmes being adversely or halted. Commonly infrastructure programme delays are a common phenomenon. Usually, there are many reasons to experience a delay in infrastructure, as the pre-design, design and execution

phase usually leads to time overrun in work. Completion of infrastructure projects on time seems to be challenging tasks in large-scale projects, and it has been observed that about 90% of government infrastructure projects fail to achieve on-time completion (Krishna and Nisha, 2020: 79). These delays are a common occurrence, especially as a result of the pandemic.

3.6.1.2 Impact of the economic disruptors on Infrastructure Development Programmes

The South African economy is not immune or insulated from global forces and issues affecting the world. Like the rest of the world, South Africa has been impacted by the worldwide pandemic, natural disasters, socio-political unrest, and the Russia-Ukraine conflict**.** These economic disruptors have greatly affected infrastructure development programmes (par 2.8.7). This has resulted in various infrastructure projects being temporarily halted or completely stopped as projects are no longer economically viable or lack human and financial resources are no longer available to implement those projects effectively.

The impact and effect of external factors, such as those that the country is experiencing currently with the economic disruptors, have necessitated the use or the need for processes and practices, such as the implementation of technological changes to adapt to what the environment has directed the global and South African market too. In different sectors, including infrastructure and technology, the way projects are procured today has changed. This situation leads to several problems, where a long-standing and deep-rooted managerial perspective and how infrastructure projects are executed may result in a significant gap in understanding new agile techniques (Maulik, 2019). The utilisation of processes, such as change management due to the impact of a pandemic, necessitated the need for infrastructure development projects or programmes to adapt and change.

A change management process which is defined as a systematic and structured process that enables businesses to adopt a change so that objectives are realised (Creasey & Hiatt, 2015), ensures that new approaches effectively align and adjust to sustain business and promote further growth (Creasey & Hiatt, 2015). Change management processes such the Kurt Lewins

(Connelly, 2016), Mc Kinsey sevens (Recklies, 2007), and John Kotters (Rose, 2002) models have been trailed and tested through implementation in various projects and programmes, and change is prevalent to all organisations operating in a business market; whether profit-driven or non-profit driven. The influence on change, directly or indirectly, will manifest as circumstances pushing for the transition to occur.

A change management process is essential and will ensure infrastructure development programmes are able to adapt to changes in project management processes that external factors have necessitated. A change management approach necessitated by the impact of the pandemic requires a paradigm shift in management processes for the effective attainment of set objectives. This, therefore, requires a strategic approach to deal with project management that is cognisant of external factors that impact projects and the delivery thereof.

3.7 Chapter conclusion

In this chapter, a brief overview of the South African economy and an overview of the socio-economic and economic profile of the Gauteng province was discussed. The structure examined specifically referenced the province's population, health, social security statistics, provincial economic structure, provincial economic performance and poverty level (par 3.2). Understanding the sociodemographic factors is imperative for the study. It forms a foundation for understanding the reasons for the development or underdevelopment of the province's infrastructure development concerning the economy (par 3.3.1).

The overview provided in this chapter was critical for this study as it established the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles that currently exist in the province. This was imperative for the development of the study framework. The Gauteng province’s current socio-economic and economic profile (par 3.3.2) and status explored in this chapter offered contextualisation of the province's level of development. Furthermore, the province's socio-economic and economic review provided valuable information on the condition of the province, challenges, and difficulties that exist in

the province (par 3.6.1), assisting in holistically understanding the various industries that exist and the impact that infrastructure development projects have within the province.

3.8 Chapter Summary

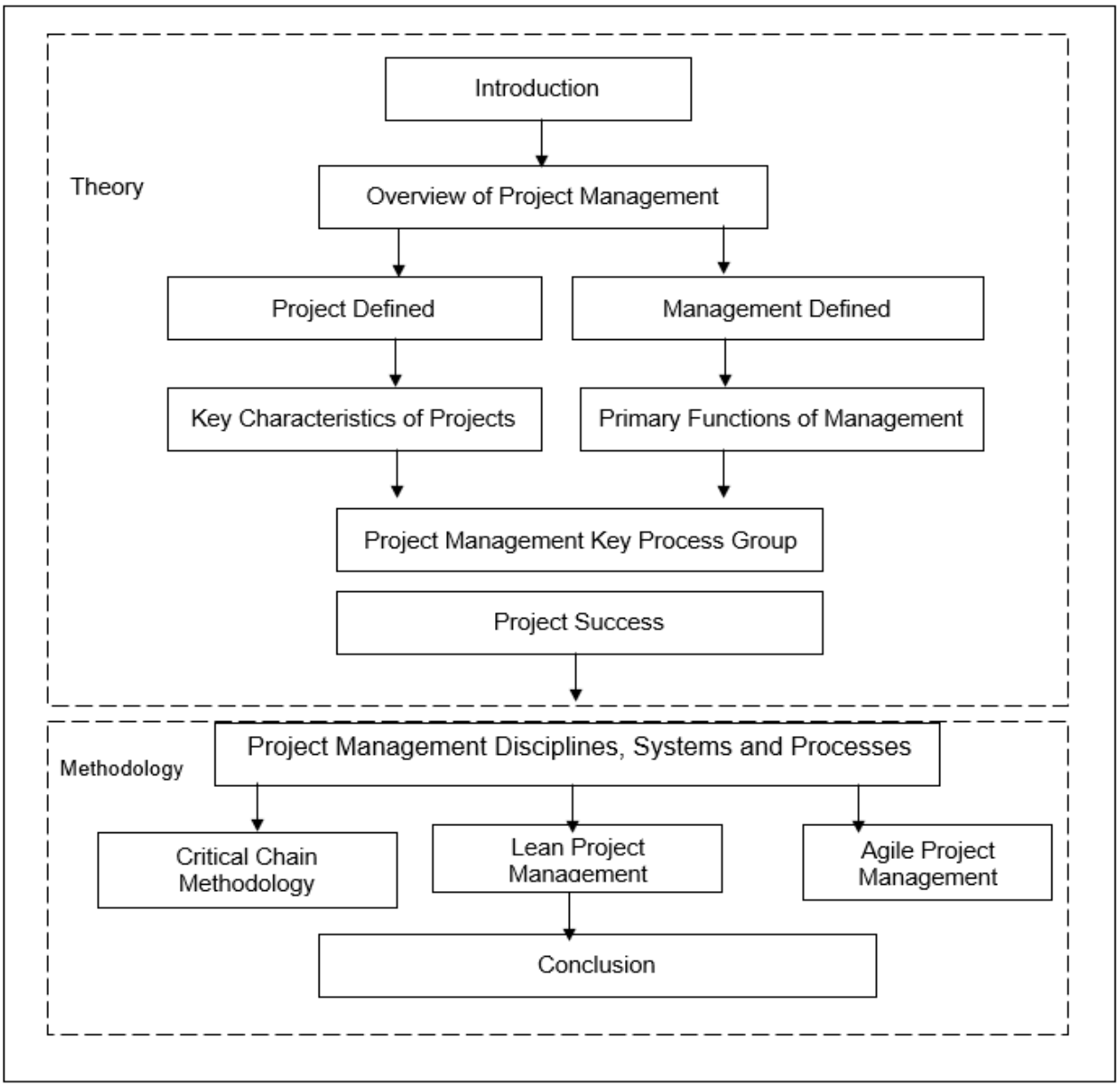
Chapter a brief overview of the South African economy and an overview of the socio-economic and economic profile of the Gauteng province (par 3.2). Chapter four will provide an analysis of project management. This will include the various project management methodologies that exist globally.

Chapter four will further outline the importance of project management as a fundamental aspect and discipline of planning and executing tasks and activities in an organized and systematic way to achieve goals and milestones within a certain period within certain budgetary constraints. Chapter four will also refer to the systematic process of initiating, planning, executing, monitoring and controlling, closing and evaluating the effectiveness of an activity set within the parameters of what is classified in a scoped activity.

4. CHAPTER 4: PROJECT MANAGEMENT UNPACKED

4.1 Introduction

Figure 4.1 Structure of Chapter 4



In chapter three, a brief overview of the South African economy and an overview of the socio-economic and economic profile of the Gauteng province were discussed. The

Gauteng province's current socio-economic and economic profile and status were also explored to contextualise the province's level of development. Furthermore, the province's socio-economic and economic review provided valuable information on the condition of the province, challenges, and difficulties that exist in the province, assisting in holistically understanding the various industries that exist and the impact that infrastructure development projects have within the province.

Chapter four will further outline the importance of project management (par 4.3) as a fundamental aspect and discipline of planning and executing tasks and activities methodically and systematically to achieve goals and milestones within a certain period within certain budgetary constraints (par 4.4.1). This chapter will also refer to the systematic process of initiating, planning, executing, monitoring and controlling, closing and evaluating the effectiveness of an activity set within the parameters of what is classified in a scoped activity.

4.2 Overview of project management

Project management is a broad term that encompasses a wide range of disciplines (Harned, 2021; Murray-Webster, 2019). A simple definition of project management would be the application of processes and skills to achieve a specific project objective per the project acceptance criteria while working within the agreed deliverables and constraints. According to Ceri *et al.* (2021), project constraints should be completed within the boundaries of timeline and budget (Ribeiro and Fernandes, 2010; Vukomanovi *et al.,* 2021). Over time, the theoretical foundations of project management have evolved and progressed. As a result of these ideas, several principles have been developed. This is supported by the statement of Koskela & Howell (2002) that there are many principles by which a project is managed. Additional techniques, practices, and approaches that may be utilized with different project management methodologies to organize a project to assure the best possible performance or delivery of a final deliverable or product are also available for consideration (Warburton & Cioffi, 2014). This chapter will discuss the most widely used project management principles.

Every project has specific qualities and traits that are unique to it, and these characteristics are only temporary. Unlike routine operations in an organization (Ceri *et al.,* 2021; Melo Salerno, Freitas, Bagno & Brasil, 2021; Witz *et al.,* 2021), projects are defined as a specific set of operations designed to accomplish a singular goal (Project Management Institute, 2020). All projects are established and designed to deliver a unique service, product, or result (Ceri *et al.,* 2021; Melo, 2021; Witz *et al.,* 2021). Project management approaches may be dated back to the beginning of time, and "project management has been practised for as long as mankind has inhabited the planet," according to the Project Management Institute (Seymour & Hussein, 2014). Many historical records have been of project complexity, uncertainties, successes, and failures. However, some past projects may not have been conceptualized, classified, collated, or methodical (Buehring, s.a.; Koskela & Howell, 2002; Morris, 2011; Seymour & Hussein, 2014). Historically projects necessitated an enormous workforce, large scope, many years of work, advanced planning and precise execution. Despite the historical and monumental accomplishments, there is relatively little record of the methods and procedures to be found (Seymour & Hussein, 2014).

In the 1900s, project management ideas, procedures, and techniques began to emerge (Adobe Eperience Cloud, 2021; Buehring, s.a.; Delisle, 2020; Ika, Söderlund, Munro & Landoni, 2020b; Keinz, Hienerth, Gemünden, Killen & Sicotte, 2021; Martinsuo & Geraldi, 2020; Stefan, Hurmelinna-Laukkanen & Vanhaverbeke, 2021) and some project management professional organizations have developed, tested, and modified these new approaches to stay up-to-date with the expanding field of project management. As theories, project management methodologies such as PRINCE2, Project Management Institute (PMI), Project Management Body of Knowledge (PMBOK), Lean, Six Sigma, Agile, and Goal Directed Project Management are some of the methodologies that continue to dominate the project management methodology spectrum as theories that have been widely published and researched to ascertain the reliability in terms of delivering projects.

According to Richardson and Jackson (2018), all projects fit the same conceptual model with only degrees of variation across the elements, and all project management

methodologies involve dichotomizing the total transformation hierarchically into more minor transformations and tasks and minimizing the cost of each task independently (Koskela & Howell, 2002). Project management, as a process crucial to teams and organizations, comprises identifying the scope, timetable, budget, and resources necessary to generate the desired output, according to the Project Management Institute. Within these constraints, functioning requires a combination of mapping and selecting a precise and effective project management methodology, which involves using *"knowledge, skills, tools, and methods of project operations to achieve the project objectives"* (PMI, 2017).

It is essential to human and commercial activities to undertake projects and project management (PM). The project management approach is a key delivery mechanism for all human endeavours, according to Pinto (2010), and projects are the principal means through which people transform their reality. Project management concepts are used in planning and executing events to attain a particular purpose.

The combination of two ideas, namely project and management, has given existence to the phenomena known as project management, which has successfully combined the two knowledge fields, including the numerous principles and aspects that have existed. The notion of project management has been defined, articulated, and understood successfully. This article will begin by defining project and management to address the abovementioned issues. This should consider the term's historical conception, the numerous theories that have grown through time, its relevance to humankind, and the value it contributes as a strategic instrument.

4.3 Definition of a project

A project is a detailed objective and goal outlined through structured planning and implementation using other available resources and employed with the sole intention and purpose of achieving the set objective and goal. All projects are transitory efforts to add value by creating a one-of-a-kind product, service, or outcome; all projects have a start and an end (Project Management Institute, 2020). This statement emphasises that a project is

recognized as a temporary assignment with a specified objective and a set of qualities that separate project assignments from recurring activities, which is universal to all definitions (Hussein, 2019).

A project, according to Kerner (2017), is considered to be any series of activities and tasks that:

- have a specific objective, with a focus on the creation of business value, to be completed within certain specifications
- have defined start and end dates
- have funding limits (if applicable)
- consume human and nonhuman resources (i.e., money, people, equipment)
- multifunctional (i.e., cut across several functional lines

The result or outcome of the project can be unique or repetitive and must be achieved within a finite period.

According to the Project Management Institute (2020), each project comprises a team, a well-specified budget, a predetermined timeline, and a clearly stated level of expectation and standards that each team must fulfil. It is the unique character of a project that distinguishes it from the everyday activities of an organization. This is attributed to the reason that each individual project concludes only after the project's purpose has been accomplished. The term "project" has been defined in various academic contexts, and definitions have evolved over time. Still, they have remained consistent in their focus on the critical elements of a project: a clear objective or goal must be accomplished at a particular time using specific means and resources. The following definitions contribute to the academic catalogue of how to define a project:

- According to Prince 2, a project is defined as a temporary organization established to provide per an agreed Business Casper
- Kaizen is a lean manufacturing tool and a lean project management approach that focuses on continuous improvement and is used in the manufacturing industry.

The Kaizen methodology improves productivity, quality, safety, and workplace culture defines project management as (do Doanh, 2017) lean project management, which focuses on delivering value from your customer's perspective by cutting down waste (Morris, 2011) and ensuring continuous improvement through project efficiency and providing more with less.

- An iterative method of planning and steering project activities is called Agile project management. Iterations are little parts of work that are performed in succession (Raharjo & Purwandari, 2020).
- According to the British Standard ISO 10006(1997), a project is defined as a unique system consisting of a set of coordinated and controlled activities with start and complete deadlines, undertaken to achieve an objective conforming to specific requirements, including time, cost, and resource constraints (Al-Hajj *et al.*, 2018).
- In 2003, the International Organization for Standardization (ISO, 2003) published an International Standard that gives guidelines on quality in the project management process. According to the ISO guidelines for quality management and project, a project is defined as a unique process comprised of a sequence of synchronised and controlled activities with beginning and completion dates, conducted to accomplish the goals and objectives whilst meeting specific requirements, such as those related to time, cost, and resources, as part of the ISO guidelines for quality management in projects.
- According to the Association for Project Management (APM, 2021), a project is a distinctive, ephemeral endeavour undertaken to attain the intended result.
- In the words of the International Project Management Association (IPMA, 2002), a project is described as a cost and time-constrained operation to actualize a set of specified deliverables following quality standards and requirements.
- According to the British Standards Institute (2021), a project is a unique set of collaborations, with defined starting and finishing points, undertaken by an individual or organization to meet specific objectives with defined schedule, cost, and performance parameters.

- A project is defined as a unique set of coordinated activities, with defined starting and finishing points, undertaken by an individual or organization to meet specific objectives with a well-defined schedule, cost, and performance parameters (BS6079-1: Guide to Project Management).

4.3.1.1 Key characteristics of a project

The essential characteristics of a project must be clearly defined once the different definitions of a project have been examined. This will allow a project's uniqueness and any project offer to be clearly identified and established. The characteristics of the project and the restrictions that exist in conjunction with the characteristics of the project allow the project to be completed within the specified time frame. The main characteristics of a project, as identified by various authors, are as follows:

A project has defined objectives with an ending time. The unique aspect of the project is that it is temporary with an inception and conclusion date., In line with this statement, each project must have a distinct beginning, a distinct ending, and a summary of what happened in between (Hussein, 2019; Picciotto, 2020 & (Galvin *et al.*, 2021).

Each project's offerings are distinct, generating something new, innovative and original. Each project is unique, creating something that did not previously exist (Richardson & Jackson, 2018); (Koskela & Howell, 2002a).

A project is a one-time operation that will never be repeated in the same manner again. This ultimately means that a project will never be performed in the same way again. The circumstances around the project are continuously changing, and the environment surrounding the project's planning, processing, and delivery either has changed or are changing, resulting in different project outcomes or delivery of the final project (Omezzine, 2019).

A project has limitations - A project operates under specific boundaries, namely project scope, schedule, people and resources (Warburton & Cioffi, 2014). This clearly reiterates the statement that a project is not process-driven and does not conform to a business-as-usual approach. Projects are frequently mistaken for processes, defined as a set of routine, established procedures used to carry out a particular function, such as expenditure reimbursement approvals.

For this research, the following synopsis of the concept of “project” will be sufficient:

- Projects can be thought of as any series of non-routine, unique, non-repetitive and temporary activities conducted to achieve particular, measurable goals in terms of cost, time and performance criteria;
- The unfamiliarity, scale, and variety of tasks involved in a project are examples of the complexity that distinguishes one project from another. Uncertainty is another distinguishing attribute of projects;
- Projects require the use of scarce resources;
- Projects may require the collaborative contributions of more than one organization, and projects may also involve the management of expertise, resources, and knowledge of several professionals, which must be coordinated through the boundaries of the multiple organizations involved;
- Projects are distinct from repetitive and continuous operational systems;
- Projects must be coordinated professionally, efficiently and effectively.

4.4 Definition of management

Management is a systems approach to planning, organizing, and regulating resources to attain a specific purpose or goal in an organized manner. Management is defined as the act of creating and sustaining an environment in which people working in groups may effectively achieve specific goals (Sethy, 2018). A more formal definition of management is how a cooperative group directs activities toward shared goals (Sethy, 2018). Management is used to achieve specified objectives by utilising individuals and other resources. This involves organizing issues, work, and activities in an organized way to

facilitate the successful completion of the activities considered significant and required to achieve the stated aim and objectives and achieve those goals.

Various definitions have detailed the notion of management, its aspects, and its principles, all of which have contributed to the body of knowledge in the management domain. Among the well-articulated definitions of management that help to understand the notion of management are those that include the following:

A management activity or task can be defined as an activity or task that involves cooperating with people, physical resources, and financial resources to achieve organizational objectives by carrying out the planning, organizing, leading, and controlling functions. Management can also be defined as a process or task involving working with human, physical, and financial resources to achieve organizational objectives by implementing policies and procedures (Megginson *et al.,* 1997).

Management is defined as the act of creating and sustaining an environment in which people working in groups may effectively achieve specific goals (Koontz & Weihrich, 2006) According to Kreitner (2009), the management process is collaborating with and through others to successfully accomplish organizational goals while using limited resources in a changing environment. It is evident that the concept of management is a structured approach that deals with how things are to be done through the five primary or general functions of management, namely, planning, organising, staffing, directing and controlling the set resources available for the set objectives and goals through effective and efficient implementation of processes required.

4.4.1.1 Five primary functions of management

As a major management function, planning is a forward-thinking or future-based activity that sets the organisation's general direction. Through this process, management will have an organized foresight of the organisation and a corrective hindsight process to guide the organization in its future direction. The primary objective of the planning process is to

identify suitable goals and activities to pursue and determine what tactics to utilize, what actions to take, and what resources are required to attain the goals. The planning process is divided into three stages (Davis, 2019). This method necessitates incorporating internal and external variables into management throughout the successful planning program, which is essential.

Limited development prospects owing to saturation necessitating diversification, changing patterns of the workforce, more complicated organizational structures, and decentralization (Kukreja, 2018) are examples of internal variables that exist and have a substantial impact on the planning process. External factors that exist and have a significant effect on the planning process include shortages of resources, both capital and material, general economic trends in terms of interest rates and inflation, dynamic technological advancements, increased governmental regulation regarding community interests, and unstable international political environments (Kukreja, 2018).

Managers need to have a well-structured process of delegation authority and a well-established flow system of how the delegation authority links and connects in an organized, coherent way to achieve the aims and objectives of their organizations. This process entails establishing worker relationships that enable workers to collaborate to achieve their organizational goals (Davis, 2019). It also entails providing tools, capital, raw materials, and personnel for the organization to function optimally and achieve its strategic goals, among other things. Organising should ideally include identifying the necessary actions to be accomplished and classifying those as required to achieve the desired results. Assigning obligations to employees while also clarifying respective responsibilities and power is essential. It provides authority and obligations available to employees while creating a link between their responsibilities and authority.

Furthermore, staffing is critical to every organisation's success because it includes attracting, training, developing, assessing, rewarding and keeping the best-qualified employees possible. Among the duties of management is the responsibility of ensuring that

employees in an organization, both managerial and non-managerial, are motivated via incentives or incentive programs designed specifically for the organization. Identifying and recruiting the most qualified candidates significantly affects and influences the whole management. It is critical to recruit and choose workers for jobs inside the organization (within teams and departments) (Davis, 2019). Following Kukreja (2018), the managerial function of staffing is concerned with proper and effective manpower planning for an organization's organizational structure, including the right and effective selection and development of individuals to fill the roles defined in the structure.

In an organization, the function of directing or leading is concerned with the provision of leadership, motivation, supervision, and constant communication by management to ensure that the employees can perform the duties and responsibilities delegated to them by management most efficiently and cost-effectively to achieve the goals and objectives of the organization (Megginson *et al.,* 1997). As part of this duty, managers are responsible for articulating a vision; energizing staff; inspiring and motivating individuals via vision, influence, persuasion, and effective communication skills (Davis, 2019). The leadership constituent's responsibility is to provide others commands, instructions, and directions. Furthermore, this entails guiding subordinates on methods and techniques. Communication should be a two-way process in any organization; it should encompass the exchange of expertise and information provided to subordinates and feedback received from subordinates. Motivation is important because highly motivated employees perform effectively even when given minimal direction from their superiors. Supervising subordinates would result in regular progress reports, reassuring supervisors that instructions were being followed and implemented appropriately.

Monitoring and controlling are managerial functions that evaluate how well you accomplish your goals, grow and improve performance, and implement solutions (Picciotto, 2020). Controlling is a function of management that entails developing systems and processes to assist in developing guidelines and standards to measure, analyse, and make decisions on the goals and objectives of the organization. This includes taking corrective actions as and when necessary to correct any deviations from the goals and objectives of the

organization. Controlling is the measurement and adjustment of the performance activities of subordinates to ensure that the corporate goals and strategies intended to achieve them are being achieved (Kukreja, 2018).

The integration of the two concepts, namely project and management, clearly gave rise to the phenomenon known as project management which has effectively integrated the two knowledge areas, including their various principles and elements that have been in existence. To effectively understand project management, it is vital that the concept is defined and articulated, considering its historical conception, the various theories that have developed over time, its importance to humanity and the value it adds as a strategic tool. Defining project management and project management to address those mentioned above was imperative.

4.5 The project lifecycle

The sequential project management processes shown in the project life cycle are integral to the project. The project management lifecycle is a method for evaluating, conceptualizing, and analysing the project. The project life cycle creates the procedures, systems, tools, and methods necessary to accomplish a project. PMBOK (2012) defines the project life cycle as a series of phases that a project passes through from its initiation to its closure. The APMBoK (2012) defines a life cycle as the interrelated phases of a project, programme or portfolio and provides a structure for governing the progression of the work.

The project lifecycle breaks project management into distinctive phases. These phases are essential for planning as they define and guide the steps to complete a project. In addition, these phases help provide a high-level pulse to ensure a project is progressing as planned (Mavenlink, 2021).

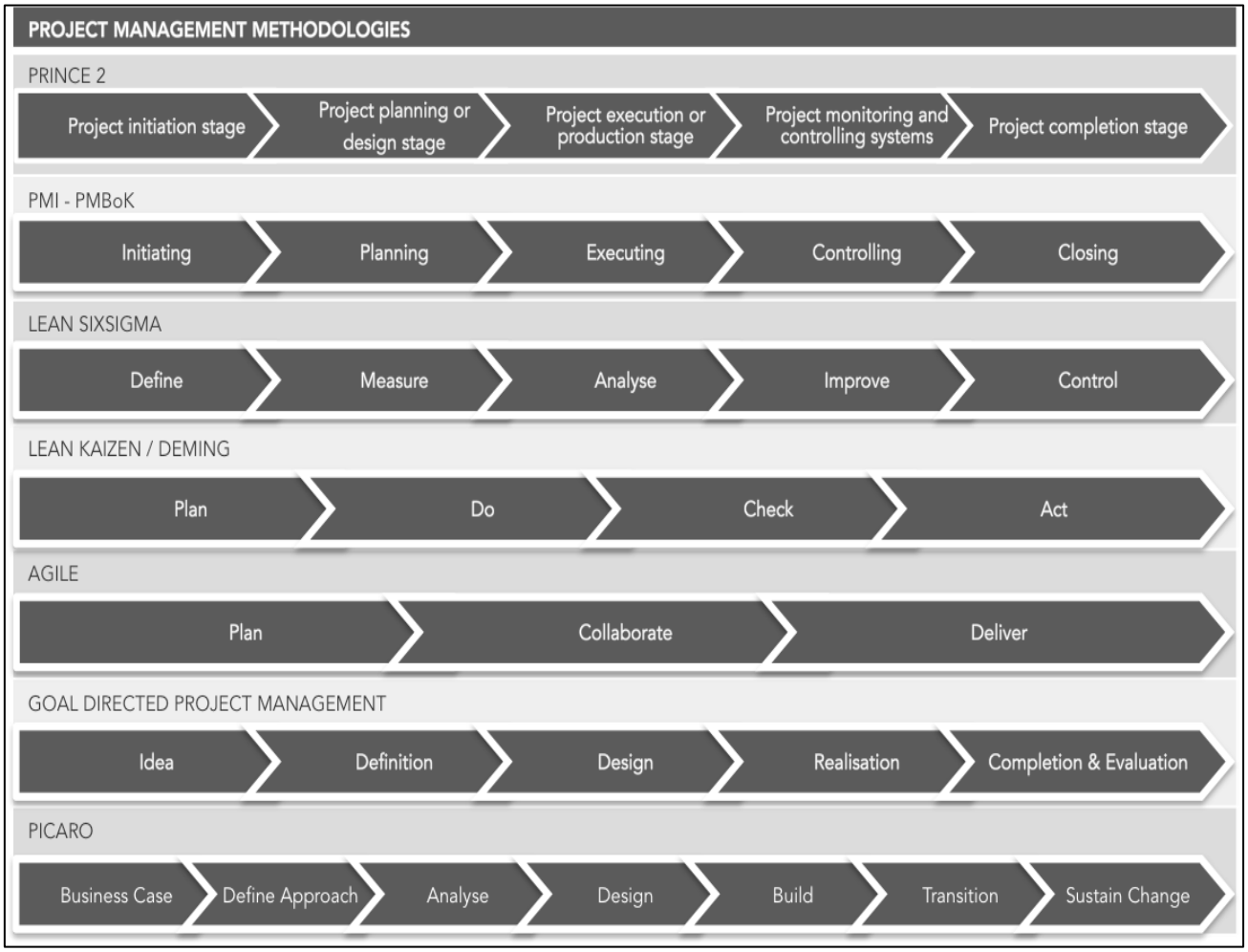
The project lifecycle serves other roles in addition to planning. The application of the knowledge, techniques, and resources that are essential to meet the requirements of a

project constitutes project management. The numerous project lifecycle phases differentiate activities and deliverables into categories to enable advancement and assess completed work for future improvement. The project lifecycle may be broken down into several distinct phases, as illustrated in Figure 4.2. The various bodies of knowledge and the phases always follow the same pattern regarding their content, deliverables, and sequencing.

The project manager may modify the project's stages to accommodate the project's industry-specific requirements. This is because distinct needs, activities, and processes are associated with each industrial sector. It is recommended that the stages of the project lifecycle be modified to accommodate these prerequisites.

There is a widespread consensus that most projects follow a four-stage project lifecycle (Burke, 2012). The sequential phases that each project will go through during its completion are namely: concept (feasibility phase); development (definition phase); execution, and termination (commissioning and handover phase) (Arshad & McCormick, 2018). Numerous projects may be classified into logical stages or phases that indicate or illustrate activities and tasks performed during a particular time. The number of stages and the specifics of each are subjective and unique to each project, although the sequence and structure are essentially the same for all projects. Figure 4.3 graphically illustrates the anatomy of the project life cycle.

Figure 4.2 Lifecycle – project phases from several bodies of knowledge related to each other



Source: (Leap, 2020)

Wideman (1991) states that selecting acceptable stages is often industry-specific for the reviewed business. Wideman (1991) recommends the anatomy of the project life cycle, presented in Table 4.1, in which, from a macro-view, the project plan and stages are universal to all projects.

Table 4.1The anatomy of the project life cycle

MICROVIEW	PLAN	NUMBER OF COMPONENTS	APPLICATION
	PHASES	CONCEIVE DEVELOP EXECUTE FINISH	GENERIC
MICROVIEW	STAGES	5 TO 10	INDUSTRY SPECIFIC
	ACTIVITIES OR TASKS	MANY	PROJECT SPECIFIC

Source: (Arshad & McCormick, 2018) adapted from Wideman, 1991

However, as one moves further down to a micro-view, the third tier is specific to the industry or company. In contrast, the fourth-tier tasks and activities are specific to the project. Several researchers indicated that many activities, jobs and efforts are often carried out concurrently within a project. These phases or stages are illustrated graphically in Table 4.2.

Table 4.2: Typical project lifecycle and activities

TOTAL PROJECT LIFE CYCLE			
PLAN		**ACCOMPLISH**	
PHASE 1	**PHASE 2**	**PHASE 3**	**PHASE 4**
CONCEPT Conceive (Feasibility)	DEVELOPMENT Develop (Definition phase)	IMPLEMENTATION Execute, Monitoring and Control	TERMINATION Finish (Closure)
Gather data	Appoint key team members	Set up: - Organisation - Communications	Finalize product(s)
Identify need	Conduct studies	Motivate team	Review and accept
Establish: - Goals, objectives - Basic economics, feasibility - Stakeholders - Risk level - Strategy - Potential team	Develop scope baseline: - End product (s) - Quality standards - Resources - Activities	Detail technical requirements	Settle final accounts
Guesstimate resources	Establish: - Master plan - Budget, cash flow - WBS - Policies/procedures	Establish - Work packages - Detail schedule - Information and control systems	Transfer product responsibility
Identify alternatives	Assess risks	Procure goods and services	Evaluate projects

TOTAL PROJECT LIFE CYCLE			
PLAN		**ACCOMPLISH**	
PHASE 1	**PHASE 2**	**PHASE 3**	**PHASE 4**
Present proposal	Confirm justification	Execute work packages	Document results
Obtain approval for next phase	Present project brief	Direct /monitor /forecast/ control - Scope - Quality - Time - Cost	Release/redirect resources
	Obtain approval to proceed	Resolve problems	Reassign project team
OUTPUT	**OUTPUT**	**OUTPUT**	**OUTPUT**
Project feasibility study	Project design & project plan	Certificate of completion	Closeout report

Source: Burke, 2012

4.5.1.1 Project Management Process

As best practices dictate, a highly particular sequence of process groups must be executed in project management (Vargas, 2001). The groupings are known as process groups because each includes or houses distinct processes that must be completed. The process groups are also interrelated and produce a dynamic network of processes that are repeated and integrated throughout each phase of the project, resulting in a process that is not discrete and overlaps itself at several stages and levels (Sherman, 2018; Fewings & Henjewele, 2019). Procedures must be repeated at each phase when working with complex projects (Sherman, 2018). The project management process consists of five significant processes connected by the results created. Specifically, the outputs from one process are often the input to the following process. PMBOK (2017) defines the project management processes groups as a logical grouping of

project management inputs, tools and techniques and outputs. The Project Management Body of Knowledge (PMBOK) divides the project management processes into the following five categories: initiating, planning, executing, monitoring and controlling processes. Altogether, the 39 processes may be placed into one of these five categories, and each generates inextricably linked outcomes. This is illustrated in Figure 4.3.

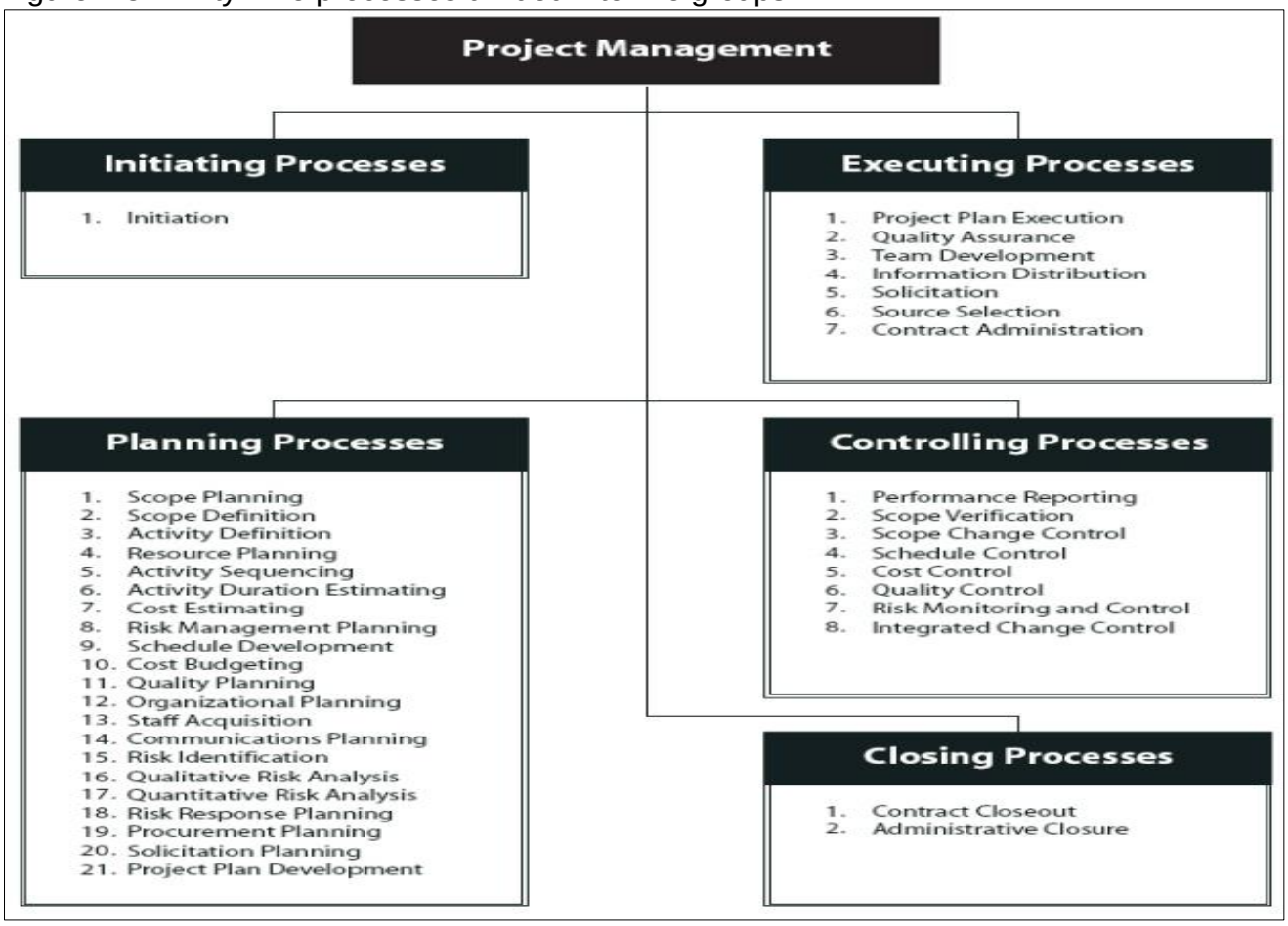
4.5.1.2 Initiating Processes

The project initiation phase is the first step of a project's lifecycle. This phase of the project is responsible for determining and governing the project's vision (Picciotto, 2020)The strategic planning and documentation of the business case, project scope, deliverables, goals, and resources necessary to accomplish the intended result are specified and carried out during this phase of the project. Importantly during this phase, external stakeholders are identified. This includes the customer, senior executive, funding agency or entities.

The cost estimates, hazards, and concerns addressed during the project initiation phase are detailed in this phase. The detected component may have a substantial influence on and impair the execution of the project, as well as result in cost overruns and delays (Sethy, 2018). Documenting dependencies is a critical component of the project initiation phase and must be completed successfully.

A detailed and complete understanding of the elements, project dependencies, and interdependencies critical to a project's effective execution needs to be developed and implemented (Koskela & Howell, 2002b). A thorough project dependency plan or documentation goes into further depth on the variables and aspects the project depends on being completed. For example, it is critical to take the time to build a clear and unified vision, considers who ought to ideally be engaged in bringing the project to life, and secure the resources required up front" during the start phase of a project (Adobe Experience Cloud, 2021). Following the project-initiating step, the project-planning phase will be the next phase to be completed, as illustrated in Figure 4.3.

Figure 4.3: Thirty-nine processes divided into five groups



Source: Vargas, 2001

4.5.1.3 Planning Process

The planning process is during which the project infrastructure is developed in detail. This phase allows the project planner or project manager to strategically create and map an accurate and well-defined plan to tactically assure the execution of the project and the achievement of the objectives that must be reached within the time and financial restrictions that have been established in advance of the project (Kreitner, 2009; Kerzner, 2019).

The planning process involves the drafting of a detailed and diligent project roadmap. During this project planning phase, crucial or primary tasks are identified and documented in the project schedule as technical requirements. A project schedule is an all-encompassing

document that allows the project manager to define the project activities, sequence activities, estimate resources, and estimate durations (Koontz & Weihrich, 2006; Gunduz & Alfar, 2019; Crawford, 2021). The all-inclusive project schedule includes project activities, deliverables, and milestones. This document enables the project manager to identify and track the progress of the project activities.

Several benefits can be derived from drafting a comprehensive project plan and schedule, which entails formulating this document as the documents assist the project manager or planner with tracking the project's progress. This is to ensure that the project remains on track and mitigates all risks that may evidently hinder or affect the delivery of the project (Burke, 2014; Levy, 2018; Fewings & Henjewele, 2019).

The project plan and schedule also provide a comprehensive report and enable effective communication throughout the project (Koontz & Weihrich, 2006; Murray-Webster, 2019; Richardson & Jackson, 2018), as illustrated in Figure 4.3. This further ensures that the tasks, dependencies, and deadlines are adhered to effectively and efficiently. As mentioned in the project initiation phase, project risks and issues were identified; however, during the planning phase, quantitative and qualitative risk analyses and risk responses are detailed in a project risk report, which is a critical component of the project planning phase. A sufficient project schedule and plan highlight the concerns and issues that emerge in a project. These issues and concerns may range from a lack of human resources, time and money to other pertinent project-related matters.

4.5.1.4 Executing process

The project executing process refers to the project team executing the work documented in the project schedule. An effective workflow must be carefully monitored to ensure the project's delivery. The importance of this phase is to effectively communicate and collaborate with the project stakeholders (Sifumba *et al.*, 2017). The constant maintenance of the communication process with stakeholders ensures that the project stakeholder is aware of any changes

affecting the project delivery is paramount. It effectively contributes to improving efficiency and increasing the project team's productivity.

4.5.1.5 Controlling Process

The project execution process, as illustrated in Figure 4.3, runs parallel with the monitoring and control process, and this refers to the process of assessing and monitoring progress made in respect of the implementation of the project plan and continuous evaluation of the project plan (Delisle, 2020; Laine, Korhonen & Suomala, 2020). This process and the project execution phase are not sequential but instead, phases that co-occur in the project management process. This phase must be executive effectively to ensure that the project is delivered successfully and project deliverables are delivered

Continuous tracking, monitoring, and controlling projects are crucial to ensuring delivery. Still, this has a positive impact not only on the current project but on future projects equally dependent on the current project and its success. During the simultaneous project management phases, the project's cost must remain within the allocated budget. This phase can be conducted through effective quantitative tracking methods (Rodríguez-Rivero *et al.,* 2020).

4.5.1.6 Closing Process

The closing process is the final project management phase. It is a significant phase in the project delivery cycle (Hedborg, Eriksson & Gustavsson, 2020; Rodríguez-Rivero *et al.*, 2020). This process refers to the conclusion of the project once it has been delivered. This phase requires extensive administrative functionalities as contracts are concluded and terminated. The overall productivity of the project management team is also accessed during this phase to ensure that the organisation is continuously improving on the delivery approach as well as on the overall performance of the project and of the project team. During this process, the finalisation of documentation must be well undertaken to ensure delivery to key stakeholders. This documentation finalisation phase entails the completion of detailed reports covering all aspects of the project management process, deliverables and expectations.

4.6 Extent of corporate and project responsibility

Various project management bodies of knowledge explain the different components of the project management lifecycle. Still, it is essential to specify the scope of project responsibility, i.e., who is accountable for what and when in a project.

- Chief Executive Officer, Board of Directors and Executive Management: The interests of the shareholders are represented by the Chief Executive Officer (CEO) and the board of directors. This implies that they are accountable for formulating and executing the organisational strategy. It is the role of the executive and senior management to organise and allocate the organisation's work into portfolios, divisions, and departments (Burke, 2014, 2017). Additionally, the executives are responsible for selecting the portfolio managers and the project steering committee. The CEO and board of directors are responsible for everything from developing the company goal to disposing of the project. They are ultimately accountable for everything inside the organization (Mavenlink, 2021; Warner, 2020).
- Portfolio Manager: The portfolio's performance is ultimately the portfolio manager's responsibility, encompassing “business as usual" and "project work." The portfolio manager is responsible for developing the need to relate the portfolio to the market or operational environment and designating a project sponsor to oversee project activity (Burke, 2014). In addition, the portfolio manager is responsible for appointing a project sponsor to manage the project work. The tasks and activities of the portfolio manager include a wide range of responsibilities, beginning with the formulation of the statement of requirements and continuing to the project's conclusion (Omezzine, 2019).
- Project Sponsor: In the context of project management, the responsibilities of the project sponsors span the whole duration of the endeavour, beginning with the period in which the (Buehring, s.a.) business case solution is produced and continuing through the phase in which the project is placed into operation (Burke,

2017). These responsibilities are not concluded until the corporation starts seeing a return on its project investment.

- Project Steering Committee: The committee comprises diverse, experienced organisation representatives in various professional fields. The project steering board is responsible for directing and advising the project sponsor and project manager on how to accomplish corporate and project goals and considering the project's relationships with other business interests (Barbosa, Salerno, Nascimento, Albala, Maranzato & Tamoschus, 2021a; Melo *et al.,* 2021). In addition, the project steering board is responsible for considering the project's relationships with other business interests. Additionally, it is the responsibility of the project steering board to consider the project's interactions with other commercial interests (Burke, 2014).
- Project Manager: The project manager is accountable for delivering the project's outputs. This implies that the project manager might be active in all stages, from feasibility to completion. Although the project manager is accountable to the portfolio sponsor, they must also collaborate with the steering board (Nisha, 2020; Al-Hajj *et al*., 2018).
- Depending on the nature of the project and the requisite expertise, a separate project manager may oversee each phase (Guertler & Sick, 2021a). Depending on the project's scope and construction approach, the project manager may need to hire a project team and external consultants, contractors, and suppliers.

4.7 Project success

The definition of a successful project has traditionally been one that accomplishes its goals while staying within budget and on time. These assessment criteria have remained the most widely used in various sectors and are the most popular. However, for a project, success extends beyond schedule and budget objectives; it also entails providing the benefits, rewards and advantages and exceeding the expectations of beneficiaries, stakeholders, donors, and funding agencies (Omezzine, 2019). However, identifying these aspects of success is more challenging, and several of those may only be assessed sometime after the project has been

concluded (Kerzner, 2017). Furthermore, for several organisations, executing such types of assessments is attributable to a shortage of available financing resources. Figure 4.4 is an illustration of the four phases of the establishment of project success definitions that may be distinguished.

Figure 4.4 Four periods identified in the development of definitions for project success

<table>
<tr><th colspan="6">PROJECT LIFE CYCLE</th></tr>
<tr><th>Conception</th><th>Planning/ Developing</th><th>Production/ Implementation</th><th>Handover</th><th>Utilization</th><th>Close Down</th></tr>
<tr><td colspan="2"></td><td>Period 1: Project Implementation and Handover (1960s -1980s)</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2">Period 2: CSF Lists (1980s – 1990s)</td><td></td><td></td></tr>
<tr><td colspan="3">Period 3: CSF Framework (1990s – 2000s)</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="6">Period 4: Strategic Project Management (21st century)</td></tr>
</table>

(Jugdev & Muller 2005; Ika, 2009; Steyn, 2015).

Period 1: Project Implementation and Handover (1960s -1980s)

When project management first became formalized, most definitions of project success were based on the iron triangle (Jugdev & Muller 2005). This was especially true in the early years following the formalization of project management. The success criteria were more practical in nature and internal in nature.

Period 2: CSF Lists (1980s – 1990s)

It was recognized that project success and organizational or product success were entwined throughout the 1980s and 1990s, and increasing emphasis was put on lists of essential success elements during this period. Table 4.1 lists the critical success criteria often used to

determine the main determinants of project success, which illustrates the general use of this approach.

Table 4.3: Identified critical success factors

Define goals Select project organisational philosophy General management support Organise and delegate authority Select project team Allocate sufficient resources Provide control and information mechanisms Require planning and review (Martin 1976)	Make project commitments known Project authority from the top Appoint competent project manager Set up communications and procedures Setup control mechanisms Progress meetings (Locke 1984)	Top management support Client consultation Personnel recruitment Technical tasks Client acceptance Monitoring and feedback Communication Troubleshooting Characteristics of the project team leader Power and politics Environment events Urgency (Pinto & Slevin 1988)
Project summary Operational concept Top management support Financial support Logistic requirements Facility support Market Intelligence Project schedule Executive development and training	Project objectives Technical uncertainty innovation Politics Community involvement Scheduled duration agency Financial contract legal problems	Clear goals Goal commitment of the project team On-site project manager Adequate funding for completion Adequate project team capability

Manpower and organisation Acquisition Information and communication channels Project review (Cleland & King 1983)	Implementation problems (Morris & Hough 1987)	Accurate initial cost estimates Minimum start-up difficulties Planning and control techniques Task orientation (vs social) Absence of bureaucracy (Baker *et al*. 1983)

Source: adapted from Steyn, 2015

In practice, meeting project goals while adhering to budget, schedule, and performance restrictions is inadequate to decide whether a project will succeed. In the mid-19th century, project management researchers devoted significant effort and time to analysing and understanding project success (Omezzine, 2019). Rather than relying on simplistic measures of time, cost, and performance to determine project success, researchers have built multidimensional frameworks that consider various factors (Warburton & Cioffi, 2014). Other crucial aspects that are important for the performance or failure of a project have been discovered by project management researchers within this framework as well (Picciotto, 2020).

It is commonly acknowledged that when project management emerged in the 1950s, it was primarily concerned with planning, budget control, and performance evaluation and due to the nature of most projects mainly concerned with manufacturing, client interaction and check-ins remained infrequent (Hedborg *et al.*, 2020). Recent research, however, illustrates that the average Iron Triangle of time, budget, and quality is no longer an adequate measure of project success, given the wide range of project types and sizes.

Thus, project management scholars established the first comprehensive and systematic categorization of important success variables in project management, published in the journal Project Management Journal (1987). According to scholars, success factors may be divided into strategic considerations and tactical elements. Among the most crucial strategic success variables is the support of executive management, project scheduling, and the project's mission. Tactical success includes client consultation, human resource recruiting, selection and training, and organizational success components include organisational culture and leadership development.

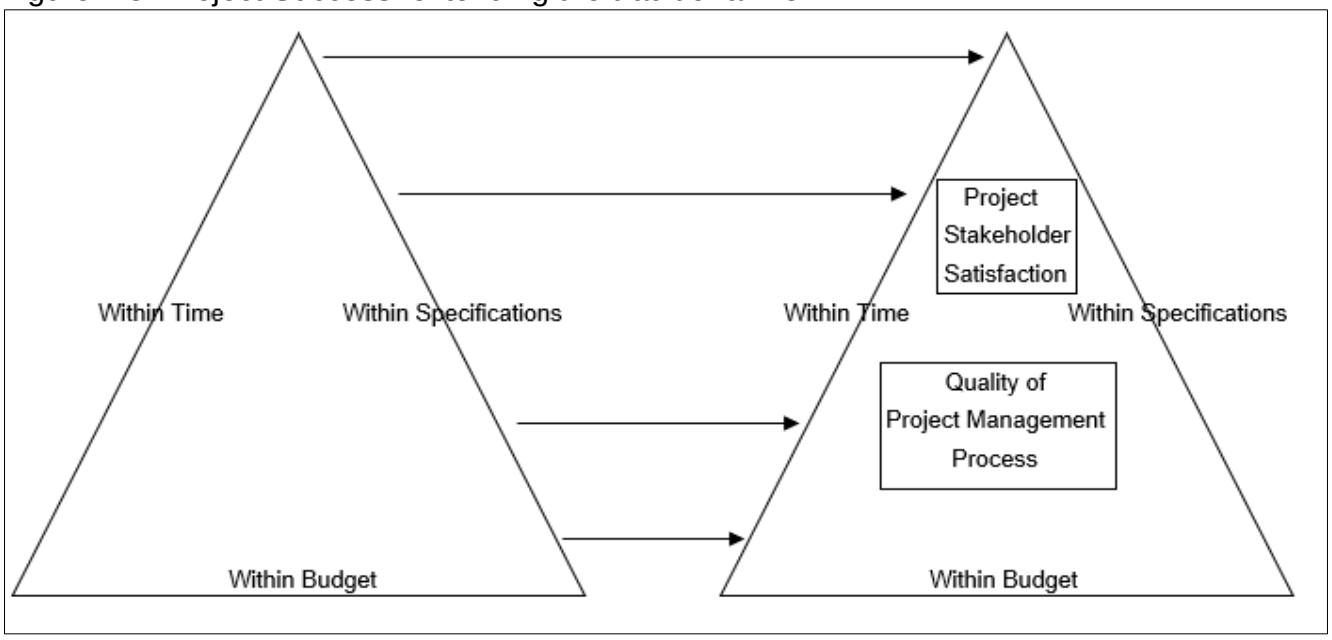
In the subsequent years, scholars discovered that this category was inadequate, as they realized they needed to consider the various stages of the project life cycle. According to scholarly results, project management researchers eventually agreed with their findings and provided sets of essential project success variables depending on the project's life cycle at different stages.

Period 3: CSF Framework (1990s – 2000s)

A critical success framework was developed over many decades, starting in the 1990s and continuing up to the 2000s. During this period, internal project measurements and external environmental variables were recognized as significant predictors of project success. Hartman (1999) proposed a broad determinant of project success, stating that the stakeholder must be completely comfortable and satisfied with the results and outcomes of the project. This was an essential requirement".

Scholars such as Shenhar (Shenhar & Levy 1997) prioritized stakeholder satisfaction over the iron triangle. Including stakeholder satisfaction and the overall quality of the project management process in the classic triangle, as illustrated in Figure 4.5, provides a complete view of project success.

Figure 4.5: Project Success: extending the traditional view



Source: Westhuizen and Fitzgerald, 2005

Scholarly research the following elements made the following statement in the same context: "In addition to the time, budget and costs associated with the project, and performance or specification level, the project must be finished following the following criteria (Kerzner, 2009):

- with the customers' approval
- without interfering with the essential workflow of the organization
- without making any changes to the company's culture,
- with the least amount of mutually agreed-upon scope adjustments as feasible

In addition to the criterion, project managers must manage projects following the main organisation's rules, regulations, policies and procedures (Omezzine, 2019). This has been conducted to maintain the primary workflow of the parent organization, and scope adjustments are critical to the overall project's success. They should be kept to a minimum and authorized by the project manager and the client (Kerzner, 2009).

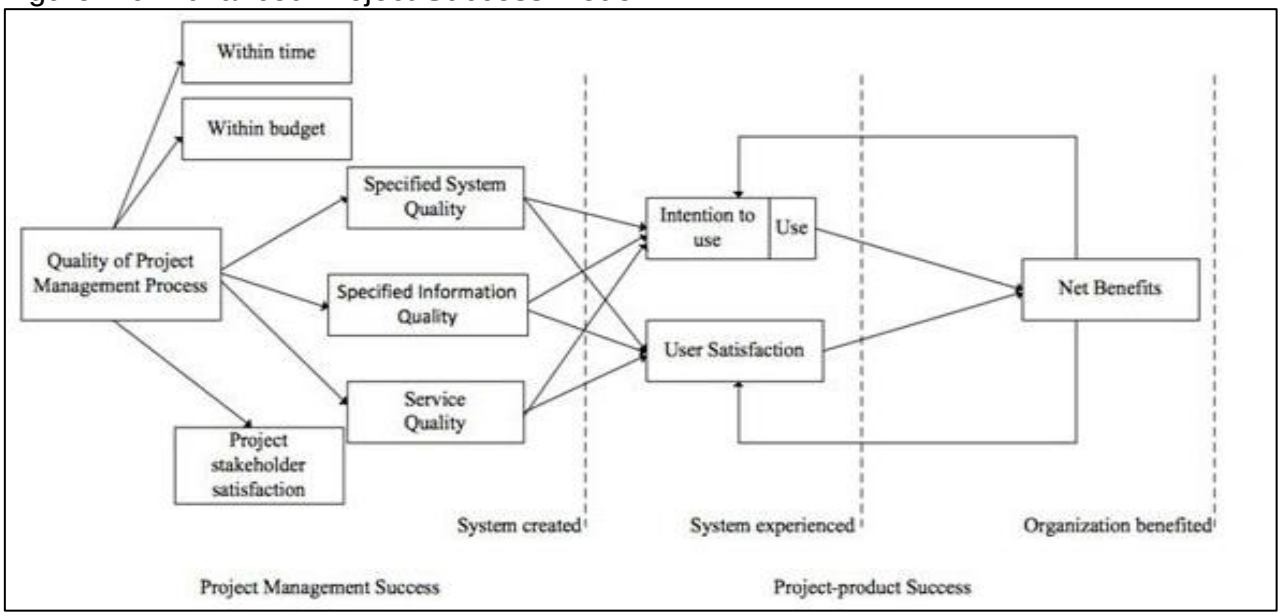
Period 4: Strategic Project Management (21st century)

In 2000, an emphasis on the project's success evolved from historically focusing on achieving the project's goals to ensuring that projects implemented by the respective organisations achieved the organisational goals, objectives, vision and mission. The refined and newly introduced characteristics place the focus on the organisation's success (Hedborg *et al.*, 2020; Rithe & Pachekar, 2021). It was imperative with the models developed that the project manager was involved in the strategic planning and implementation that were essential to accomplish these objectives. Critical to the relationship between management and stakeholder, the project manager must recognise the possibility of changes in the key stakeholders' success criteria at any point throughout the project's lifespan.

Scholarly articles assert that project success is a mix of project-management and project-product success (Baccarini, 1999; Al-Hajj *et al*., 2018). The success of a project is defined as the project's capabilities to be delivered as a whole while also effectively offering benefits to the numerous stakeholders engaged in the project, such as the customers, project employees and customers (Atkinson, 1999; Ciric Lalic, Lalic, Delić, Gracanin & Stefanovic, 2022).

Even though going over budget or lagging in time is considered a failure in project management, scholars such as Baccarini (1999), Al-Hajj *et al.* (2018) and Rithe *et al*. (2021) have determined that the project's final output may still be a success. However, this illustration considers several criteria that can only be measured after completing the project. Scholars believed that Figure 4.5 was insufficient to determine a project's completion success. Therefore, researchers introduced the advanced project success model (Figure 4.6) (Westhuizen and Fitzgerald, 2005). This model highlights the various stages of implementation as well as the link between project management and experiences by the multiple customers

Figure 4.6: Advanced Project Success Model

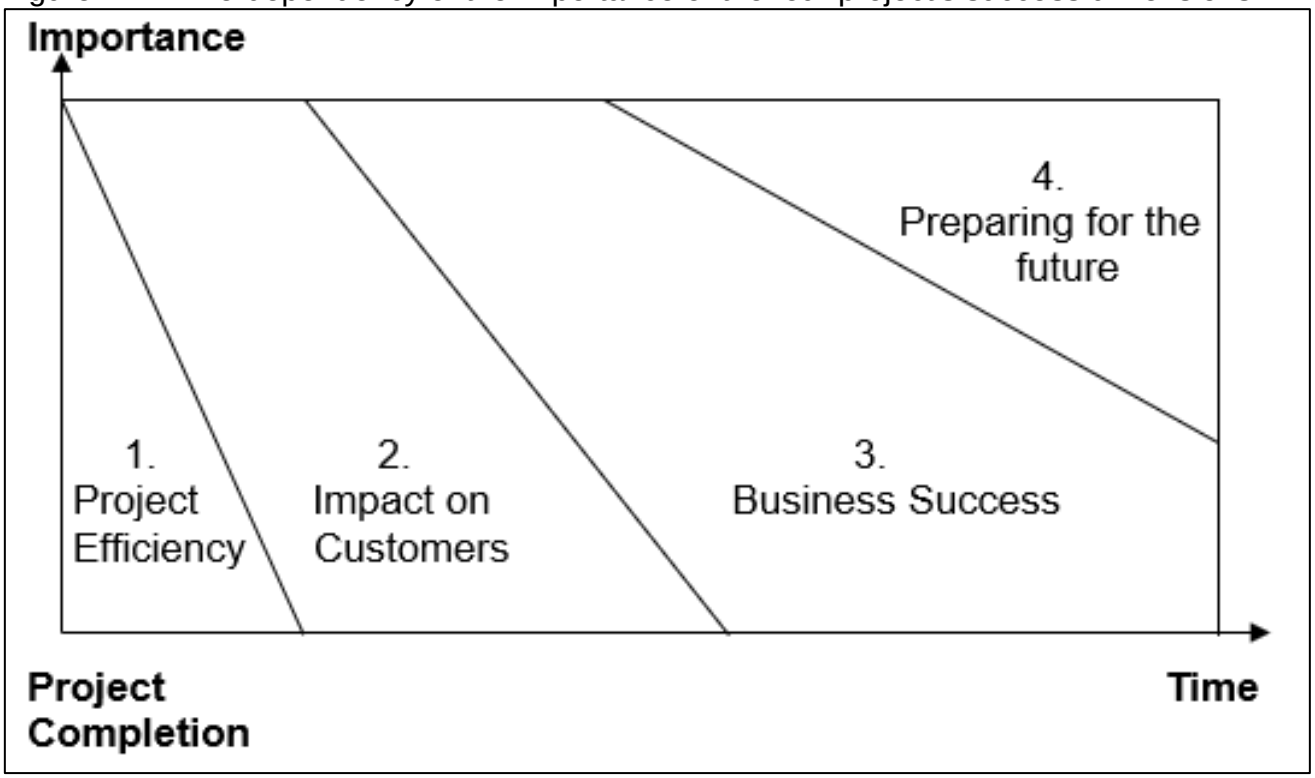


Source: Westhuizen and Fitzgerald, 2005

The demand for organizations to adopt the ideas of sustainability into their business practices, particularly project management, is increasing considerably. Among the contributions was Labuschagne's (2005) assertion that current project management frameworks do not effectively address the three goals of sustainable development, namely social equity, economic efficiency, and environmental performance, as well as an outline of a sustainable project lifecycle management methodology for use in the manufacturing industry.

Shenhar (2002) the four major success dimensions of projects: (1) project efficiency, (2) impact on customers, (3) direct business and organizational success, and (4) preparing for the future. These four success dimensions are summarized in Figure 4.7. Furthermore, project definition is also a critical component of project success. Figure 4.8 clearly illustrates that the project definition is influenced by various essential aspects, including the aims of the project's sponsor, the amount of finance currently available, the project's socio-political and environmental context, and the schedule's needs and limitations.

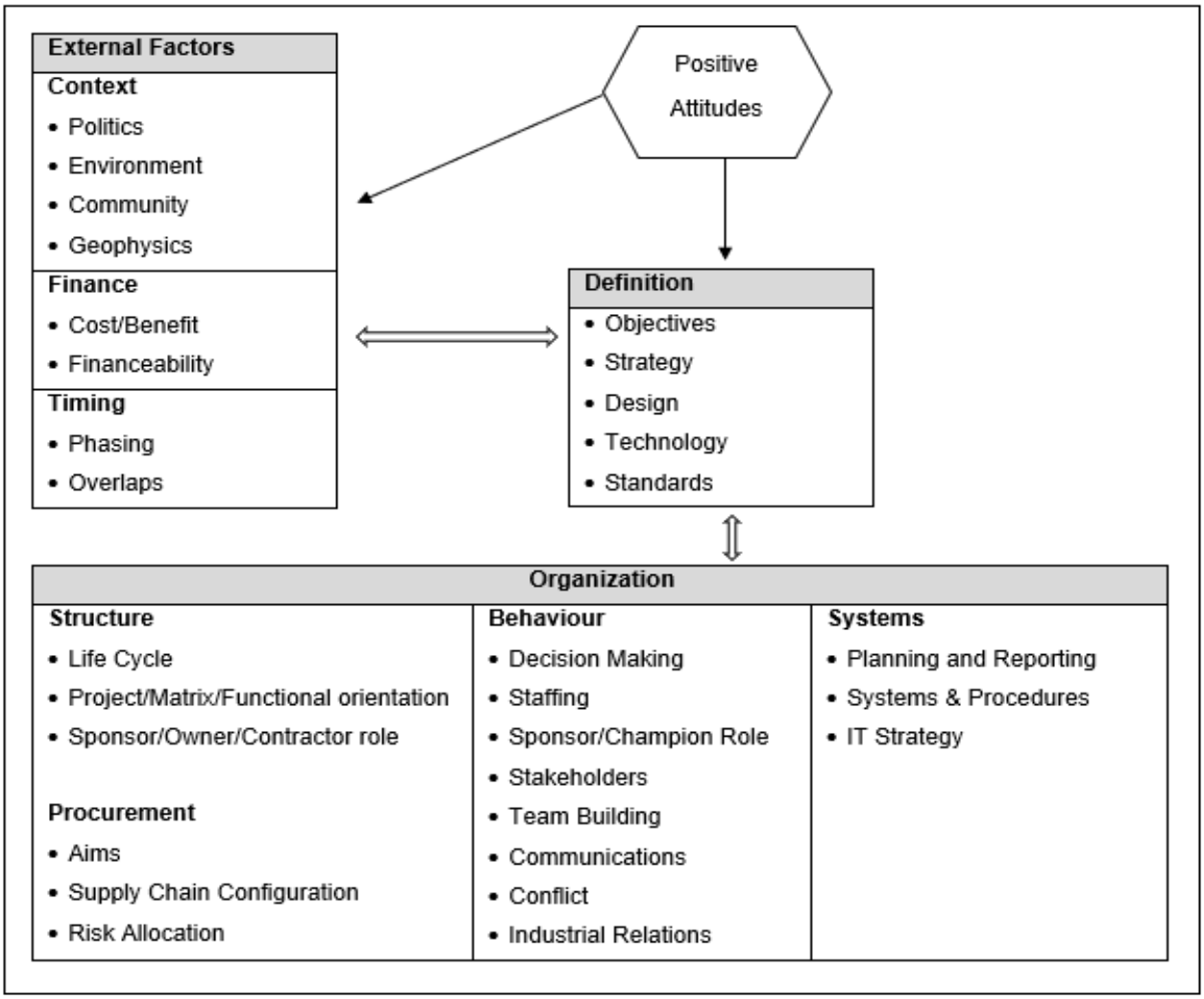
Figure 4.7: Time-dependency of the importance of the four project's success dimensions



Source: Shenhar *et al.,* 1997

True managerial talent involves optimizing all these factors to produce the highest possible value and the most accurate definition and description. Developing the project definition involves the same abilities that project management has historically believed are essential to delivering on time, within the budget, and to specification: commercial, organizational, people, and systems (control) skills (Morris, 2000).

Figure 4.8: Anatomy of project success



Source: Morris, 2000

4.7.1.1 Overview of the most important success factors identified by project management scholars

In agreement with Slevin and Pinto on the relevance of success elements varying from one point of the project's life cycle to another, Kerzner, Khang, and Moe had divergent opinions on the essential success criteria that should be examined. Table 4.4 demonstrates that concluding the reasons for the success or failure of a given project is as complex as the process of project management itself.

Table 4.4: Summarized literature reviews on project's critical success factors

Critical Success Factors	Pinto & Slevin (1987, 1989)	Kerzner (1992, 2001, 2003)	Yeo (2002)	Boyd (2001)	Andersen et. Al (2002)	Hyvari (2006)	Turner & Muller (2005, 2007)	Khang & Moe (2008)	Frese & Sauter (2003)
Clear Project Management objectives	x		x		x			x	x
Top Management support			x		x	x	x	x	x
Information/Communication				x	x	x			x
Client Involvement		x		x	x	x		x	
Competent Project Team						x	x	x	
Authority of the Project Manager /Leader					x				
Realistic Cost and Time Estimates		x	x	x					
Adequate Project Control					x				x
Problem-Solving Abilities						x			
Project Performance and Quality		x		x					
Adequate Resources		x			x	x		x	
Planning and Controlling		x	x				x	x	x
Monitor Performance and Feedback			x	x	x	x	x		
Project Mission/Common Goals					x	x			
Project Ownership		x					x	x	x

Source: International Journal of Business and Management (2013)

The literature reviews of scholars such as Fortune and White (2006) conclude that there is little agreement among project management experts about the elements that influence project success. According to the findings, three often identified variables are the necessity of a project gaining backing from top management, having clear and realistic goals, and generating an efficient strategy. Using a comprehensive literature study on project essential success elements from different writers, scholars demonstrated disagreement on this point Ofori (2013).

4.8 Project failure

There are several reasons why projects fail at the project management level, including a lack of project management skills, knowledge and organisational understanding. The project manager's performance is often evaluated based on whether the project meets the crucial success elements of time, money, and quality. It is also vital to establish if the project manager was responsible for guiding the project through a minefield of issues. However, some project failures could result from system output failures, with faults or other system characteristics causing or allowing the specific failure to occur. Figure 4.9 depicts 14 potential project failure problems since no failure materialises in isolation.

Project failures are caused by occurrences that are neither predictable nor within human control. Certain failures are inevitable because they are beyond the project manager's abilities and judgment to predict, avert, or influence (Levitt, 2011; Sherman, 2018; Vargas, 2000). Nicholas (1990) contends that the majority of project failures are due to problems in (1) the project and user organization or (2) the project deliverable. Project failure includes the absence of the desired outcome or the inability to meet cost, time, performance, quality, safety, or other associated goals, as illustrated in Figure 4.9.

Level I: Failures in the context of project management: Failure may be related to the incompatibility between the project organization and the project's tasks and activities, objectives, larger environment and senior and executive management. Some of the project failures that exist in Level I are:

- An insufficient project management model. Inadequate or incomplete organizational structure, project team or project manager is selected to meet the project's requirements.
- Unsupportive senior and executive management: The project's goals are unmet because upper-level management does not provide continued structured support.

Figure 4.9: Project management causes of failure

<table>
<tr><td colspan="4">LEVEL I: PROJECT MANAGEMENT CONTEXT</td></tr>
<tr><td colspan="2">(1) Inappropriate project management approach</td><td colspan="2">(2) Unsupportive top management</td></tr>
<tr><td colspan="4">LEVEL II: PROJECT MANAGEMENT SYSTEM</td></tr>
<tr><td>(3) Wrong project manager</td><td>(4) Failure to use a systems approach</td><td colspan="2">(5) Misuse of management techniques</td></tr>
<tr><td colspan="4">LEVEL III: PLANNING AND CONTROL PROCESS</td></tr>
<tr><td>CONCEPTION</td><td>DEFINITION</td><td>ACQUISITION</td><td>OPERATION</td></tr>
<tr><td colspan="4">(6) Inadequate communication</td></tr>
<tr><td colspan="4">(7) Non-involvement of user</td></tr>
<tr><td colspan="4">(8) Inadequate planning</td></tr>
<tr><td colspan="4">(9) Inadequate definition</td></tr>
<tr><td colspan="4">(10) Bad estimating</td></tr>
<tr><td colspan="4">(11) Incorrect scheduling/resources</td></tr>
<tr><td colspan="4">(12) Numerous changes</td></tr>
<tr><td colspan="4">(13) Inadequate control</td></tr>
<tr><td colspan="4">(14) Poorly planned termination</td></tr>
</table>

Source: Nicholas, 1990: 466

Level II: Failures that occur in the project management system: Failure attributed to various factors such as the theoretical principles and practices as well as the leadership of the project, including the following:

- The person serving as project manager lacks the skills, knowledge and understanding of the organisational and project background, lack of temperament, and attitude, which are essential components that severally influence the team and lead the project.
- Disregarding the structured nature of projects. Inability to conduct the project systematically. Throughout the project's life cycle, its components and processes are separated without regard to their interdependence.
- Misapplication or misuse of project management procedures, systems and techniques. The approaches are misconstrued, rejected, or improperly used.

Level III: Planning, monitoring control process failures: The determinates of project failure in the planning, monitoring and control processes include:

- Inadequate and insufficient communication permeated the whole project. The problems stem from incomplete, untimely and inaccurate information and inferior or insignificant collection and documentation of processes. This may also result in and influence insufficient information exchange among project participants.
- Absence of engagement with the user. The user or customer is not included in the project planning, definition, scoping, implementation, monitoring and controlling stages; as a result, the user's requirements are disregarded.
- Insufficient or absence of project planning. Inadequate analysis of how and when activities will be performed and disregard of previous project reports and/or recommendations.
- Insufficient project definition or scoping. Failure results from vague, wrong, deceitful, or non-existent project definitions. There is no detailed description of the project's tasks, activities, scope and technical requirements.
- Inaccurate assessment of the available time and resources. The projections of required resources and completion dates are either erroneous or unrealistic.
- Inadequate planning and administration of the given resources result from issues with the schedules and resources allocated to the project. The resources' skills and capabilities may also be unknown, and neither reserve nor backup resources exist.

- During the acquisition period, several alterations are made. Changes to the preliminary estimate are made, but no corresponding changes are made to the plan's schedule, budget, or other components.
- Inadequate control. Control focuses on day-to-day issues rather than anticipating future problem situations since problems cannot be anticipated before they occur. It is uncertain what variables contribute to the completion of a project, what defines the final product, what acceptance criteria must be met, or how the project must be approved. The project's conclusion lacks sufficient preparation.
- The causes of failures are not universal principles, and the validity and relevance should always be considered and evaluated specifically for each project. The existence of failure causes does not necessarily indicate success. The absence of the elements reduces the likelihood of failure but does not ensure success.

4.9 Benefits of Planning and control system in project management

Considering the project's requirements is a significant stage toward realizing the importance of using a project management method. The project manager's responsible for establishing a method whereby the project may be monitored and managed to ensure that the project will achieve the goals set. To accomplish this efficiently, the project manager needs information that is both accurate, reliable and consistent (Keinz *et al.*, 2021a; Warburton & Cioffi, 2014). The planning and control system needs to give this information, which defines the scope of the task and evaluates its progress compared to the initial plan. However, suppose the planning and control systems may increase administrative expenditures. In that case, it is essential to remember that insufficient knowledge and understanding "*could be even more expensive if it leads to poor management decisions, mistakes, rework and overrun*" (Burke, 2019). A seamless, integrated project planning and control system has several key advantages (Burke, 2019):

- **Estimating**: The estimate forms the basis of the project. The present project outcome will serve as the basis for forecasting future projects. If the planning and control system does not capture such information, this may result in the project manager continuing to make the same errors.

- **Critical path method**: The critical path method quantifies estimated timelines of tasks and activities, as well as the important decisions that influence the duration of each task; postponing a vital action will cause the project to be delayed.
- **Integration of project participants**: The participation of each individual involved in the project is an essential component of the project. A coordinated effort to integrate and incorporate participants into the project is imperative.
- **Reporting Interfaces**: The work breakdown structure (WBS) for project reporting and the organization breakdown structure (OBS) for corporate reporting may be the foundation of the planning and control system. The two different reporting requirements can be utilized separately without a unified system. Nevertheless, any of the two systems for project reporting must be used appropriately.
- **Response Time**: A prompt response on project performance is necessary for effective project management. The project planning and control system may adjust the substance and frequency of input to match the project's needs, while corporate systems may be less flexible.
- **Trends**: Monitoring time, cost, and performance trends is the most efficient project management method. If trend parameters are produced from many functional sources, the project manager may not have access to this information.
- **Data capture**: If the progress of a project is reported based on information provided by functional departments, the project manager will not be able to control the accuracy of that information. Problematically, it may not become apparent until the conclusion of the project that the reporting is erroneous, at which point it may be too late to get the project back on track to accomplish its goals
- **Single point of responsibility**: Considering the project manager is responsible for the entire project, this typically eliminates scope overlap and scope underlap. The planning and control system enables the project manager to develop procedures and work instructions tailored to the project's specific needs.
- **Client**: The project manager is the single point of contact for the project and the liaison between the organization and the client. During client meetings, the planning and control system will provide information on every aspect of the project.

4.10 Project management disciplines, systems and processes

Project management refers to a systematic process of initiating, planning, executing, monitoring and controlling, closing and evaluating the effectiveness of an activity that is set within the parameters of what is classified in a scoped activity (Morris, 2011; Murray-Webster, 2019; Rodríguez-Rivero *et al.*, 2020; Seymour & Hussein, 2014a). Project management entails the management of time and cost, and quality by understanding the scope, implemented through human resources that require continuous effective communication, management of risk and stakeholder relations.

The Association of Project Management (2018) defines project management as applying processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters. This is fundamental for infrastructure development because project management outlines what activities must be undertaken at what point, what resources must be employed, and how the project must be structured and effectively managed and implemented. A key factor distinguishing project management from just 'management' is that it has this final deliverable and a finite timespan, unlike management which is an ongoing process (Marc Werfs, 2013; Filmalter & Steenkamp, 2022).

Project management as a phenomenon has various elements deemed critical to implementing project management. The essential elements in project management are identified as those that may influence and impact the project and the outcome (Hedborg *et al.,* 2020). Various project management principles or methodologies are generally utilized in infrastructure development, construction and information and communications technology (ICT). However, challenges continue to exist in the various project management models. An example is the Project Management Body of Knowledge (PMBOK) Guide defines ten key project management processes. The guide refers to the ten project management processes that are crucial for the implementation of a project, and of the ten, seven are on the planning processes, only one on the execution of the project, and the two remain on the project control processes (Project Management Institute 2013).

Every project's importance, viability and sustainability primarily depend on the planning process; however, the dependence on the execution must also be highlighted. Although the Project Management Body of Knowledge Guide maintains a strong focus on the planning process due to the implicit assumption that "management is planning," a minimum value is placed on the project execution regarding project success and organization benefits. It is necessary to develop additional research development, and applicable techniques should be applied to assist with project execution and control, particularly in managing time during the project management.

According to recent research findings, the future of project management as a critical process is in jeopardy. A paradigm shift is a long time overdue as the "*present state of project management is founded on three theories of management: (1) management as planning, (2) dispatch model as the theory of execution, and (3) cybernetic model as the theory of control*" (Koskela & Howell 2002). However, the realistic nature of an organisation cannot be fully described by either management as the planning process or the dispatch model as a theory of execution.

Researchers and scholars have identified several project management disciplines, each adhering to a guide or principle. This research will discuss project management to highlight the importance of processes and challenges identified in each field. An example of such a discipline is the waterfall or traditional project management methodology, which is a sequential, linear project management process consisting of several discrete phases, with no phase beginning until the previous phase is complete. Each phase's completion is terminal (Hassett and Burke, 2017). The challenges identified in this discipline include the waterfall project management methodology not allowing the project manager to return to a previous phase. The progress of a project is seen as flowing steadily from top to bottom (as in a waterfall), and the only way to revisit a phase is to start over at phase one (Santo, 2020). However, waterfall or traditional management methodologies are not always effective in infrastructure development,

and their application depends on the features and complexity of the environment in which they are developed.

The highly sequential waterfall project management methodology has the following key phases, the requirements phases, which are followed by the design, implementation, and verification process.

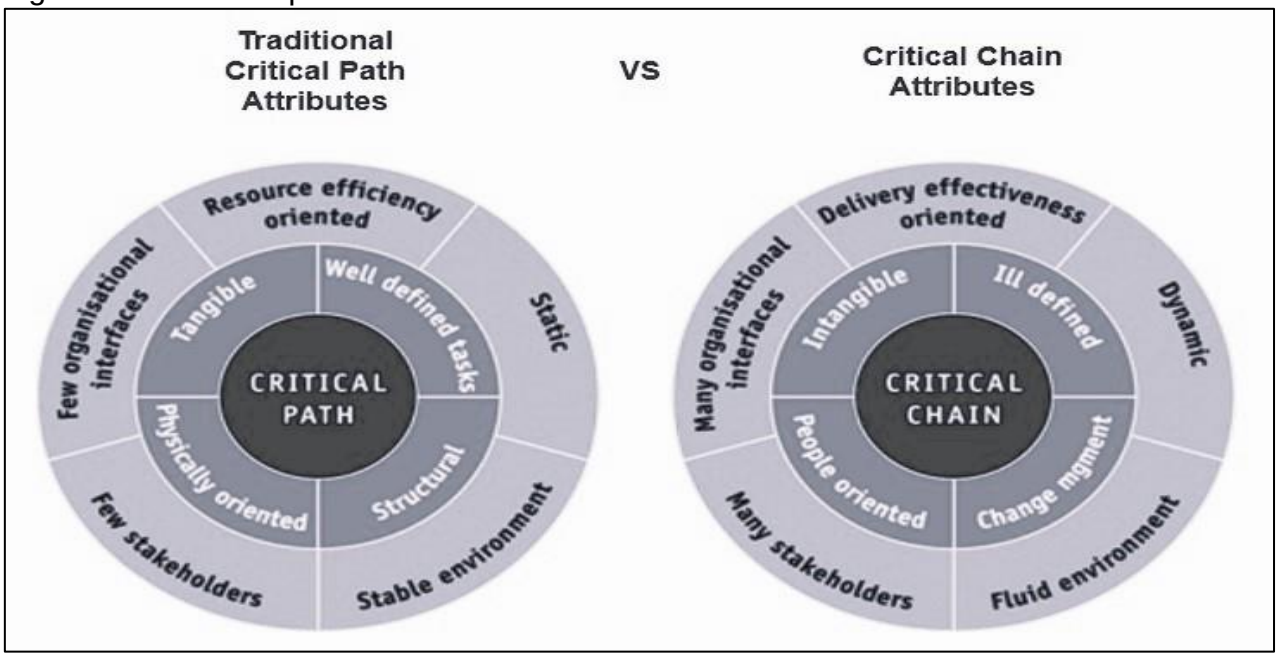
Another example of a project management discipline is agile project management methodology. A continuous, cyclical process differs considerably from a waterfall as elements within this methodology encourage experimentation and adaptability (Conrad, 2019). Agile project management is a six (6) phase approach that consists of identifying the requirements, planning, designing, developing, releasing, tracking and monitoring. These phases are flexible and evolving, and the phases often overlap one another, so multiple projects are in process simultaneously (Eby, 2016). Agile project management is an iterative development methodology that values human communication and feedback, adapting to change, and producing working results (Conrad, 2019).

4.10.1.1 Critical chain project management

From its origins in the manufacturing business, critical chain and lean project management have progressed to become widely used in the project management field (Steyn & Stoker 2014). Critical chain project management contributes to the effectiveness of project planning and execution, and delivery by focusing on the critical chain (Goldratt 1997). In essence, the critical chain is the longest chain of interdependent operations, which may or may not be constrained by available resources. The critical chain and path are similar when there are no resource limitations, as illustrated in Figure 4.10. The Critical Chain Model (derived from the Theory of Constraints) has a resource focus, whereas Critical Path is task-order focused (Caravel, 2019). Including the project buffer, which ensures that the due date is not missed, is one of the most significant contributions to critical chain project management. According to Goldratt (1997), a project schedule is typically produced based on "worst-case" projections or, at the very least, estimations within the 80% confidence range or above. As a result, a large

contingency buffer is included in each duration prediction estimate (compared to a 50% confidence estimate).

Figure 4.10: Critical path attributes and critical chain attributes



Source: Caravel, 2019

The fundamental aspect of monitoring and managing the project primarily concerns exploiting the buffers. The critical chain is recalculated regularly when the progress of the project is reported on a continuous basis. Because the critical chain technique considers the fundamental critical pathway based on the project network and timeline, this could result in an entirely new schedule.

Organizations and project managers with little or no experience with project management are highly likely to benefit from the critical path project management technique Zhang, Ramanathan, Raj, Parwal, Sherwood & Chabbi, 2022). Critical path or critical chain methodology, on the other hand, does not encourage applying multiple tasks in the project management process, and the outcomes of using the critical chain and critical path methodology have shown to be a hindrance to the overall project schedule, particularly in projects with complicated scheduling networks. Furthermore, there is no standard way to

estimate and improve the project buffers identified in the process, which results in difficulties when comparing various projects (Seymour & Hussein, 2014b). Given the critical attributes of change projects, such as poorly defined project tasks and multi-stakeholder environment, etc., Critical Chain Modelling best addresses the inherent uncertainty associated with change and human behaviours, improving projects' control (Caravel, 2019). The critical path project management system has seen some success in the manufacturing business but has failed to gain significant success in the information technology industry (Caravel, 2019).

Similarly, the event chain technique of project management is concerned with identifying and forecasting unpredictable events and the chain reactions that result from them. Modelling uncertainty using Monte Carlo analysis and various other replications approaches is the goal of this technique (Sharma, 2020). When events occur, the events can generate additional events, so creating an event chain likely to impact the project's direction significantly is operative to the project's success. When event chains and events are identified, quantitative analysis is conducted to estimate the level of uncertainty and the likely effect of the uncertainty on the project's progress and completion (Sharma, 2020). Thus, Critical event chains are generated due to this exercise, and critical events can highly influence the project's progress. The event and event chain diagrams are graphical representations of the possibilities with a high likelihood to occur and the chains and the consequences of those events. It was evident in the research conducted that challenges continue to exist with the event chain methodology, the critical chain methodology and the critical path methodology, as neither of the identified methodologies can be considered a substitute for the conventional project management methodology as proposed by the Project Management Body of Knowledge (Koskela & Howell, 2002b, a). Compared to the three identified methodologies, the critical path methodology is the most effective tool for constructing schedule networks in project management, and the event chain methodology is the most effective method that should be best applied in quantitative risk analysis.

4.10.1.2 Lean Six Sigma and DMAIC

The study and application of lean manufacturing techniques resulted in expanding and implementing lean project management techniques. The most appropriate use of lean principles will likely reduce waste or wastefulness in the project management process. Lean principles applied in a continuous process will more likely increase the satisfaction of customers, thus positively impacting the organisation's bottom line and profit margin.

Lean principles and approaches have been applied to successful and profitable companies (such as Motorola and Toyota). This resulted in attaining excellence through applying the lean approach in organisational operations (PMI, 2017). The seven wastes, as all addressed through the use of lean manufacturing techniques, include effectively reduced (1) defects, (2) overproduction, (3) transportation, (4) waiting, (5) inventory, (6) motion, and (7) processing. Stemming from the Toyota Production System, the 3M model – Muda, Mura, Muri which exposes inefficient processes that are a hindrance to customer value generation (Rastogi, 2020), and through Muda which refers to any activity that does not add value to the creation of the product or service for the customer (Rastogi, 2020) the 8th lean waste was incorporated (8) underutilization of skills. Mura refers to “unevenness” or “irregularity,” specifically irregularity in production levels, and Muri refers to employees or equipment that have been overburdened (bin Yahya, 2021)

The lean principle is based on concepts that assist in finding the exact "waste" that gives the most benefit. When applying lean manufacturing concepts to project management, particular focus is made on reducing the amount of time spent on administrative tasks. In 2012 the notion of "non-value-added time" (NVAT) was introduced (Han *et al.,* 2012), which alluded to time spent on projects that are not vital to the success of the project, and especially time spent on the critical chain and path methodologies and critical event methodology (Han *et al*., 2012). The non-value-added time was established as any time on the critical path methodology that does not contribute to customer value. This description necessitates the development of supportive measurement tools used to recognise, quantify, and emphasise minimizing non-value-adding time on the critical chain and path methodology.

The lean principle as a strategy was further refined to include the five core principles introduced by Womack and Jones (1996). The five core principles applied in this strategy include (1) specifying the value in the eyes of the customer, (2) identifying the value stream for each product, (3) making value flow by eliminating waste, (4) letting the customer pull the flow, and (5) continuously improve in the pursuit of perfection. The possibility of value stream mapping as an imperative aspect of the lean principle could be applied as an instrument that could enhance project management procedures (Mostafa *et al.*, 2016). Organisations and project managers must address waste management issues and waste in the organisation. This can be done by creating a conducive environment for a member of the project teams to operate in. Project managers must involve functional managers and sensitise them to remove waste to ensure the project's success (Saini *et al.*, 2017). The project manager must maintain a coherent collaborative relationship with the customer.

Six Sigma is a data-driven approach to problem-solving. An emphasis on six sigma has been placed on process variations and the satisfaction of customers. This strategy aims to improve the continuous process while maintaining a low failure rate. Six Sigma ensures a process is 99.9% defect-free (Kerner, 2013; Rastogi, 2020). Consequently, a six-sigma process generates 3.4 errors per million opportunities or fewer.

The Six Sigma technique is an organized approach to problem-solving. The Six Sigma team comprises individuals in cross-functional roles with different lines of sight into the process and is responsible for meticulous inspections to eliminate flaws. The team rigorously uses the DMAIC process to pinpoint the underlying cause (or causes) of the problems (Kerzner, 2013). The framework may be broken down into five distinct phases DMAIC as indicated by Rastogi (2020) (1) define (define the problem and the objectives); (2) measure (process variables are measured at this stage); (3) analyse (an analyse the process and factors of influence); (4) improve (identify and implement improvements); (5) control (assure that improvements will sustain).

Six Sigma and Lean are often related since both highlight the necessity of minimizing process variation. When Six Sigma and Lean manufacturing are combined, the project team use the project methodology to guide them through the lean six sigma toolbox and create significant changes to business processes (Kerner, 2013). The overarching objective is to reduce defects that affect internal and external customers and eliminate waste that affects cycle times and costs.

4.10.1.3 Agile Project Management

Agile project management is a project management methodology that uses an iterative approach to developing projects. Agile project management allows one to respond to inputs immediately and formulate coherent adjustments at each point or product cycle (Kaufmann *et al.*, 2020). Through agile project management, members of the project teams are likely to adopt agile project management practices to operate rapidly in the ever-changing environment. Project teams will work cooperatively and collaboratively within the constraints of a project's timeline and budget (Adobe Experience Cloud, 2021).

Agile project management as a project management methodology encompasses a variety of project management methodologies. In agile project management, no agile approach is universally applicable. Instead, the approaches are based on shared agile principles and fundamental values (Nisha, 2020). Most modern agile project management methodologies derive from the software development industry. In the early 1990s, software development teams determined that the highly organized conventional project management approaches, such as the traditional Waterfall project management methodology, did not accommodate the software development process required by software development to operate and conclude the respective projects. This was due to traditional project management methodologies lack of adaptability, flexibility, and even autonomy existed in such methodologies; thus, difficultly to uncounted when teams had to adapt and respond to change rapidly (Mostafa *et al.*, 2016; Saini *et al.*, 2017). Modifying the traditional project management approach resulted in costly errors for the organisation and project teams.

While change is a fundamental component of software projects is inevitable, it is not as prevalent in businesses where the method was established. The output is dependable and stable (for example, a manufacturing process that produces the same product on an assembly line) (Kaufmann *et al.*, 2020). In agile project management, changes in stakeholder requirements are expected, and testing during the software development process may indicate defects or the non-functionality of various components of the software before the end user has had an opportunity to utilize the product or system (Mostafa *et al.*, 2016; Saini *et al.*, 2017).

With the ever-changing environment of software development teams, agile project management approaches allow teams to consider such change to produce the best possible final result (Saini *et al.*, 2017). To do this, the team requires shorter development cycles (known as sprints), a more iterative approach, and constant feedback and testing. Software engineers later modified this process introduced in the early 1990s in the early 2000s. The research derived the fundamental principles of agile development and the philosophy that underpin these fundamentals (Ribeiro & Fernandes, 2010). This resulted in the Manifesto for Agile Software Development, a set of values and principles designed to assist teams in transitioning to an agile development process. The Agile Manifesto reiterates that agile project management as a project management methodology has four core values (1) Individuals and interactions over processes and tools, (2) working software over comprehensive documentation, (3) customer collaboration over contract negotiation, (4) responding to change over following a plan. The core values are the foundation of all project management approaches (Kaufmann *et al.*, 2020). The core values are the pillar that lay the foundation for the agile project management standards and the twelve identified agile project management principles.

The Agile Manifesto identifies the twelve fundamental principles (Alexander, 2019; Landau, 2021; Mostafa *et al.*, 2016; Saini *et al.*, 2017):

- The first priority is customer satisfaction through valuable software's early and continuous delivery.
- Welcome changing developments, even late in development. Agile processes harness change for the customer’s competitive advantage.

- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference for a shorter timescale.
- Business people and developers must work together daily throughout the project.
- Build projects around motivated individuals. Give them the environment and support they need and trust them to do the job.
- A face-to-face conversation is the most efficient and effective method of conveying information to and within a development team.
- Working software is the primary measure of progress.
- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
- Continuous attention to technical excellence and good design enhances agility.
- Simplicity — the art of maximizing the work not done — is essential.
- The best architectures, requirements, and designs emerge from self-organizing teams.

The agile project management methodology enables teams in all project management processes to work more iteratively and flexibly, allowing them to respond more quickly to changing project needs and produce results more quickly (Ribeiro & Fernandes, 2010).

According to research and the State of Agile Report, Scrum, Kanban, Srumban or hybrid models that incorporate the Scrum approach are unquestionably the most popular agile approaches. Like other agile project management approaches, Scrum is guided by agile project management's core values and principles (iterations and responsiveness to change).

4.11 Chapter conclusion

This chapter outlines the importance of project management as a fundamental aspect and discipline of planning and executing tasks (par 4.3). This chapter deliberated on how project management applies processes, skills, knowledge, method and experience combined to achieve a specific project objective according to the project acceptance criteria within agreed deliverable parameters and constraints (par 4.5.4). Chapter Four deliberated on how project management is a fundamental aspect of planning and executing tasks and activities in an

organized and systematic way to achieve goals and milestones within a certain period within certain budgetary constraints (par 4.6.5). Project management refers to a systematic process of initiating, planning, executing, monitoring and controlling, closing and evaluating the effectiveness of an activity that is set within the parameters of what is classified in a scoped activity.

The key characterises of a project are clearly outlined in this chapter. Key characteristics are used to establish the uniqueness of a project and the uniqueness of any project offerings. The characteristics and constraints of a project enable the project to be achieved at the designated time. This chapter illustrates that many professional bodies and theorists have widely defined project management as a concept. The theoretical foundations of project management have evolved over the years. These theories have established the development of several principles as there are principles to manage a project. Additional methods, practices and approaches can also be used with various project management methodologies to ensure optimum performance or delivery of a final deliverable or product.

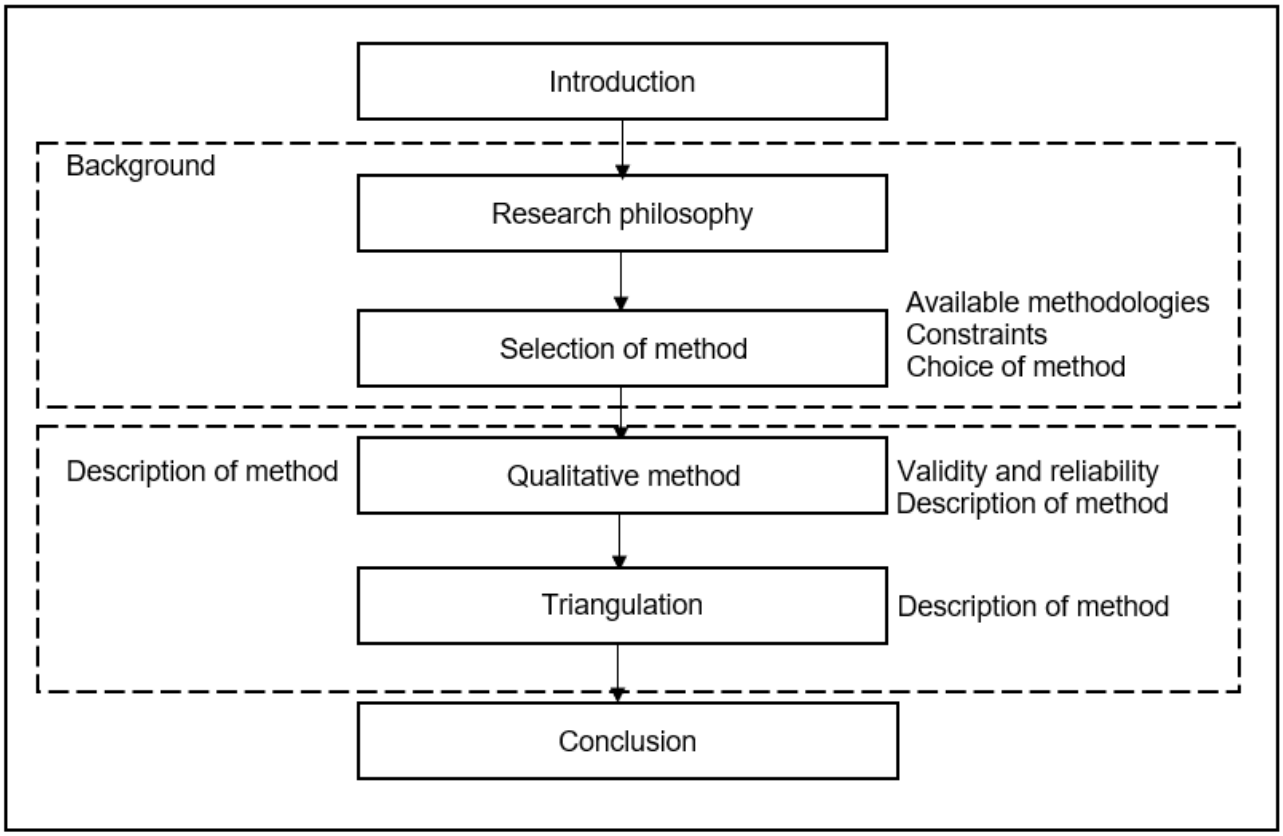
4.12 Chapter Summary

Chapter Four deliberated on how project management is a fundamental aspect and discipline of planning and executing tasks and activities in an organized and systematic way to achieve goals and milestones within a certain period within certain budgetary constraints (par 4.3). The chapter reviewed the literature on project management as a fundamental aspect and discipline of planning and executing tasks. Chapter Five discusses the research methodology applied in the research. This will include data collection, analysis methods and sampling techniques. In this chapter, the second secondary objective of the study is addressed, namely, to examine and identify relevant project management methodologies (par 4.8) that can contribute to infrastructure development programmes for SMEs, as this chapter provided an in-depth understanding of the current project management procedures and methodologies applied.

5. CHAPTER 5: RESEARCH METHODOLOGY

5.1 Introduction

Figure 5.1: Structure of Chapter 5



The previous chapter provided an analysis of project management, including the various project management methodologies. Chapter Four outlined the importance of project management as a fundamental aspect and discipline of planning and executing tasks and activities methodically and systematically to achieve goals and milestones within a certain period within certain budgetary constraints. Chapter four also referred to the systematic process of initiating, planning, executing, monitoring and controlling, closing and evaluating the effectiveness of an activity set within the parameters of what is classified in a scoped activity.

In this chapter, the research approach will discuss the research methodology and data collection method employed in this study. The study adopted a qualitative research methodology approach. The study was conducted in Gauteng, and participants from various

locations within Gauteng were interviewed. Gauteng is one of the nine provinces in South Africa, in which most of its territory is defined by two of the nation's largest cities, Pretoria (Tshwane) and Johannesburg (Gauteng online, n.d). The Gauteng Province is divided into five districts regarding the Gauteng Provincial Government (GPG) demarcation process. These districts are Ekurhuleni, Tshwane, City of Johannesburg, Sedibeng and West Rand. The Gauteng Province consists of a large number of sub-sections within the districts. The nominated population for the research is entrepreneurs from Gauteng operating in infrastructure development.

Semi-structured interviews were used for qualitative data with semi-structured interview guides. A self-administered questionnaire was used to collect the demographic information. The interview guides consisted of open-ended questions, which allowed participants to provide more details when answering the questions. Semi-structured interviews were chosen because this gave the researcher a chance to probe for vague answers and ask for an explanation for vague answers. This study continuously observed the rights to confidentiality and free withdrawal.

5.2 The philosophical basis for the study

The primary objective of the research and the approach is to understand project management in infrastructure development through assessing and reviewing existing methods and knowledge regarding the study. The primary epistemology of the research is based on the foundation of constructivism. Constructivist research aims to understand particular situations or phenomena, rich data is gathered from which ideas can be formed, and the interaction of several people is researched, primarily to solve social problems of the target group (Braun & Clarke, 2019). The nature of the research and available knowledge directed this study to adopt a more qualitative approach given the context, data and information required and available from previous research(Allen, 1994; Baker *et al.,* 2008; Packer & Goicoechea, 2000). Through the qualitative approach adopted, the research is able to effectively gather additional and more extensive information and data regarding agile project management in an infrastructure project that has provided comprehensive insight and information for the study. Post-positivists argue

that a researcher's ideas, and even their particular identity, influence what they observe and impact their conclusions (Hurd, 2009). Post-positivism as a research paradigm will complement the constructivist nature of the research as a post-positivist paradigm will pursue objective answers by attempting to recognise, and work with, such biases with the theories and knowledge that theorists develop (Packer & Goicoechea, 2000). This study has integrated well with an existing body of knowledge. It has further provided scientific value and information that has enhanced the current understanding of project management in infrastructure development. The study aims to develop an adaptive and agile hybrid project management model that incorporates internal and external influence factors to enhance the successful management of infrastructure projects. The model also includes economic disruptors that may affect projects. As a result, the model aims to improve the utilisation of project management principles and processes to effectively deliver projects by ensuring compliance and structured implementation of infrastructure projects by SMEs. It may be effective for other SMEs undertaking projects in environments other than infrastructure.

This is a post-positivist study because a hybrid project management model has been developed. This model scientifically originates from integrating research and information in the existing body of knowledge. This combined knowledge has been enhanced to significantly add value to the project management approach by SMEs in infrastructure development projects (Braun & Clarke, 2019) and the overall project management for infrastructure projects. The initial aspect of the research was to assess the impact of hybrid project management for SMEs in infrastructure projects (a positive impact). However, the study progressed scientifically beyond that and has since outlined a model that can be effectively adopted and utilised by SMEs in infrastructure projects. This research should improve project management and project delivery for SMEs in the infrastructure fraternity because it will provide guidelines and application processes that can be adopted and utilised in projects.

5.3 Research approach

The study adopted a qualitative research methodology approach since a qualitative research methodology covers interpretative techniques which seek to describe, decode, translate and

otherwise come to terms with the meaning of naturally occurring phenomena in the social world, according to Welman, Kruger and Mitchell (2012).

The study explored using a hybrid project management approach in infrastructure development. Therefore, a qualitative research methodology must be used to examine hybrid project management in Gauteng. Qualitative field studies are appropriate when analysing individuals or small groups, whereas quantitative studies are suitable for hypothesis testing (Welman *et al*., 2012). Therefore, qualitative research methodology is chosen because it leads to acquiring results that the whole research anticipates.

Using qualitative research methodology, the meaning is socially constructed by individual interactions with their world (Streefkerk, 2019). Therefore, the researcher acquired knowledge from the selected participants and the literature. Information obtained from participants' views was necessary for this research. A qualitative research methodology had the advantage of allowing the researcher to learn different perspectives from participants and why participants give specific responses to questions. This was conducted through probing responses from participants. A qualitative research methodology allows the researcher to acquire in-depth comprehension (Streefkerk, 2019), which was beneficial in obtaining more information on using agile project management in infrastructure development programmes.

5.4 Research design

The research design is an imperative aspect of a study. It often assists in determining the plan for the study. The research design is the strategy that the researcher chose to integrate various study components logically and coherently. Research design continuously assisted the researcher in efficiently addressing the research problem: it constitutes the blueprint for the collection, measurement, and analysis of data (Sacred Heart University, 2016).

As Abowitz and Toole (2015) suggested in research, no perfect data collection method exists for a research study as each method has strengths and weaknesses. Data collection methods are based on the study aims, objectives and research questions. Therefore, the researcher

could apply different techniques of data collection that were suitable for the study. This study selected a qualitative research approach as the data collection strategy because the research aim, objective and question required only a qualitative research methodology approach to enable the researcher to probe and ask questions and acquire an in-depth understanding.

Qualitative research involves understanding what descriptions arise in a particular time and context (Bhandari, 2020). The period in which the research takes place is critical. For example, the research conducted about using a hybrid project management approach that relies on traditional project management methodologies and agile methodologies in infrastructure development is a recent phenomenon; hence, experiences from this research may be different in the future. Therefore, the significance of qualitative research was to understand the meanings and experiences of this period. The study attempted to understand responses and experiences from the participant's perspective and learn from them (Bhandari, 2020). Grounded theory, which aims to develop a theory inductively by systematically analyzing qualitative data, is deemed a suitable research design for the study as in most grounded theory studies, data come from interviews and participants' observations; a wide variety of documentary materials, literature, and previous research are also potential sources of valuable information (McCombes, 2021). Therefore, in this study, a qualitative research methodology applies an interpretative social science approach as justified above. inductive

5.5 Research Philosophy

Research philosophy plays a crucial part in research methodology, and it can be classified as ontology, epistemology and axiology (Thakurta and Chetty, 2015). The three mentioned philosophical approaches assisted the research in determining the approach to be adopted for the study. Assumptions are present in research philosophy explaining the researcher's view of the world. These assumptions will determine the research strategy and the methods of that strategy (Thakurta and Chetty, 2015).

The first philosophical approach was epistemology, defined as the acceptable knowledge of a particular area of study (Thakurta and Chetty, 2015). Epistemology is classified into three areas, namely realism, positivism and interpretivism.

The second philosophical approach discussed was ontology which is based on the nature of reality. Ontology is found in the aspects of objectivism and subjectivism. Objectivism portrays the position that social objects persist in reality external to social actors, and subjectivism is concerned with the social phenomena which emerged from the perceptions and consequences of those social actors concerned with their existence (Thakurta and Chetty, 2015). The third philosophical approach is axiology, the philosophical study of value. It includes questions about the nature and classification of values and what things have value (Thakurta and Chetty, 2015).

This study researched SMEs' perceptions, temperaments and attitudes toward infrastructure development. The researcher better understood the problems, benefits and challenges of a hybrid project management approach to sustain SMEs in infrastructure development. Therefore, the researcher adopted an interpretivism approach to determine the perceptions, attitudes and temperament.

5.6 Research setting

The study was conducted in Gauteng, one of the nine provinces in South Africa, where most of its territory is defined by two of the nation’s largest cities, Pretoria (Tshwane) and Johannesburg (Gauteng online, n.d). The Gauteng Province is divided into five (5) districts regarding the GPG demarcation process. These districts are 1) Ekurhuleni, 2) Tshwane, 3) City of Johannesburg, 4) Sedibeng, and 5) West Rand. The Gauteng Province consists of a large number of sub-sections within the districts. Participants from various sub-sections were interviewed. This was done to avoid being biased towards one section of the district. All SMEs have registered CIPC companies with the compulsory Construction Industry Development Board (CIDB). CIDB is a regulating board responsible for ensuring that all construction companies' national standards and Codes of Conduct are upheld in South Africa. Some interviews were conducted face-to-face (with all Covid-19 protocols observed to protect the

participant and the researcher) or via telephone, Skype, Zoom, and WhatsApp in adherence to the #stay at home campaign raised to flatten the curve of Covid-19 in South Africa.

5.7 Population and sampling technique

5.7.1.1 Population

Small and medium enterprises (SMEs) play an essential role in the economy, employing vast numbers of people and helping to shape innovation. Small, Medium-sized Enterprises (SMEs) in South Africa are generally understood as businesses that maintain revenues, assets or many employees above a certain threshold. The government offers incentives, including favourable tax treatment and better loan access, to help keep them in business (Liberto, 2020). SMEs involved in infrastructure development projects within Gauteng significantly contribute to the economy and employment as part of the government's strategic approach to growth and development.

The selected population for the research were SMEs in Gauteng that employ less than 200 employees, with an annual turnover of less than R64 million, with capital assets of less than R10 million and whose direct managerial involvement is by the business owner. The population for the research consists of SMEs in the infrastructure development projects that contribute to the overall development within the province. Project managers who oversee individual projects or program managers who preside over the strategy and success of multiple connected projects were the targeted population within the organisation.

A population is a well-defined collection of individuals or objects with similar characteristics (Alvi, 2016). In most instances, this refers to individuals or entities with specific common and binding characteristics or traits. The classification of a population further relates to characteristics used to identify individuals as part of the population. For instance, homogeneity in terms of purpose, objective and engagement were critical characteristics for classifying a population (Alvi, 2016).

The SMEs involved in the infrastructure development projects in Gauteng were located in the five (5) districts, which combined, constitute the population for the research. The sample was identified from this population within Gauteng, and interviews were conducted and continued until the saturation point plus one was reached. Originally one person per organisation was targeted to get as broad a reach as possible. Should saturation plus one not have been reached, an additional person from each organisation in the identified population would have been interviewed.

5.7.1.2 Sampling Criteria

The sample population for this study was selected to meet a criterion determined by the researcher. The sample population chosen was nominated because participants were considered key informants for this research. They were better able to answer the questions than public members who had not registered a business and had not implemented a project management technique in their organisation.

Furthermore, this data collection method was more suitable as the study needed a small subset of a larger population in which many subgroup members were identified easily. Still, the enumeration of all is nearly impossible (Babbie 1990).

5.7.1.3 Sample Size

The sample consisted of SMEs operating in infrastructure development in Gauteng. According to the Standard Industrial Classification, infrastructure development is a branch of manufacturing and trade based on building, maintaining, and repairing structures. This classification is inclusive of drilling and solid mineral exploration. Infrastructure development includes all general contractors and operative builders primarily constructing residential, farm, industrial, commercial, or other buildings (Standard Development Indicator Group, 1996).

The participants were identified from the various districts in Gauteng. Interviews continued until saturation was reached to ensure the validity and reliability of the data collected. When saturation plus one is not reached, an additional person from each organisation in the identified

population would have been interviewed. Initially, SMEs were taken from the researcher's acquaintances as a sample to conduct a qualitative analysis concerning the research topic. The initial sample was selected from the researcher's personal acquaintances in the industry to ensure that the POPI Act was obeyed. The analysis enabled the researcher to make informed findings, recommendations and conclusions on the topic research based on the analysis of the information from the sample identified and selected. If the data were insufficient, the sample would have been expanded using snowball sampling until saturation plus one was reached.

A sample was drawn because many SMEs in infrastructure development can collate and manage their project management information. Only data valid to address the study's objectives were collected.

When conducting research, selecting a population from which information will be extracted is imperative. It is also essential that the population is willing to participate in the study. This process is known and understood as sampling. According to McCombes (2019), sampling can be referred to as a subset of a group. This chosen subset must be representative of the population.

For a valid conclusion, it is crucial to select a sample using the following sampling methods; probability sampling and non-probability sampling. Probability sampling involves random selection, allowing the researcher to make statistical inferences about the whole group (McCombes, 2019). Non-probability sampling involves non-random selection based on convenience or other criteria, allowing you to collect initial data (McCombes, 2019) easily.

Probability sampling, commonly used in quantitative research, means every member of the entire population will likely be selected as a representative in the study (McCombes, 2019). The four main types of probability sampling are simple random, systematic, stratified, and cluster sampling.

The non-probability sample is an appropriate sampling technique for qualitative research. Non-probability sampling means that individuals are selected based on non-random criteria, and not every individual has a chance of being included (McCombes, 2019). The non-probability sampling technique does not test a hypothesis about a broad population but develops an initial understanding of a small or under-researched population (McCombes, 2019). Four main types of non-probability sampling techniques exist, namely convenience sampling, voluntary response sampling, purposeful sampling, and snowball sampling.

The sampling technique used in the research was initially purposive sampling, as it focused on SMEs from various locations within Gauteng operating in infrastructure development. A non-random sampling technique was used to identify an initial sample for the study. It included the owners of the business and or individuals responsible for project management within the respective business. Since this is a qualitative study, a non-probability sampling technique was used. The specific non-probability sampling technique was purposive and snowball

According to Lathan (2007), purposive sampling is selecting a sample based on your own knowledge of the population, its elements, and the nature of your research aims. Krauss, (2005) cites Babbie (1990) and states that purposive sampling is selecting a sample based on one's knowledge of the population, its elements, and the nature of the research aims.

A non-probability sampling method was applied in this research: Within the researcher's large circle of acquaintances in the construction and project management fraternity, purposive sampling refers to intentionally selecting participants based on their characteristics, knowledge, and experiences (Stratton, 2021). Purposive sampling was used for the following reasons.

1. Achieve a representative sample
2. Reduce the sampling bias by ensuring that frames and populations are sampled.

The sampling strategy that was selected in this study applied the following process:

1. Define and describe the population, obtain a list of the sampled population, and list and number the population
2. A probabilistic method to select the units of analysis was done using a simple random sampling method. This ensured that the population was represented and that all SMEs had an equal chance/probability of being selected, reducing generalization.

The researcher compiled a list of individuals in her circle of acquaintances involved in SME project management. This list was used to conduct purposive sampling as a first phase to obtain enough participants for the study. From these participants, more participants were identified (snowball sampling) who, in turn, were interviewed until saturation plus one was reached.

5.8 Methods of data collections

5.8.1.1 Data Collection Instrument

Semi-structured interviews were used with semi-structured interview guides for data collection. Semi-structured interviews were chosen because the research was aimed at understanding the experiences and perceptions of SMEs in infrastructure development who had adopted project management techniques in their organisations. Welman *et al.* (2017) explain that an interview guide includes a list of topics the interviewer or researcher should use throughout the interview. Babbie (1990), however, reiterates that the order of questions in the interview guide may be varied. Semi-structured interviews were chosen for the research because semi-structured interviews offer the researcher an opportunity to probe vague answers and ask for explanations for inadequately answered questions (Welman *et al.,* 2017). Some interviews were conducted face-to-face (with all Covid-19 protocols observed to protect the participant and the researcher) and via telephone, Skype, Ms Teams and Zoom.

The guides that were used for interviews consisted of open-ended questions. An advantage of semi-structured interviews and open-ended questions used in the study is that they allowed participants the opportunity to answer questions in their own words and provide further detail to the questions asked. Demographic information was elicited in the first of the questions,

followed by questions about using project management techniques by the SME, project manager or programme manager. Finally, the benefits and challenges of project management were discussed with the participants, and the interview ended with a question on recommendations for better project management.

5.8.1.2 Data Collection Procedures

The SMEs' permission to conduct a study was obtained by phoning their representatives. Individual interview participants were called and asked whether they agreed to an interview and would like to do the interview via Zoom, Skype, Teams, Phone or face-to-face (with all Covid-19 protocols observed to protect the participant and the researcher). An internet link was then sent to the participants, and an interview time was scheduled that suited the participant. An informed consent form was attached to the link. The participant returned the completed informed consent form before or during the interview.

Secondary data, consisting mainly of literature sources, were consulted to guide the development of questionnaires. A pilot study was conducted to verify the understandability of questions. The consent form was provided during the interview, and the study's purpose and how participants need to participate were outlined. Participants were informed of ethical concerns, including the fact that participants could withdraw from the study. Semi-structured interviews were used to collect the qualitative data. This allowed the researcher to probe and obtain clarification on some of the points given by the respondents.

An interview guide was used to collect the information. It was written in English to ensure that the required information was provided. It was possible that some interviews could be conducted in other languages that both the researcher and the interviewee were comfortable with. Still, all transcriptions were done in English (with a note where the interview was in another language). Participating SMEs were approached once approval and clearance had been obtained from respective SMEs. SMEs were formally requested through a letter to participate in the study.

All the possible precautions and reasonable online assistance were used in response to the Covid-19 data collection regulations. Semi-structured interviews were used to collect the qualitative data, allowing the researcher to probe and clarify some of the respondents' points. Bless *et al*., 2013) pointed out that in interviews, data collection may include the use of tape recorders, therefore the recorder on Microsoft Team, Skype and Zoom was used for the collection of the data, and a mobile phone as the recording device was being used to record calls conducted through WhatsApp and face-to-face. The interview guides that were used consisted of open-ended questions. This allowed participants the opportunity to provide more detail when answering the questions. During interviews that were conducted face-to-face, all Covid-19 protocols were observed to protect the participant and the researcher. This was a possibility, especially since the first participants were acquaintances of the researcher.

The interviewer attempted to position themselves in a manner that did not make participants uncomfortable when responding to interview questions. The researcher aimed to apply reflexive methods throughout the process by using proper ethics, thus setting standards for the other researchers.

5.9 Methods of data analysis

For the practical analysis of data, a thematic analysis method was adopted by the researcher. The thematic analysis method analyses qualitative data applied to text forms such as interview transcripts (Caulfield, 2019). This analysis method provided an advantage, allowing the researchers to examine the data to identify common themes closely and other commonly repeated responses and information.

Once the data had been collected, the data was entered into a database, and interviews were transcribed word for word. Data were abstracted and assessed. The researcher applied a descriptive data analysis method, and the data analysis described the collected data features. The collected qualitative data was analysed using ATLAS ti version 22 software package. The data was conceptualised and thematised to identify common themes. Coding and thematising data and information were done to qualitatively measure the study's variability. Coding and

thematising the data provide simple summaries of the data collected. Coding refers to fracturing data and rearranging data into categories to enable the researcher to select data elements that are interesting and relevant to the research (Wilson, 2020).

Each participant's data was issued a unique identifier letter. The data were edited for duplicate records, missing values/information, out-of-range values or miscoded values. The data were classified and grouped into categories, and each category was named. In the case of overlapping and uncoded text, the researcher checked if any text segments had not been assigned to any category or if any text segments were coded in more than one category.

In the case of incomplete data, records were checked to ensure that all relevant information was reassessed, obtained, and entered into the database. The researcher refined and revised the system categories by identifying sub-topics, unexpected points and new insights. The researcher selected suitable quotes that summarised a particular category's overall meaning. This was done to refine connections between similar categories. The findings were interpreted and developed into meaningful concepts to answer the research question.

Data backups were stored on multiple flash drives that are securely locked up in different locations on- and offsite. Univariate and bivariate analyses were conducted on the data. A unique identifier letter or number was used to identify participants (no participant names or identity numbers were captured).

5.10 Trustworthiness

McNair, Taft and Hegarty (2008) define reflexivity as an attempt to reflect on how the researcher is positioned in a particular political, social, cultural and linguistic context. Therefore, reflexivity is referred to how the research is undertaken within the field. This may pose different challenges for proper research. For example, how the interviewees react toward the researcher and how the researcher positions them not to be distracted during data collection.

Semi-structured interviews were chosen because this gave the researcher a chance to probe vague answers and ask for an explanation (Welman *et al.,* 2012:167). During interviews, participants were requested to respond in English. Still, if they did not understand, a translation in their preferred vernacular was provided to avoid them repeating themselves and not answering the questions correctly.

Member checks are a technique used to explore the credibility of results (Birt & Scott, Cavers, Campbell and Walter, 2016). Member checks employed in this study were to verify the emerging theories formed during dialogue (Shenton, 2003). For example, certain participants were requested to provide a rationale for theories observed during the data analysis process. The researcher needed to understand this phase to ensure that the interpretation did not contradict the findings from the participants. The researcher examined previous research findings to assess the degree to which the results of the project are congruent with those of past studies (Shenton, 2015). By doing this, the researcher ensured the credibility of the data by understanding similarities with other literature reviewed could be conducted in a different context. Those existing themes were covered in the research.

High levels of transferability were encouraged during the interviews, which means that the findings should be applicable in other scenarios (Shenton, 2015). It was observed from the reviewed literature that there was a possibility that research of this magnitude could provide similar results in different contexts.

5.11 Research ethics: Key considerations

Ethical behaviour is imperative in research because ethics are guidelines for the researcher during the study. Ethics was a crucial element in research, as in any other significant field of human activity (Welman, 2012). The importance of ensuring ethical consideration in research is due to the requirements most needed when dealing with human subjects in both biological and social sciences (Welman, 2012). The researcher informed all participants of their right to withdraw from the study without prejudice or unfair treatment to ensure its credibility and good ethical standing. All non-deceptive practices, such as guiding or bribing participants, were

evaded. To ensure that participants were not exposed to Covid-19 during the data collection process, all data collection tools used during the interview were in response to the Covid-19 data collection regulations to avoid transmission risks during data collection. The participants were also selected following consideration and verification of their willingness to participate in the study and ensuring that there is no financial or any form of beneficial expectation created for participating in the study.

5.11.1.1 Informed consent

Consent forms are an imperative aspect of the study; consent forms were provided to the identified participants with sufficient detailed information on the study. This allowed potential participants to make an informed, voluntary decision to participate in the study. Consent forms that were given to the identified entrepreneurs were written in a language that the entrepreneurs easily understood. This allowed the entrepreneurs to decide to either participate or decline to participate in the study. All entrepreneurs willing to participate in the study were required to sign consent forms. The researcher guaranteed the protection and confidentiality of subjects and ensured that the participant's information shared during the interview was not traced back to them.

5.11.1.2 Confidentiality

In this study, the rights to confidentiality and free withdrawal were observed. Participants were assured that their names and identities were not used in the study at any time. This was done before the interviews. The right to confidentiality was conducted to ensure anonymity and privacy. Informed consent from participants was attained by issuing consent forms to all entrepreneurs participating in the study. Participants were requested to sign consent forms to show they were willing to participate in the study.

Participants were requested to review the results after the researcher captured the information in the study. This is important as participants could state if the data represents the participants' beliefs. It was important for a researcher to maintain objectivity and avoid bias.

5.12 Chapter conclusion

The research methodology and method of data collection that was employed in this study were discussed in the research approach. The study adopted a qualitative research methodology approach. The study was conducted in Gauteng, and participants from various locations within Gauteng were interviewed. Gauteng is defined by two of the nation's largest cities, Pretoria (Tshwane) and Johannesburg (Gauteng online, n.d.). The nominated population for the research was entrepreneurs from Gauteng operating in infrastructure development.

Semi-structured interviews were used for qualitative data with semi-structured interview guides. A self-administered questionnaire was used to collect the demographic information. The interview guides consisted of open-ended questions, which allowed participants to provide more details when answering the questions. Semi-structured interviews were chosen because this gave the researcher a chance to probe for vague answers and ask for an explanation for vague answers. This study continuously observed the rights to confidentiality and free withdrawal.

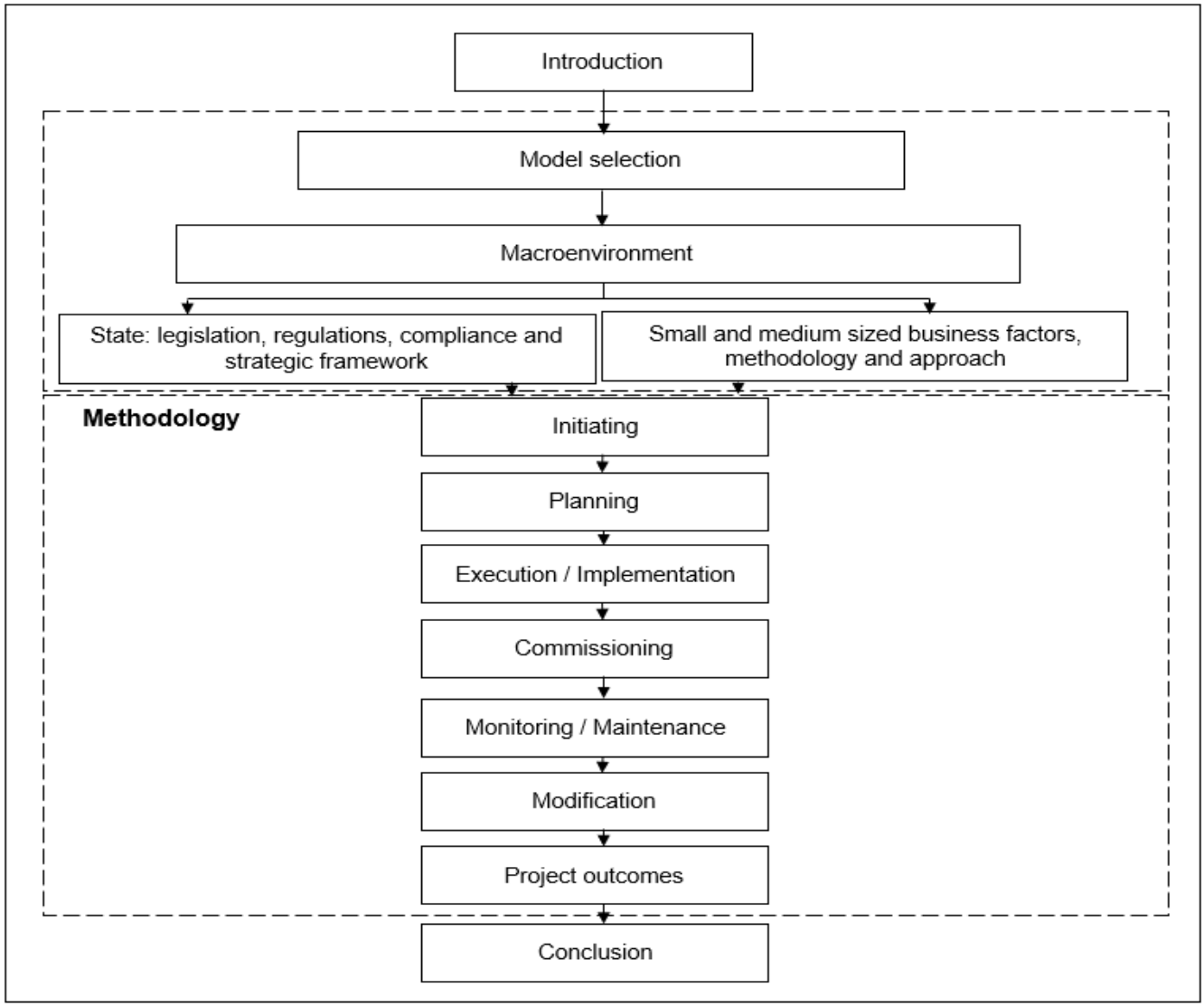
5.13 Chapter Summary

Chapter five unpacked the research methodology applied in the research, including data collection methods, data analysis methods, and sampling techniques. This chapter also explored the study area, study design, and methods to maintain and ensure rigour and reflexivity. The next chapter will include a report on qualitative analysis. The qualitative analysis that provides a model examines the relationships between the theory and its resulting model. Six themes emerged from the study after discussing project management and SMEs in infrastructure development. These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure and delays, the impact of practical and formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies, and approaches used by SMEs. All these themes will be investigated similarly. This chapter will detail the results of the research.

6. CHAPTER 6: THE CONCEPTUAL MODEL

6.1 Introduction

Figure 6.1: Structure of Chapter 6



The previous chapters described the theoretical foundation of a conceptual hybrid project management model to enhance the successful management of infrastructure projects affected by economic disruptors. The definition and characteristics of Small and Medium Sized Enterprises (SMEs), both globally and in developing countries, were provided in chapter two (par 2.3). Chapter two further highlighted the role of SMEs in the South African economy (par

2.4.3) and the contribution that SMEs have in creating jobs in South Africa and provincially (par 2.4.5). This was followed by a brief overview of the South African economy and an overview of the socio-economic and economic profile of the Gauteng province in chapter three. The overview in chapter three established the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles currently existing in the Gauteng province (par 3.2.1). Chapter Four outlined the importance of project management as a fundamental aspect and discipline of planning and executing tasks and activities in an organized and systematic way to achieve goals and milestones within a certain period within certain budgetary constraints (par 4.5.2). Chapter four provided an analysis of project management. This was inclusive of the various project management methodologies that exist.

Chapter Five analysed this study's research methodology and data collection method. The study adopted a qualitative research methodology approach. Chapter Five further outlined the data analysis methods and sampling techniques. The study area, design, and methods to maintain and ensure rigour and reflexivity were further explored. In the study, semi-structured interviews were used for qualitative data with the assistance of semi-structured interview guides. A self-administered questionnaire was used to collect the demographic information. The interview guides consisted of open-ended questions, which allowed participants to provide more details when answering the questions. Semi-structured interviews were chosen because this gave the researcher a chance to probe vague answers and ask for an explanation for vague responses. This study continuously observed the rights to confidentiality and free withdrawal.

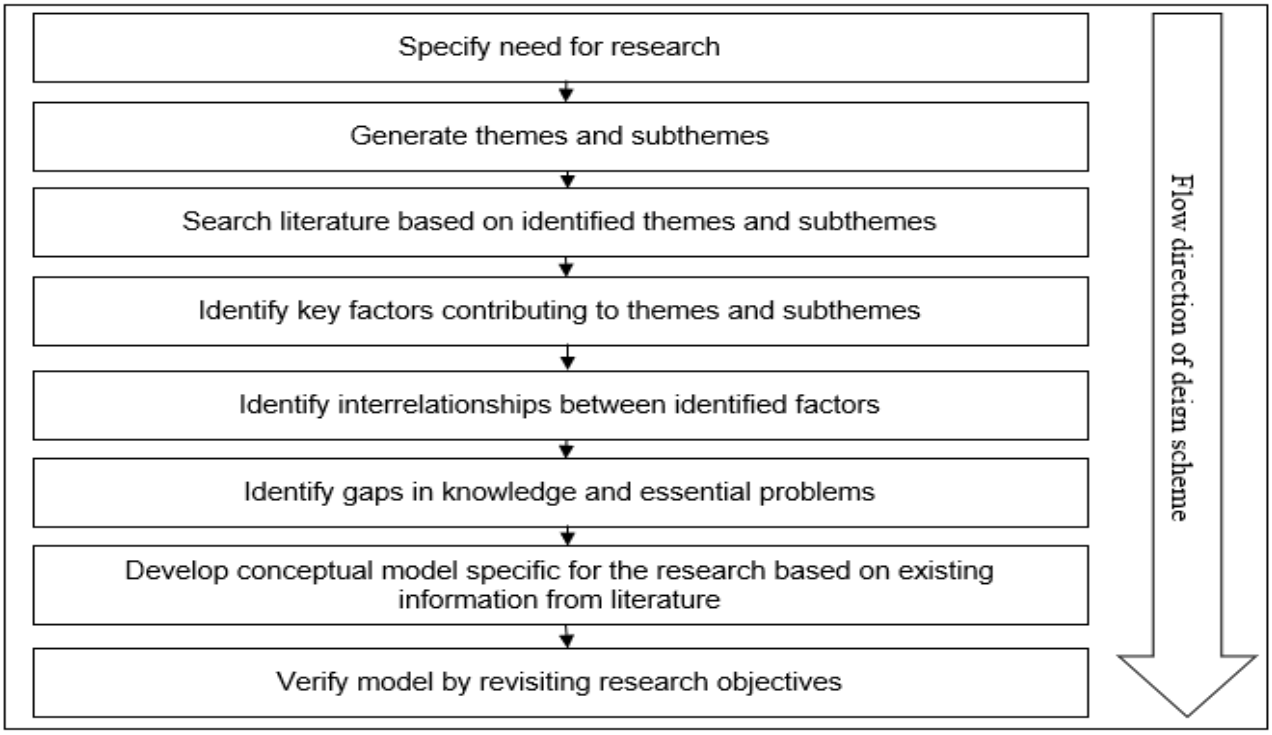
In this chapter, a proposed model for SMEs in infrastructure development programmes in Gauteng will be discussed further. The conceptual model strives to be adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors. The proposed hybrid project management model relies not only on traditional project management methodologies but also on agile methodologies. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project

management components to increase the likelihood of success of infrastructure development projects.

6.2 Methodology for development of conceptual model

A conceptual model is a framework initially used in research to outline the possible courses of action or present an idea or thought. When a conceptual model is developed in a logical manner, it will provide rigour to the research process (Elangovan & Rajendram, 2015). In this study, the conceptual model may be regarded as a schematic representation, diagram or map depicting a researcher's current perception of the problem being researched (Yap *et al.,* 2016). Figure 6.2 illustrates the methodology used in designing and developing a conceptual hybrid project management model based on Bhattacharya *et al.* (2013). This is important for establishing the study limits and boundaries, which serve as the foundation for the research design approach and indicate the direction for fieldwork.

Figure 6.2: Flow chart showing steps for designing a conceptual model



Source: Bhattacharya *et al.*, 2013

The identified themes, issues, and knowledge gaps are used to inform the development of a conceptual hybrid project management model that is adaptable and agile to internal and external factors that influence and enhance the successful management of infrastructure projects impacted by economic disruptors.

The initial phase in the design process was to identify knowledge gaps within the research area by critically evaluating the literature so that the study's themes and subthemes could be established (Yap *et al.,* 2016). This phase is essential in determining the scope of the investigation. The conceptual model was created using the information from the literature (Bhattacharya *et al.*, 2013). The conceptual model was then validated by examining the research parameters and verifying that the constructed model accurately represents the study goals (Elangovan & Rajendram, 2015).

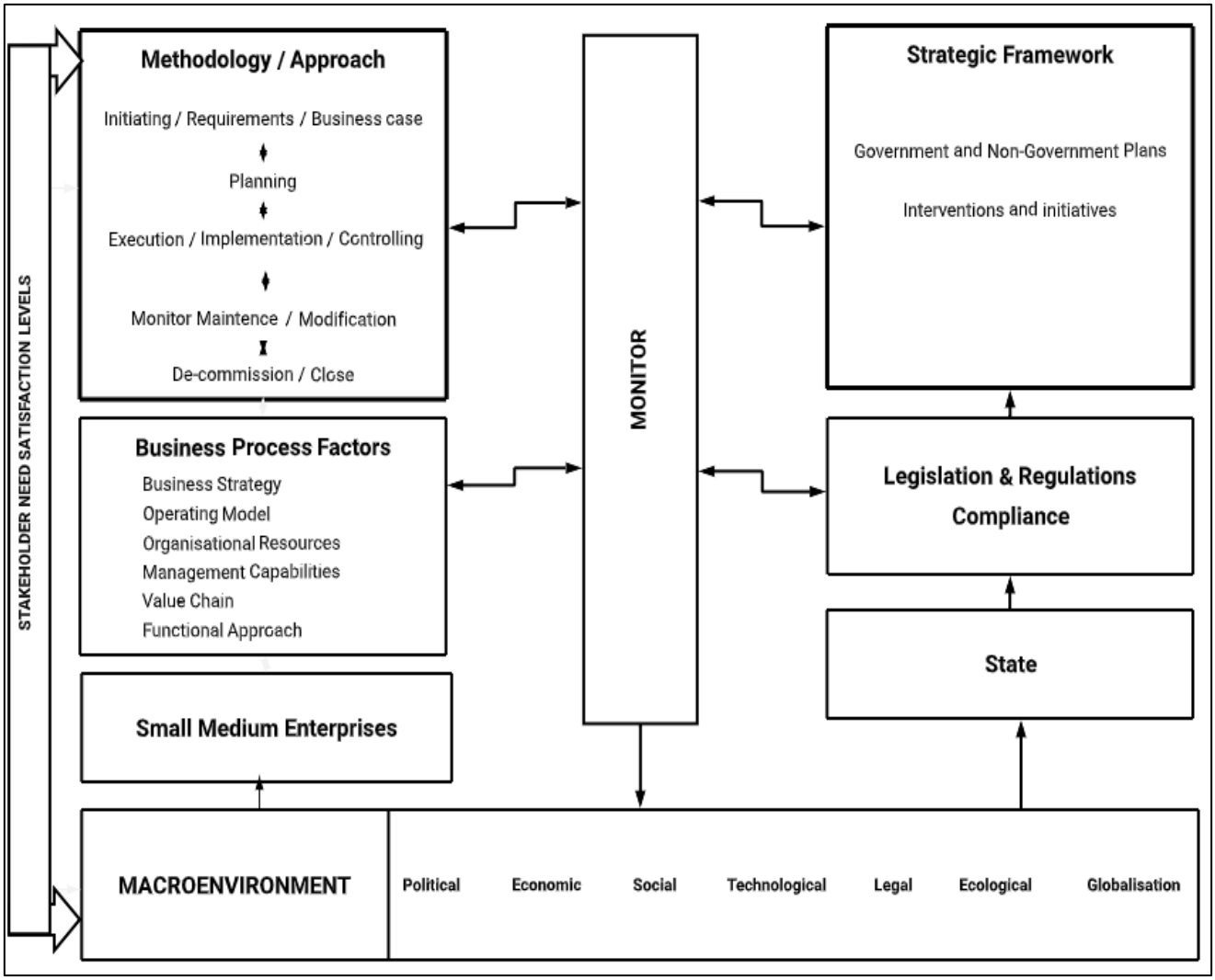
6.3 Model selection

Reviewing existing literature offers a foundation and a basis for a conceptual hybrid project management model. The creation of a conceptual hybrid project management model for infrastructure development projects is aided by a knowledge of the evolution, failure, and best practices of agile project management and traditional project management.

Although the agile methodology primarily focuses on software applications (par 4.5), several principles may be used in infrastructure development projects. This model tries to extract best practices from these project management methodologies: traditional, agile, and lean design approaches (Lalmi *et al.*, 2021).

The conceptual hybrid project management approach emphasizes the benefits received from the structure and predictability of traditional techniques, as well as the adaptability and waste reduction of lean design and agile development. As a result of the combination of agile and traditional methodologies in infrastructure development projects, project failures may be discovered, and their position within the project can be targeted with more precision, therefore maintaining and enhancing the project's strong characteristics.

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs



In addition, the conceptual hybrid project management model will further include a review of internal and external environmental factors and legislative and business factors that impact project management, specifically focusing on SMEs. The model considers the macro-environment, legislative requirements, and other factors and procedures influencing project management. The model is designed to be comprehensive and inclusive of all aspects that affect the implementation of infrastructure development projects for SMEs.

6.3.1.1 Macro-environment

The macro-environment is a collection of external variables that influence organisational growth initiatives and operations, either favourably or adversely. The macro-environment variables are deemed uncontrolled and affect the firm's overall success (Chaouk et al., 2020). Macro-environmental variables are characterized as macro as they influence the whole economic system rather than simply the organisation's local market.

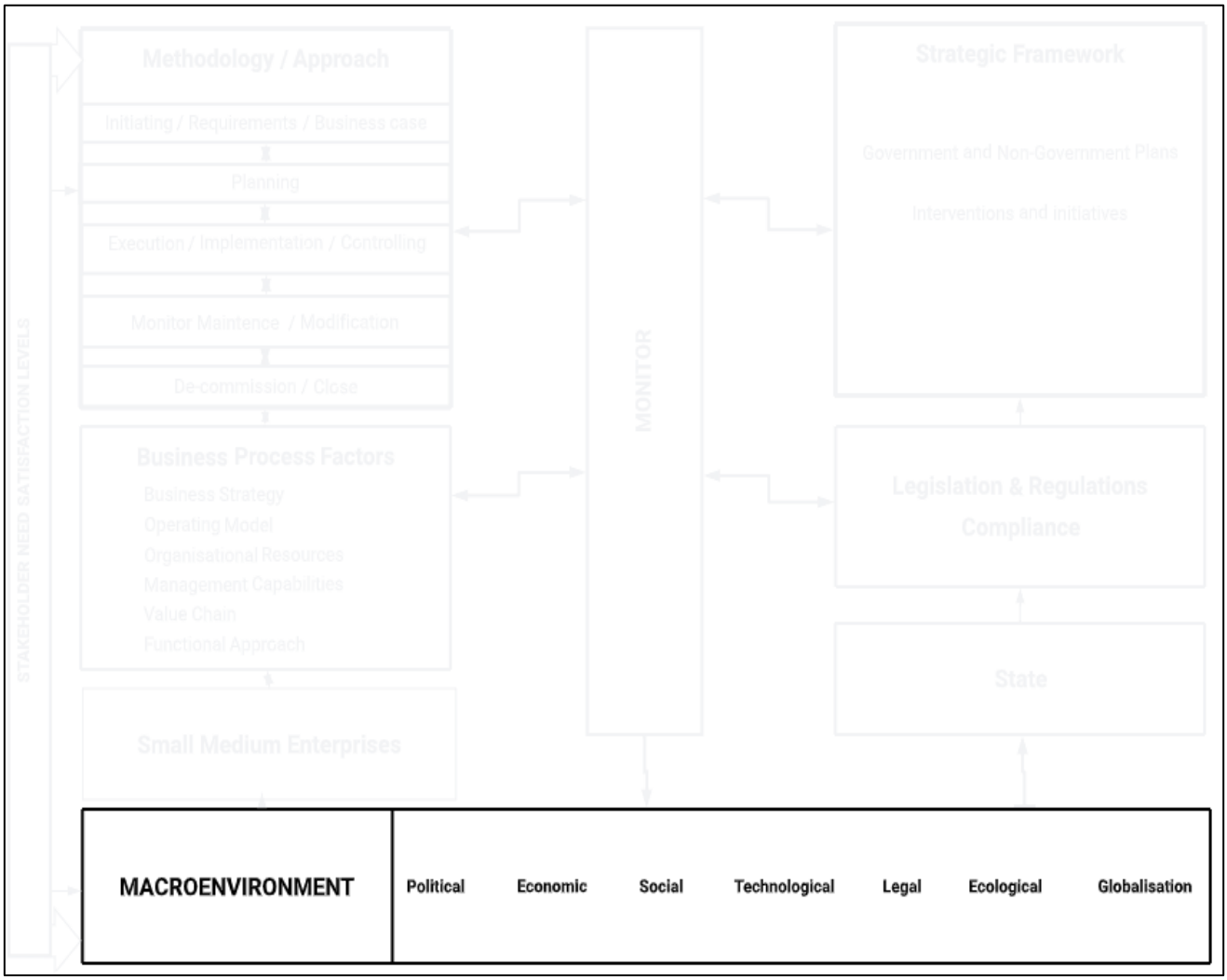
Economic growth, social circumstances, government policies, inflation, climate change, interest rates, technological breakthroughs and advancement are some of the identified variables (Rakovec, 2019). Each macro-environmental variable has a specific impact on how the organization operates. Macro-environmental variables need the development of strategies to manage the threats and capitalize on the opportunities presented by this macro-environment. An organisation's capacity to quickly adapt to external changes is unquestionably a great asset, as it may react positively and evolve its business model around new paradigm shifts (Tsai *et al.,* 2020).

SMEs implementing project management as a tool or as an operating approach to their business should appreciate the various factors that influence the project management process, as described in paragraph 2.4. The macro-environmental variables significantly impact the business's success, sustainability and effectiveness (Carrim, 2021; Smit, 2021). This affects how SMEs operate and continue to deliver on their project-specific strategic objectives.

The various macro-environment variables work within the context of the larger global environment, and changes in the patterns of any PESTLE elements may have either a favourable (opportunity) or negative (threat) effect on a project. A change in one of these variables may provide a risk, threat or hazard to one project but an opportunity to another (Lazenby, 2021). Although these forces' impacts are uncontrollable, they have severe ramifications for the organization and the project.

SMEs need to understand how their operating or project management approach is impacted by the legislative requirements stipulated and set by the government through promulgated laws and legislations of the republic (Elhusseiny *et al.,* 2021a). Therefore, SMEs must understand how the macro-environment impacts their operating or project management approach. Also, looking at other factors that are project management principles and knowledge areas or knowledge aspects important for project management if they are utilizing them as part of their process, how they impact their business or operating approach or project management process.

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs: Macro-environment



SMEs must thoroughly understand and appreciate the macro-environment, including any external or internal factors that may significantly impact the operational plan, project management strategy, or process. It is crucial that the macro-environment be understood and continuously outlined by the SME to successfully employ the process of evaluating and monitoring and comprehending the components that affect the operational or project management process

6.3.1.2 Political, government or legal environment

SMEs involved in infrastructure development in South Africa must recognize that the country's political environment consists of competing organizations and interest groups, and decisions made at the political level by a nation's administration may have a considerable effect not only on the economic environment but also on the legislation and regulations, which can influence the demographics and characteristics of the nation. The government has the authority to operate as a critical deregulator, regulator and subsidizer; however, for infrastructure development projects, the government can act as an employer and a patron of the organisation, as illustrated in paragraph 3.4. With the increasing global interconnection of economies, organisations, governments and markets, SMEs must recognize the possible effect of political issues on the conception and implementation of infrastructure development projects.

6.3.1.3 Economic environment

Globally and in South Africa, SMEs are impacted by the economic sustainability of a country, which is influenced by many economic variables. As a result, SMEs must examine the economic environment to identify trends and changes and the strategic repercussions of these occurrences, as discussed in paragraph 2.8. Economic factors affect and impact SMEs in many economic sectors and locales (Haraguchi *et al.*, 2017). Project delivery for infrastructure development projects is affected by various circumstances, including but not limited to inflation, recessions, and interest rates. For instance, SMEs must consider the unemployment rate, the availability and cost of financing, the discretionary funds, and the gross domestic product trends (GDP).

The government's monetary policies influence the amount of foreign currency entering South Africa, especially that of the South African Reserve Bank. If the GDP growth rate is less than the population growth rate, then the standard of living will decline. Although reduced interest rates are advantageous for SMEs in South Africa, they will harm capital inflow into the country.

6.3.1.4 Social, cultural or demographic environment

Changes in social, cultural, and demographic characteristics present opportunities and risks for small and medium-sized enterprises. Regarding infrastructure development projects, governments may choose where to concentrate their efforts based on demographic shifts within a nation (Singh *et al.,* 2021 Morina & Gashi, 2017). These factors also influence how individuals choose to live, work, and contribute to particular communities. This may have an impact on how individuals consume goods and services. Not only is the population demography of South Africa diversified, but so too is the cultural landscape. Different subcultures are established based on population demographics, religion, and location. These subcultures impact the delivery of infrastructure development projects. These subcultures influence the delivery of infrastructure development projects for SMEs in this sector because SMEs need to be aware of some of these factors when consulting the community where the project will be implemented.

It is possible that infrastructure development projects carried out in communities where the majority of residents have higher levels of education will be executed differently from those carried out in areas where a significant number of residents lack basic education. Infrastructure development projects that are delivered to communities where the population is ageing and relies on a limited monthly budget (pension), for example, may be different from those that are provided to communities where the ageing population has money and is eager to spend it on their health, comfort, leisure activities, and automobiles. The former population may have less money to spend on essentials like health care, comfort, and leisure activities, but the latter may have more. Essential factors such as the different spending habits of the community are important to consider (Carrim, 2021; Morina & Gashi, 2017). Some of these factors will impact

the infrastructure development project that will be delivered, so it is essential to consider these factors. It is difficult for most SMEs to translate all social and cultural societal developments into project delivery outcomes that are applicable and relevant to the community.

6.3.1.5 Technological environment

The advancement of technology described in paragraph 2.3 affects a variety of facets of society. These effects are primarily attributable to the introduction of innovative technologies and processes. An SME must be abreast of the technological changes that may affect its industry to avoid becoming obsolete and encourage innovation. Examples of revolutionary technological discoveries and innovations that significantly impact SMEs include superconductivity, computer engineering, robotics, miracle drugs, space communications, lasers, cloning, satellite networks, fibre optics, biometrics, and electronic funds transfers (Lazenby, 2021). In addition to presenting opportunities for some infrastructure development projects, technology advancements might pose obstacles for others. Due to the fast pace of technology development, an SME must assess the technical environment and the significant possibilities and dangers it brings before launching or planning a project.

The following are the effects of technological innovation and progress on SMEs according to Lazenby (2021): (1) technology has a significant impact on the goods, services, markets, suppliers, distributors, competitors, customers, production processes, marketing methods, and competitive position of organizations; (2) technology generates new markets, alters the relative cost structure of an industry, and renders existing goods and services obsolete; and (3) technology eliminates or reduces cost barriers between firms; (4) technology creates more strong competitive advantages than are presently available.

Small and medium-sized businesses should not be exempt from producing new technical advances; more significantly, SMEs should evaluate the technological environment and incorporate it into their initiatives regarding the latest technological advances. Small and medium-sized businesses cannot afford to lag.

6.3.1.6 Environmental, ecological or physical forces

The ecological or physical environment refers to the relationship between SMEs and the physical environment. In studying the physical environment, the SME must consider the potential and actual changes in this environment and the effect these changes will have on the business processes of companies built to react to these changes. Furthermore, it alludes to the limited natural resources from which a corporation obtains its raw materials (Olatunji & Houghton, 2017). South Africa is not immune to the devastation these global climate changes will have on businesses. If global warming continues, the output will suffer, and some resources will become scarce. These circumstances will provide SMEs with opportunities and threats, and businesses must take the influence of the physical environment seriously. For example, energy consumption is a crucial component of the physical environment, and SMEs in infrastructure development should be mindful of it (Rassier & Earnhart, 2015). The influence of the unmanaged natural environment on organizations is enormous. The natural catastrophes that struck South Africa demonstrate the impact of the physical environment on SMEs and the delivery of infrastructure development projects.

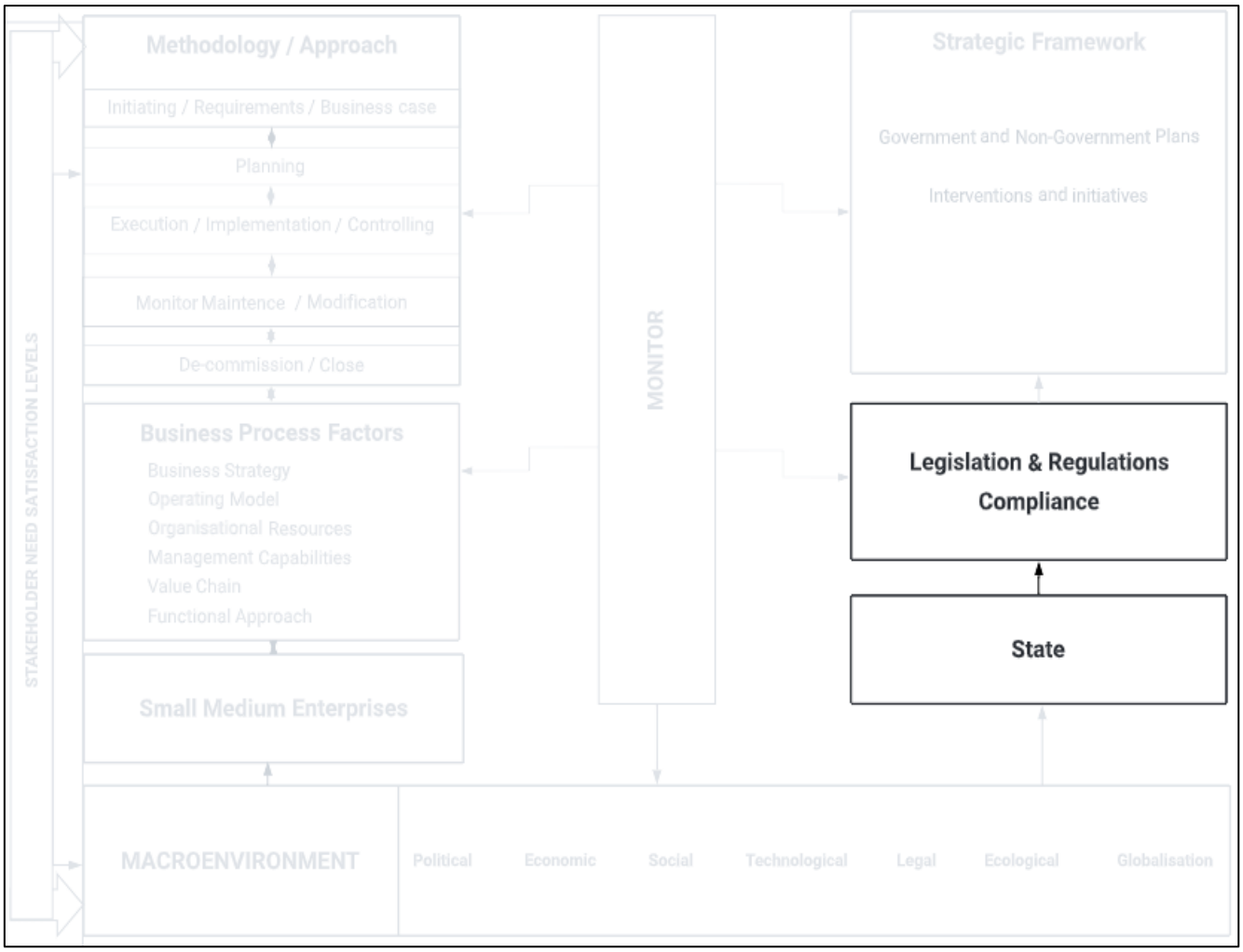
6.3.1.7 State: legislation, regulations and compliance

In support of small and medium-sized enterprises, the South African government has established various goals, which have resulted in positive outcomes for several organizations (paragraph 2.8). These government objectives, according to Lazenby (2021), are to (1) accelerate the development of social and economic change; (2) place a greater emphasis on the effectiveness of government actions and initiatives; and (3) improve the quality of life for all citizens; (4) to encourage the development of new jobs in collaboration with the private sector; and (5) have a strategy that is taken seriously when addressing issues of law and order. If the government fails to achieve these aims, inevitable consequences might lead to the ongoing demise of specific organizations.

The state may provide SMEs with substantial opportunities and obstacles, and municipal, provincial, and national rules and regulations and compliance requirements may considerably impact several SME issues. Any wide range of factors including, but not limited to, changes in

tax laws, changes in patent laws, legislation on equal employment, legislation on antitrust, the quantity of government expenditure, and any other type of government regulation or deregulatory action, may subject an SME to considerable change. Other considerations may include pricing regulations and the minimum wage, which will disproportionately influence cash flow and profit potential, affecting SMEs' decisions.

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs: State: legislation, regulations, compliance and strategic framework



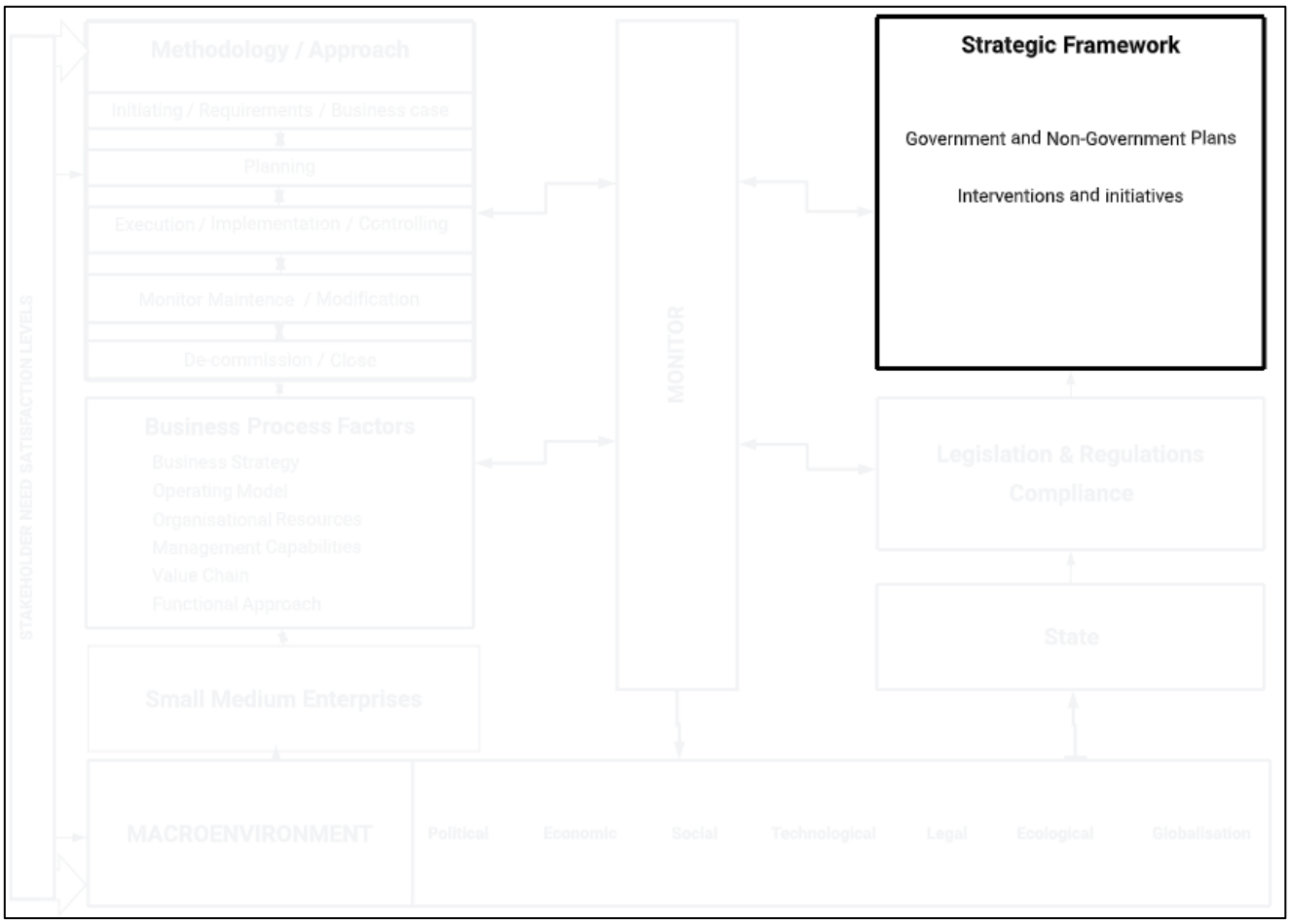
SMEs must understand how the macro-environment influences their operational or project management approach. The legislative requirements stipulated and set by the government through promulgated laws and legislations of the republic are something that SMEs need to

understand regarding how these requirements impact their operational or project management approach.

6.3.1.8 Strategic frameworks

This aspect of the model refers to those strategic policies or plans adopted by the national government or not government organisation for the development and implementation for the broader society, as discussed in paragraph 2.3.1.3 and paragraph 2.5. A strategic framework outlines governmental plans and initiatives or non-government projects and interventions wherein the SMEs must provide and render their services to assist in attaining the plan/project objectives.

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs: Strategic Framework



The SME must understand the set plans and strategic frameworks wherein they are required to deliver or render service. For instance, the government has adopted a National Development Plan (NDP) described in paragraph 2.9, outlining the various infrastructure development objectives (Lazenby, 2021). The SME forms a critical partner in the implementation of the plan. In the NDP, the government has identified specific infrastructure projects and timelines that will contribute to the strategic objectives of this framework.

SMEs must understand the NDP, how it is structured, its anticipated impact and specifically, the changes and reviews aligned with the plan. If the government decides to revise this due to whatever factors necessitated the review, the SMEs need to be able to adjust and align with the review. Therefore, this model aspect requires SMEs to appreciate how government and non-government frameworks such as the NDP could influence or impact their project management approach (Goldstrong, 2021), as described in paragraph 2.9.1.

The model's strategic framework aspect provides SMEs with an overall understanding and knowledge of the government and non-government policy or project overview so that they can assess the framework's requirements for their project management approach and how this impacts the overall approach.

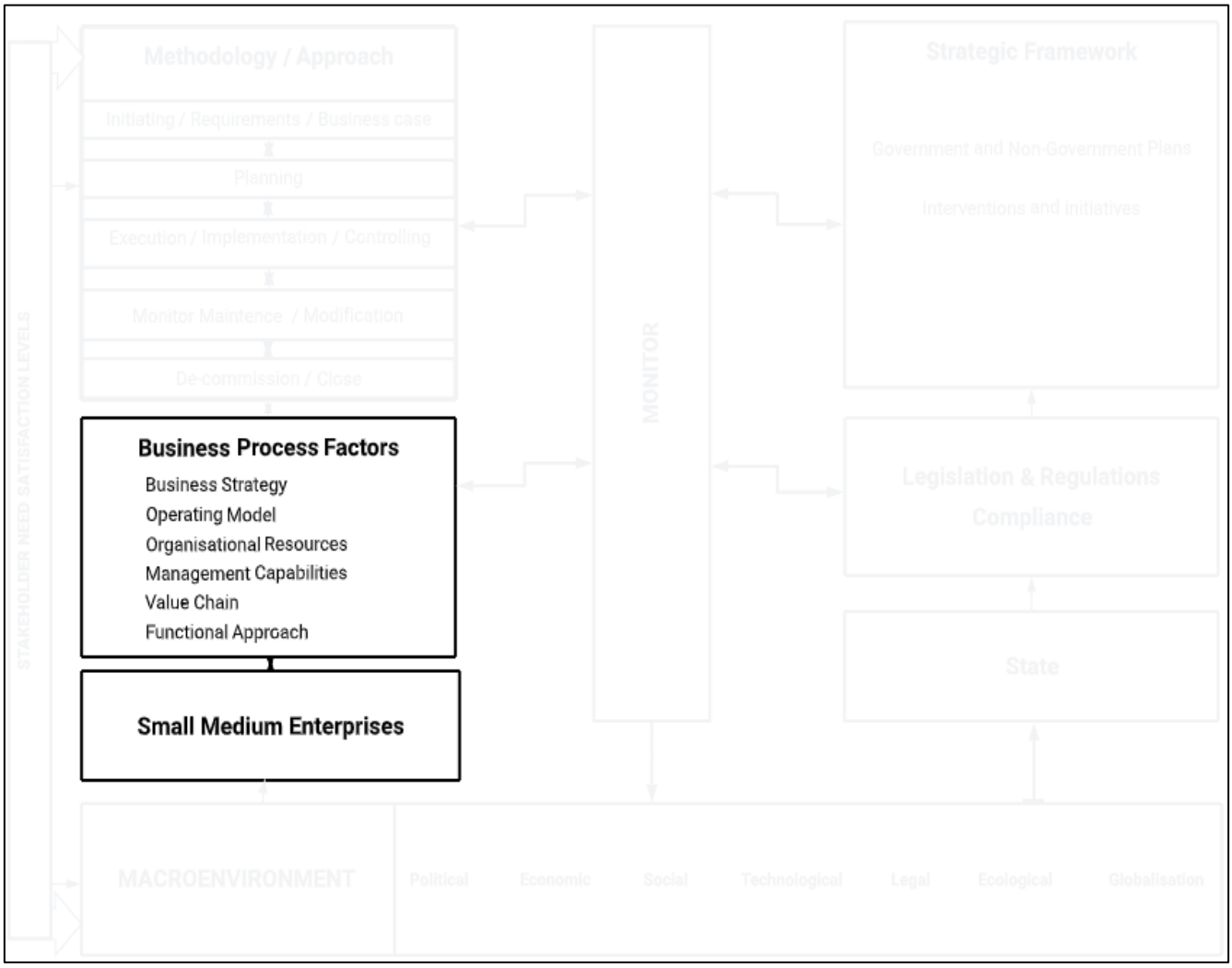
6.3.1.9 Small and Medium-sized business factors

The sustainability of a business is heavily reliant on how it operates and what processes the business has in place to ensure that it navigates the environment that it operates within, but also how it's able to adapt to the changes and the impact that affect or impact the business as illustrated in paragraph 2.5.1. Therefore, a business needs to have an operating approach, such as a business strategy or an operating model suited for the business.

An effective business strategy or operating model is fundamental for any business, especially for SMEs, as it integrates the strategic direction and objectives that align with the management and other business processes, as explained in paragraph 2.7.1. An organisation must develop and implement a business strategy, such as an operating model, as an efficient business

strategy and operating model ensures that the business can operate in an economic sector. An operating model helps drive and steer the business to a new, optimised way of working (Ithia, 2015).

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs: Small and Medium-sized business factors



It is, therefore, necessary for the business to identify the various aspects or elements that will ensure the suitability and progression of the business. Several successful businesses and SMEs, especially those within the South African market, have developed business strategies or operating models that are key to business operations as a business strategy and an

operating model can serve as a blueprint for how resources are organized and operated to get critical work done (Bain & Company, 2014).

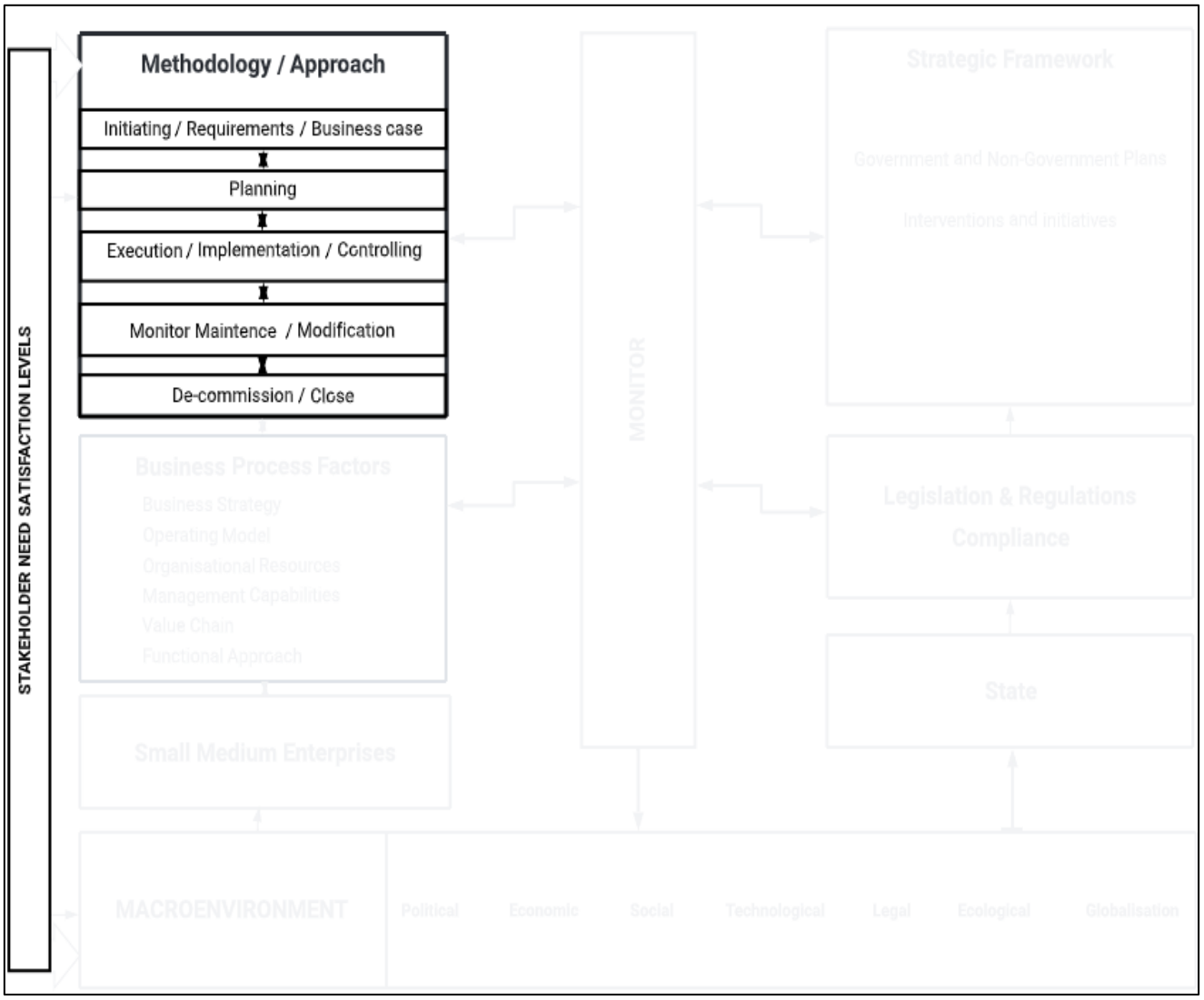
Therefore, business strategies and operating models assist businesses with delivering on business objectives and strategic business goals (Ithia, 2015). This means that when businesses are developing models, they need to be mindful of the environment and other external factors and legislative requirements that businesses need to comply with and what the role of the business itself would be in the environment. Significantly, some businesses have also developed processes such as effective project management as a tool or an approach to be able to deliver on the strategic objectives; such tools aid SMEs in business operations.

6.3.1.10 Methodology and Approach

Whilst that is the approach that is fundamental to SMEs, it's essential for the business to align itself or have a business alignment with the respective legislative requirements and also ensure that it's able to sustain itself and progress through the various processes that it has in place (Lazenby, 2021).

Against this backdrop, a project management approach or using project management as a tool or process in a business is important to ensure that the business can effectively deliver. This is critical for SMEs to deliver projects through the applicable project management approaches.

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs: Methodology and Approach



The phases of the methodology or operating model for the business need to, at the minimum, contain the process of enabling the business to initiate, plan, execute, commission and decommission the project. The phases mentioned in paragraph 4.5 and paragraph 4.7 are critical because they provide the basis and structure of how the project will be approached and undertaken from inception to completion and closeout. SMEs must embed these elements in every project to ensure consistency and effectiveness.

6.3.1.11 Initiating

This phase of the model, described in detail in paragraph 4.5.1, allows the SME to structure the project and outlines the process to undertake or start the project. At this phase, an SME needs to assess the significance of the project, what resources are required, the project's duration and other aspects key to starting the project.

In this phase of methodology/approach embedded in the model, SMEs employ project management techniques and steps to plan effectively for the project by outlining the critical requirements for the project (Huljenić *et al.*, 2005; Warburton & Cioffi, 2014). In most instances, it requires drawing up plans to detail the project.

This phase provides the SME with the reasons or needs for the project and what is required from the project. This is the process wherein the SME engages the project sponsor/ owner to ascertain the project requirements, purpose and expectations regarding project outcomes and deliverables (Lalmi *et al.*, 2021). The SME will engage the project sponsor/owner on the requirements, assess them, and align them with the relevant resource needs analysis to ensure the project is adequately resourced and understood regarding the expected outcome or deliverables. Understanding project sponsor/owner needs by breaking down work into "user stories" is an agile approach prescribed in the Scrum methodology that encourages strong customer participation by prioritizing activities based on the perceived value to the customer (Lalmi *et al.*, 2021; Segebart 2019).

This phase would result in presenting a business case to demonstrate the rationale for the project's investment, validate it, and usually acquire the project sponsor/owner’s s approval to continue (Kaufmann *et al.*, 2020). The project charter, including costs, tasks, deliverables, schedule and a stakeholder registry, will be submitted to the project sponsor/owner as per the PMBOK 6. In addition, the participation of stakeholders at the outset of a project is vital for initiating project activities (Lalmi *et al.*, 2021).

6.3.1.12 Planning

As mentioned in paragraph 4.5.2, the planning phase involves organising and allocating resources. This project phase allows the SME to effectively outline the tasks and determine what must be done, when, and how it will be done. The planning phase enables the SME to effectively set out and structure the project and detail how the project will be delivered and implemented.

This is where resources are activated to address the project objectives and outcomes. At this point, the SME determines the deliverables and how they will be attained. It contains the process of applying the project charters and guides to outline the project and timelines. During this project phase, it is feasible to suggest "daily meetings" (periodic reviews) to identify changes as quickly as possible. Based on an agile management methodology, a daily meeting in which the project team examines the whole cycle evaluates what has been completed and what might be improved (Kaufmann *et al.*, 2020; Segebart, 2019). The objective of the daily meeting is for all participants to assess their progress and impediments. To foster collaborative work and visual management, the Kanban Board (agile methodology) will be used as a workflow visualization tool after gaining knowledge of the client's needs during the design phase (Lalmi *et al.*, 2021).

During this phase of the project, the SME formalizes the project approach and principles that it will employ in the implementation of the project through outline timelines, deliverables and allocation of resources for the project (Goldstrong, 2021). The planning phase allows the SME to engage with the requirements and deliverables to ensure the project is detailed enough for adequate resourcing and implementation. The work breakdown structure (WBS), which breaks down the work into smaller components, will be utilized as a traditional project management approach to identify the project's scope (Lalmi *et al.*, 2021). Critical path methodology, as a conventional approach to project management, will show dependencies and issues. The critical path determines where to exert the most effort to reach a project's deadline.

A risk management approach is the most crucial aspect of dependable project control methods (Annamalaisami & Kuppuswamy, 2022). Tools such as WBS, critical path methodology, and risk assessments are traditional project management approaches utilised in this phase to effectively plan for the project and ensure a comprehensive understanding and outlining of the project. According to Lalmi *et al*. (2021), the use of the integration of information technologies and building information modelling (BIM) as a lean design tool can be used in the planning phase to synchronize information in the project and reduce design errors and conflicts good examples of tools used to facilitate communication in infrastructure development projects.

6.3.1.13 Execution, Implementation and Control

The execution, implementation and control phase discussed in paragraph 4.5.3 requires a phased approach wherein the project will be undertaken in a phased approach. This is critical as it allows the SME to implement a phase at a time to assess the impact and/or adjustments required for the project (Nisha, 2020). This is the essence of the project, and a hybrid approach to project management is crucial in this regard, as it enables the SME to execute one phase and analyse its effect, changing needs, and necessary modifications. To correctly manage the project's execution, implementation, and control phase, the SME must use traditional and agile approaches, such as the last planner system, earned value management, and change management process.

The Lean Construction Institute's Last Planner System (LPS) is a workflow approach used as a planning and control improvement tool to monitor the process and promote worker productivity and responsibility through tight scheduling and thorough group planning (NEHP, 2018). LPS is regarded as a managerial approach to running a construction project efficiently. The system's guiding premise assures that each contractor and subcontractor on a building site can effectively manage their workload while being held accountable for the job they agreed to do (Nisha, 2020; Kaufmann *et al.,* 2020; Segebart, 2019). LPS engages in a collaborative exercise in which contractors and subcontractors identify the work they will do and establish which phase of the project must be completed before the start of the next phase (Lalmi *et al.*, 2021). Utilizing approaches consistently facilitates on-demand planning, previous planning with

stress analysis, weekly work planning based on dependable promises, and learning based on planning system analysis.

The execution or implementation phase is wherein the SME undertakes the activities set out in the planning elements (Annamalaisami & Kuppuswamy, 2022), which is fundamental to the LPS workflow approach. This includes undertaking actual activities and functions to deliver on the set objectives and attain the deliverables through the precise and functional undertaking of the activities (Kaufmann *et al.*, 2020). During this phase of the LPS workflow, the SME can articulate and manage the time and quantity of the resources utilised in the activities and objectives.

In the control phase, infrastructure development projects require measures and indicators that can ensure the progress and control of this phase (Lalmi *et al.*, 2021), such as progress measures through progress reports and progress meetings, to measure the project's performance in terms of cost and schedule, the management of acquired value, and the acquisition of earned value (EVM) integrates cost and schedule control to offer performance indicators that assist the project team in anticipating cost overruns and delays.

Utilizing a change management process is critical for improving the dependability of the measurements used to evaluate the project's progress and performance using the change log. All essential information and lessons were recorded in a log, which will also contain lessons learnt. The lessons learned and issue registered deemed best practices in the control phase.

6.3.1.14 Commissioning

Commissioning relates to the project being introduced and handed over for utilisation to the project sponsor or end user, as mentioned in 4.5.4. T project is completed and executed according to the timelines and project deliverables (Nisha, 2020; Bajjou & Chafi, 2020). Additionally, this phase requires the completion of any outstanding checklist items and contractual commitments. During this phase, the project team and client must work together to ensure that the final components of the project have been completed, contracts have been signed, and the project has been concluded (Lalmi *et al.*, 2021; Mostafa *et al.*, 2016; Saini *et*

al., 2017). Acceptance documentation and a meeting are required for a project's conclusion. This is the stage at which the SME delivers or transfers the project to the project sponsor/owner by instructing them on its use or operation.

The handover process involves evaluating the sponsor/owner's level of satisfaction and identifying any unresolved problems that the SME must resolve before the project's acceptance and use.

6.3.1.15 Monitoring and Maintenance

Refers to monitoring and evaluating the project's implementation and effectiveness. In this phase, the SME verifies and checks if the project is accomplishing what it was meant to and whether it is fulfilling the needed or specified goals, as illustrated in paragraph 4.5.4. In this phase, the SME utilizes tools like a matrix and project monitoring and evaluation sheets to determine if the project's output meets the requirements of the sponsor/owner.

6.3.1.16 Modification

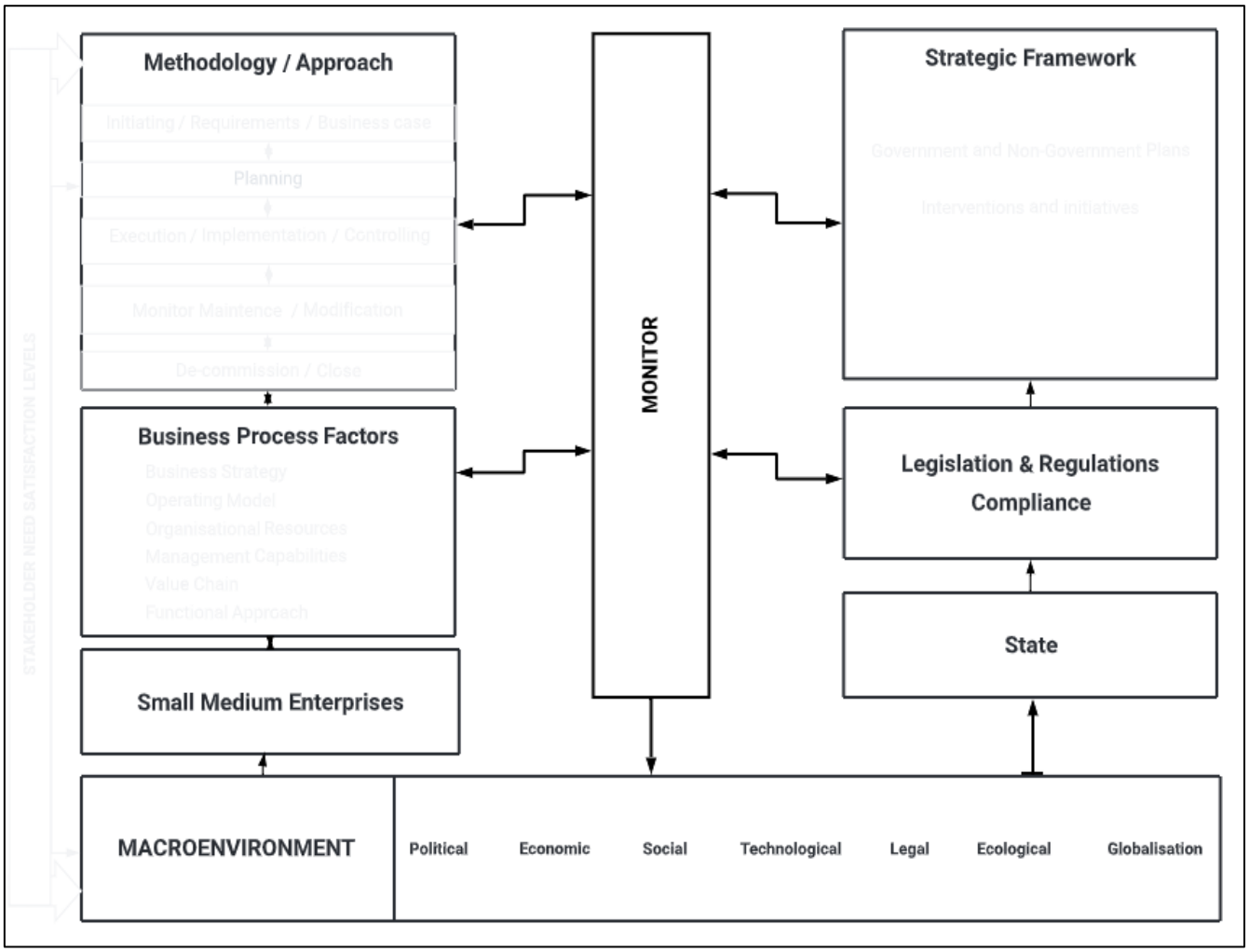
The modification phase of the project allows for adjustments and small reviews of the project after monitoring and commissioning. Following the monitoring and evaluations conducted in the monitoring phase, the SME may now specify any needs for modifying or refining the project at this stage. As concerns or aspects to consider for review or refinement are found, this phase assists the SME in implementing those necessary revisions or refinements so that the project can continue to achieve its goals and optimally fulfil its purpose.

6.4 Monitor

The macro-environment, laws and regulations, strategy framework, business process factors, and project management techniques and approaches must all be regularly monitored as by the SME described in paragraph 4.8. Continuous monitoring by the SME enables the SME to alter projects in response to external elements that might affect them without jeopardizing project execution (Guertler & Sick, 2021b), as illustrated in paragraph 4.7. Continuous monitoring also aids in determining the environmental impact of an organization's actions,

either to assure compliance with rules and regulations or to decrease risks that could detrimentally impact the natural environment. Monitoring is critical to the success of any project or program (Warburton & Cioffi, 2014).

Figure 6.3: Conceptual Hybrid Project Management Model for SMEs: Monitor



Applying a hybrid project management approach in all model phases enables successful planning, initiation, and execution processes, which is considered essential for SME project management (Ansah, 2011; Guertler & Sick, 2021b). To aid the SME in project management and ensure project delivery following the objectives and scope, the SME needs to subject the project to the various methodologies/approach assessments. This will ensure that SMEs consider and implement the hybrid approach and process for effective project management.

6.5 Chapter conclusion

In this chapter, a proposed model for SMEs in infrastructure development programmes in Gauteng was discussed further. The proposed hybrid project management model relies not only on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

This chapter further highlighted the importance of employing various methodologies in project management in infrastructure development and how this will assist SMEs in managing projects effectively and efficiently, which will minimise impairments ordinarily associated with projects of that nature. This is because a conceptual hybrid project management model could focus on breaking down a specific project into more controllable and manageable tasks or phases. This chapter further discussed how incorporating agile project management, where the tasks or phases are completed in short iterations throughout the project life cycle, is beneficial for infrastructure development projects.

Using a hybrid project management model incorporating various project management methodologies by SMEs in infrastructure development projects could result in teams that complete work faster, adapt to changing project requirements, and optimise workflow. Each project management process could ensure continuous collaboration with stakeholders. The chapter also outlined the beneficial elements of a hybrid project management model, i.e. a model that combines elements of more than one current model, and how this could assist SMEs in adjusting the projects in response to environmental factors that can influence or impact, such as the everyday economic disruptors, without compromising the project's delivery. The chapter also focused on the unique ability that the hybrid model proposes to enable and equip teams in the SME environment to be prepared to change direction and focus rapidly but with precision and accuracy.

6.6 Chapter Summary

The previous chapters described the theoretical foundation of a conceptual hybrid project management model to enhance the successful management of infrastructure projects affected by economic disruptors. The definition and characteristics of Small and Medium Sized Enterprises (SMEs), both globally and in developing countries, were provided in chapter two. Chapter two further highlighted the role of SMEs in the South African economy and the contribution that SMEs have in creating jobs in South Africa and provincially. This was followed by a brief overview of the South African economy and an overview of the socio-economic and economic profile of the Gauteng province in chapter three. The overview in chapter three established the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles in the Gauteng province. Chapter Four outlined the importance of project management as a fundamental aspect and discipline of planning and executing tasks and activities in an organized and systematic way to achieve goals and milestones within a certain period within certain budgetary constraints. Chapter four provided an analysis of project management. This was inclusive of the various project management methodologies that exist.

Chapter Five included a report on qualitative analysis. The qualitative analysis provided a model that examined the relationship between the theory and its resulting model. Six themes emerged from the study after discussing project management and SMEs in infrastructure development. These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure & delays, the impact of practical and formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies and approaches used by SMEs, were investigated similarly. This chapter detailed the results of the research

In this chapter, a proposed model for SMEs in infrastructure development programmes in Gauteng was discussed further. The proposed hybrid project management model relies not

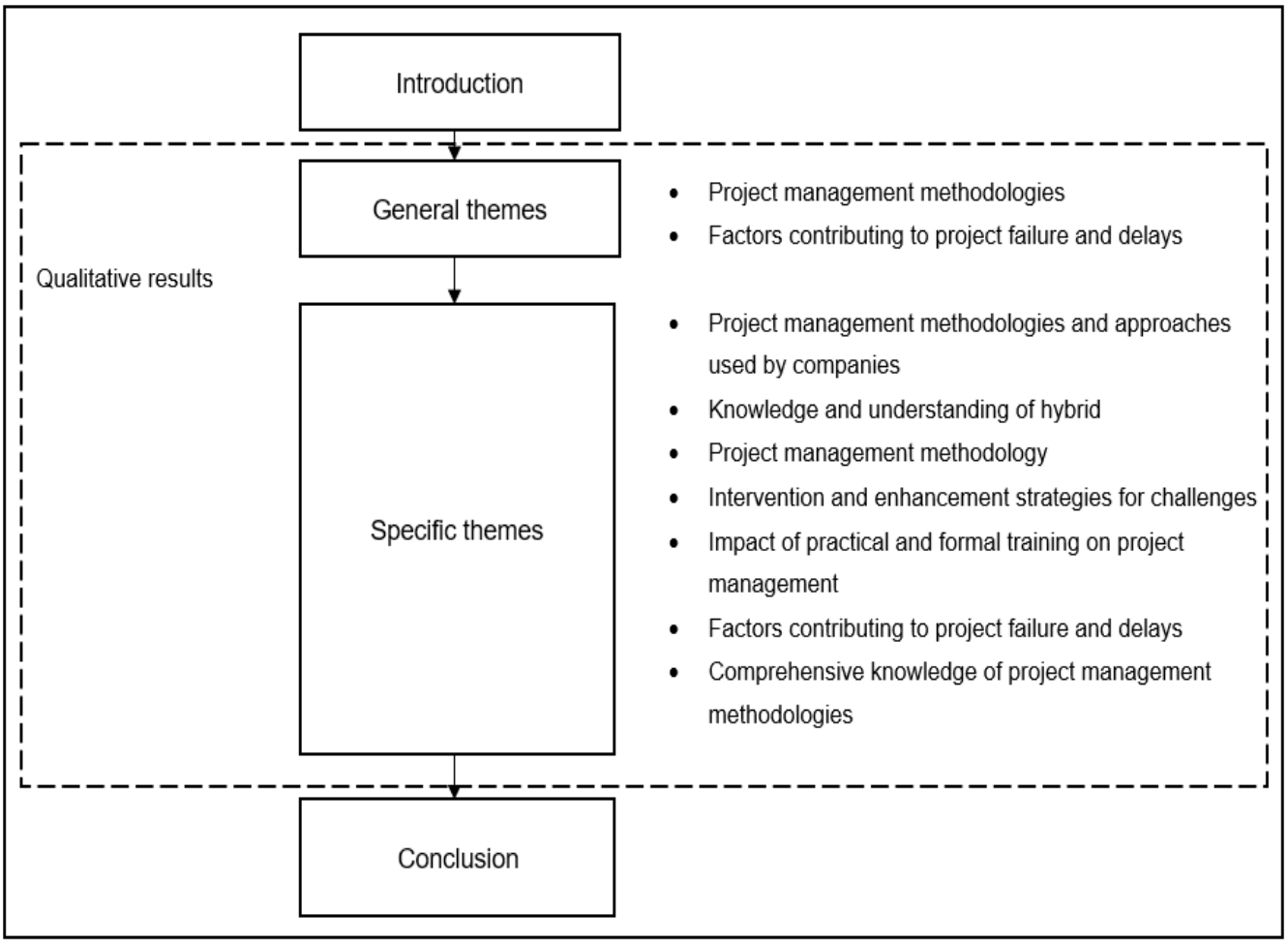
only on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

In this chapter, the third secondary objective of the study is to propose a theoretical project management model for SMEs involved in infrastructure development in South Africa. The theoretically proposed model for SMEs undertaking infrastructure development projects took into consideration certain factors and principles deemed necessary for effective project management. This outlined some of best practice processes within the project management fraternity. In essence, the theoretical proposed model sets a guideline for effectively conceptualising and outlining a project management approach for SMEs undertaking infrastructure development projects. This was done by identifying the theoretical background, best practices and other relevant theoretical information in project management.

7. CHAPTER 7: RESEARCH RESULTS

7.1 Introduction

Figure 7.1: Structure of Chapter 7



The previous chapter proposed a model for SMEs in infrastructure development programmes in Gauteng, which is discussed further. The proposed hybrid project management model relies not only on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project

management components to increase the likelihood of success of infrastructure development projects.

This chapter includes a report on qualitative analysis. The qualitative analysis that provides a model examines the relationships between the theory and its resulting model. Six themes emerged from the study after discussing project management and SMEs in infrastructure development. These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure & delays, the impact of practical & formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies and approaches used by SMEs, are investigated similarly. This chapter will detail the results of the research. In Chapter 7, a proposed model for SMEs in infrastructure development programmes in Gauteng will be discussed further. The proposed hybrid project management model relies not only on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors.

Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects. Chapter 8 will explore recommendations concerning addressing the findings and challenges identified in the study. Chapter 8 will further present the final conclusion and recommendations of the study.

7.2 The main research objective of the qualitative analysis

A thematic analysis method was adopted to examine the participants' qualitative information, thereby addressing the study’s objectives, as suggested by Braun and Clarke (2006). Following the grounded inductive thematic analysis technique, after the audio interviews had been

transcribed, the data were organised, coded, and grouped, and themes were constructed, refined, and finalised.

7.2.1.1 Participant profile

A total of 16 individuals participated in the research: all participants in the research project were African adults between 18 and 50 years old. This group consists of a total of six females and ten males. As seen in the table below, some participants held Master's qualifications (four participants), postgraduate qualifications (five participants), and seven had completed an undergraduate qualification.

Table 7.1: Demographic profile of participants

	AGE	RACE	GENDER	HIGHEST EDUCATION
Interview 1	31-40	African	Male	Diploma
Interview 2	41-50	African	Male	Masters
Interview 3	51-60	African	Male	Masters
Interview 4	41-50	African	Female	Masters
Interview 5	18-30	African	Male	Bachelor's degree
Interview 6	31-40	African	Male	Bachelor's degree
Interview 7	31-40	African	Female	Bachelor's degree
Interview 8	31-40	African	Male	Bachelor's degree
Interview 9	41-50	African	Female	Bachelor's degree
Interview 10	31-40	African	Male	Bachelor's degree
Interview 11	31-40	African	Female	Postgraduate degree
Interview 12	18-30	African	Female	Honours degree
Interview 13	41-50	African	Male	Postgraduate degree
Interview 14	41-50	African	Male	Postgraduate degree
Interview 15	31-40	African	Female	Masters
Interview 16	31-40	African	Male	Postgraduate qualification

7.2.1.2 Demographic profile of the business

The information about the company is presented in the table that can be seen below. Most of the SMEs were not officially registered companies until sometime between 2001 and 2021. Between the years 1971 and 1997, respectively, four of them were given official registration status. Most businesses have workforces that number anywhere from 11 to 250 workers, with most falling in the middle.

The following table demonstrates that 14 of the participant's businesses operate on a national level, while just one of their businesses works on an international level. Three of these businesses have earned BBBEE ratings greater than level 3, which is the minimum requirement. The data shown in the table makes it abundantly evident that most firms are engaged in some building or infrastructure project.

The great majority of the organisations were not officially registered before 2001. Between the years 1971 and 1997, respectively, four of the organisations resumed operations. Below is a table containing information about the organisations.

Based on the data shown in the table below, it is evident that most enterprises are engaged in infrastructure development projects. Most organisations have employee complements ranging from 11 to 250 employees. Additionally, the following table demonstrates that fourteen organisations operate on a national scale, while one operates nationally and internationally. The table further illustrates that thirteen organisations have attained a level 1 BBBEE level, and three organizations have attained BBBEE ratings greater than level 3.

Table 7.2: Demographic profile of the business

	BUSINESS REGISTRATION	GAUTENG REGION OF OPERATION	BUSINESS STAFF COMPLIMENT	BBBEE LEVEL	OPERATIONS REGION	PROJECT TYPE
1	1986	Johannesburg	420	1	Nationally	• Power and energy infrastructure • Hazardous Waste Management
2	1997	Ekurhuleni	150	1	Nationally	• Road infrastructure • Railroad infrastructure • Bridge infrastructure
3	2012	Ekurhuleni	50	4	Gauteng	• Hazardous waste
4	2001	Johannesburg	250	1	Nationally	• Bridge infrastructure • Power and energy infrastructure
5	2010	Johannesburg	49	1	Nationally	• Road infrastructure
6	2016	Johannesburg	250	1	Internationally	• Power and energy infrastructure • Aviation infrastructure • Bridge infrastructure

Table 7.2: Demographic profile of the business (continued)

	BUSINESS REGISTRATION	GAUTENG REGION OF OPERATION	BUSINESS STAFF COMPLIMENT	BBBEE LEVEL	OPERATIONS REGION	PROJECT TYPE
7	2001	Tshwane	50	1	Nationally	Road infrastructure
8	2009	Tshwane	50	1	Nationally	• Water infrastructure • Waste management infrastructure • Hazardous waste management
9	2015	Ekurhuleni	15	1	Nationally	• Communication Infrastructure • Road infrastructure
10	2001	Sedibeng	50	3	Nationally	• Water Infrastructure • Waste management infrastructure
11	1981	Johannesburg	250	1	Nationally	• Communication Infrastructure

Table 7.2: Demographic profile of the business (continued)

12	2006	Tshwane	20	1	Nationally	• Road infrastructure • Railroad infrastructure • Bridge infrastructure • Water infrastructure
13	1971	Tshwane	50	5	Nationally	• Water infrastructure
14	2021	Tshwane	30	1	Gauteng	• Road infrastructure
15	2002	West Rand	25	1	Gauteng	• Road infrastructure
16	2001	Johannesburg	250	1	Nationally	• Bridge infrastructure • Power and energy infrastructure

7.3 Data-analysis process

This section discusses the data analysis process followed to generate the themes from the transcribed interviews. This study followed an interpretive paradigm that employed a qualitative research design. Interviews were conducted with SMEs operating in infrastructure development. The interviews were recorded on a digital voice recorder, MS Teams, or Zoom. The audio was also recorded on a mobile device as a backup to ensure all the captured data were fully audible. In addition, the researcher made notes, which provided additional context to the interviews. The interviews were then transcribed to ensure that everything participants said was captured. The original audio recordings were replayed to ensure the researcher could become conversant with the data for analysis and interpretation.

As Henning *et al.* (2004) suggested, transcription codes and interview notes were used to capture text that could not be transcribed to gain a holistic view of participants' perspectives. Written MSWord documents were also created for each interview, i.e. each interview was transcribed into text that could be referenced and analysed. The interviews were transcribed precisely to capture the whole meaning of what the participants had to say. After transcribing the data, the interviews were reviewed meticulously, and the mistakes were methodically removed.

A thematic analysis methodology was used to analyse the information provided by the interviewees following Braun and Clarke's (2006) thematic analysis. Thematic analysis is regarded as a rigorous and inductive predictable process designed to identify and examine themes from word-based data in a way that is translucent and dependable (Guest MacQueen & Namey, 2011). Following the thematic analysis technique, after transcribing the audio interviews, the data was organised, coded and grouped, and finally, themes were constructed, refined, and finalised. The thematic analysis was used to make sense of the data provided by the participants and provide suitable themes that speak to the study's research objectives. The analysis followed Braun and Clarke's (2016) process of thematic analysis outlined in the table below.

Table 7.3: Thematic Analysis

Phase	Description of the process
Ensure you are familiar with the data	Review and re-read the transcribed data.
Generating initial codes	Data from each code is systematically collected from the data.
Analyse for themes	Themes are created by analysing the data.
Complete thematic review	Validate that themes are correctly based on the code taken from the entire data set.
Defining and naming themes	Ensure that definitions and themes are generated by ongoing analysis.
Report generation	At the end of the analysis selection, compelling data related to the study's analysis, its aims, and the literature is extracted. A scholarly report of the analysis is created.

Source: Braun and Clarke, 2015

7.3.1.1 Cleaning and Coding

The cleaning process and preparation of the interviews for coding included a detailed examination of the transcripts. Therefore, the research rejected the typos and missing words in this process. This preliminary reading highlighted the relevant paragraphs to ease the data analysis process (Creswell 2013:205). To enhance the coding, the transcripts were explored using Atlas ti through lexical queries such as word frequency and text search queries. Obtaining clean data from qualitative research is often complex, laborious, and demanding (Basit, 2003). Even though this is considered a mechanical task, the researcher must be dynamic, innovative and intuitive; and be able to code, reason, and theorize the information provided by participants (Basit, 2003) to ensure consistency, dependability, and reliability of the coding process.

Moreover, the quality checks increase the validity of the assumptions derived from the codes (Bazeley & Jackson 2013). Although there may still be some subjective factors in the coding process, collaborative coding significantly reduces the subjectivity bias associated with qualitative data analysis by providing several interpretations of the data (Saldana, 2009; Guest *et al.,* 2011). The qualitative analysis aims to analyse data sets by classifying and categorizing them so that inferences may be drawn about the phenomena examined. In this research, the procedure utilized to "clean and prepare" the interviews consisted of a systematic evaluation of the transcripts, which were verbatim transcribed and translated into Word documents. The researcher eliminated erroneous and omitted words.

During the preliminary reading, significant passages were highlighted to ease data processing (Creswell, 2013; Kruger *et al.,* 2005). The coding of data supports the primary research outputs. It may be used to modify the data to test, improve, or verify conventional literature, construct a unique model, or contribute to current literature (Creswell, 2013; Punch, 2011). The Atlas.ti 22 software package enhanced the coding, while lexical searches, such as word frequency and text-search queries, were tested. This coding procedure ensures that data is organized and structured and yields insightful results (De Vos et al., 2005; Patton, 2002). The process of coding was directed by Saldaa's (2015) coding handbook.

7.3.1.2 Trustworthiness of the Data

The researcher utilized Atlas.ti 22 to ensure the coding process's consistency, dependability and dependability to guarantee credibility, accuracy, and transparency. Moreover, the quality checks increase the validity of the assumptions derived from the codes (Bazeley & Jackson 2013). Although there may still be some subjective factors in the coding process, collaborative coding significantly reduces the subjectivity bias associated with qualitative data analysis by providing several interpretations of the data (Saldana, 2009; Guest *et al.,* 2011).

The data were validated by confirming that the transcripts and interview recordings were identical. According to Bazeley and Jackson (2013), these validation methods contribute to

the validity of the assumptions derived from the created codes and categories. As diverse perspectives are included when analysing the data, coding helps to reduce the subjectivity bias in qualitative data analysis (Guest *et al.,* 2011; Saldaa, 2009). The Qualitative Data Analysis & Research Software Atlas.ti 22 enabled comprehensive and in-depth analysis.

Based on the information extracted from the transcripts, two codes – 'Waterfall' and 'Critical Path' were assigned to make sense of the information in the transcripts. Therefore, the theme 'Project management methodologies and approaches used' was generated by grouping codes. Table 5.4 below demonstrates the coding process and how the codes and themes were created.

Table 7.4: Example of coding

THEME	**CODE**	**INFORMATION FROM THE TRANSCRIPT**
PROJECT MANAGEMENT METHODOLOGIES AND APPROACHES USED BY COMPANIES	Critical Path method	*I make use of the Critical Path method. This method helps with scheduling and understanding how critical activities can be put together, such that jointly you are able then to have proper management and proper monitoring on every activity during execution and planning right through to close out. (Participant 12)*
	Waterfall method	*We are currently using the Waterfall method. We, as developers in infrastructure, are not ready to change. When we build, when build we build, we use the waterfall method, the old methodology, and we find that it works for us quite well. (Participant 10)*

The researcher focused on themes related to project management methodologies and approaches used by organisations, knowledge and understanding of project management methodologies, intervention and enhancement strategies for challenges, factors contributing to project management failures and delays and a comprehensive knowledge of project management methodologies. The transcripts were coded in three steps, described by Thiétart (2007) and Neuman (2011) as open, axial, and selective.

De Vos (2005) and Saldaa (2015) state that open coding involves identifying patterns or categories of expression, segmenting the data into separate sections, analysing it extensively, categorizing it for similarities and differences, and examining the phenomena represented in the data. Initial codes or labels were assigned to do open coding. This procedure involves reviewing and rereading the data to understand how patterns may be grouped and categorized.

Open coding automatically assigns codes to sources based on the words or phrases they include. This may be accomplished using word frequency or text search queries (Saldaa, 2016). Open coding is an inductive method that generates codes while a researcher analyzes a text (Elo & Kyngas, 2008). The clustered patterns or codes are then categorized into themes or subthemes based on the subject matter and utilizing participant-provided text as evidence. This identifying method is known as "conceptualizing the data" (De Vos *et al.,* 2005; Strauss & Corbin, 1990).

Axial coding was performed by analysing and evaluating the aforementioned basic codes. Coherence, causation, and context were established by examining the data and recognizing patterns and clusters. Selective coding is the last step of the coding procedure, which comprises assessing all codes for linkage, variance, and comparability concerning the study's purpose; this may result in the emergence of a central theme or themes.

7.4 Brief analysis of the themes generated

The study's core purpose was supported by themes formed via manageable codes, categories, patterns, and linkages in line with the research objectives (Mouton, 2010;

Neuman, 2011; Saldaa, 2015). The major themes that emerged from the data analysis process are provided in Table 7.5 and Figure 1 below. The following table and figure highlight the contribution made to each subject.

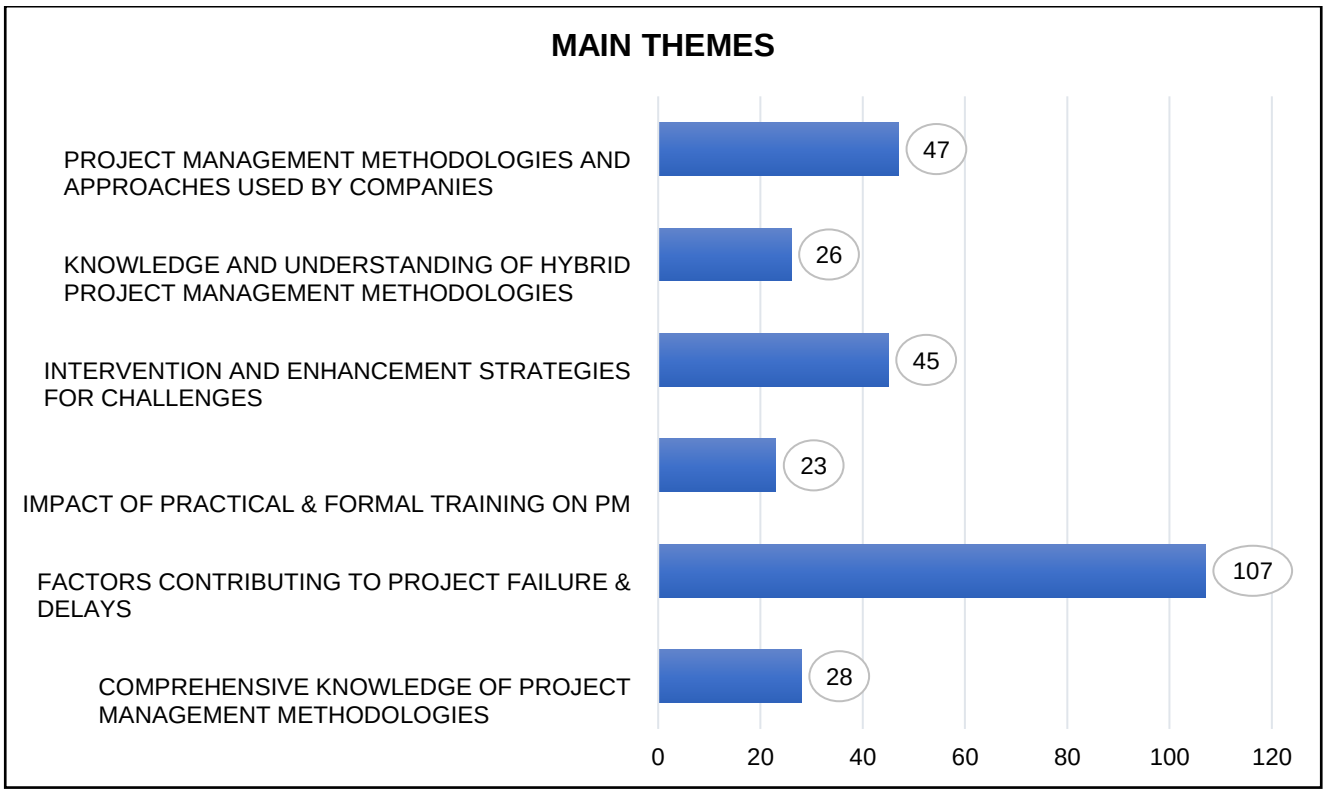
Table 7.5: Main themes

Main themes	**Number of quotations**
Project management methodologies and approaches used by companies	47
Knowledge and understanding of project management methodology	26
Intervention and enhancement strategies for challenges	45
Impact or practical and formal training of project management	23
Factors contributing to project failure and delays	107
Comprehensive knowledge of project management methodologies	28

Table 7.5 and Figure 7.2 indicate that the most discussed themes in the data were “Factors contributing to project failure and delays”. This is the most discussed topic with 107 references, followed by 'project management methodologies and approaches used by companies and 'intervention and enhancement strategies for challenges' with 47 and 45 references, respectively.

Table 7.5 and Figure 7.2 indicate that the topics with the fewest quotes are “Comprehensive knowledge of project management techniques”, “Knowledge and comprehension of project management methodology”, and “Impact of practical & formal training on project management”, with 28, 26, and 23 references, respectively.

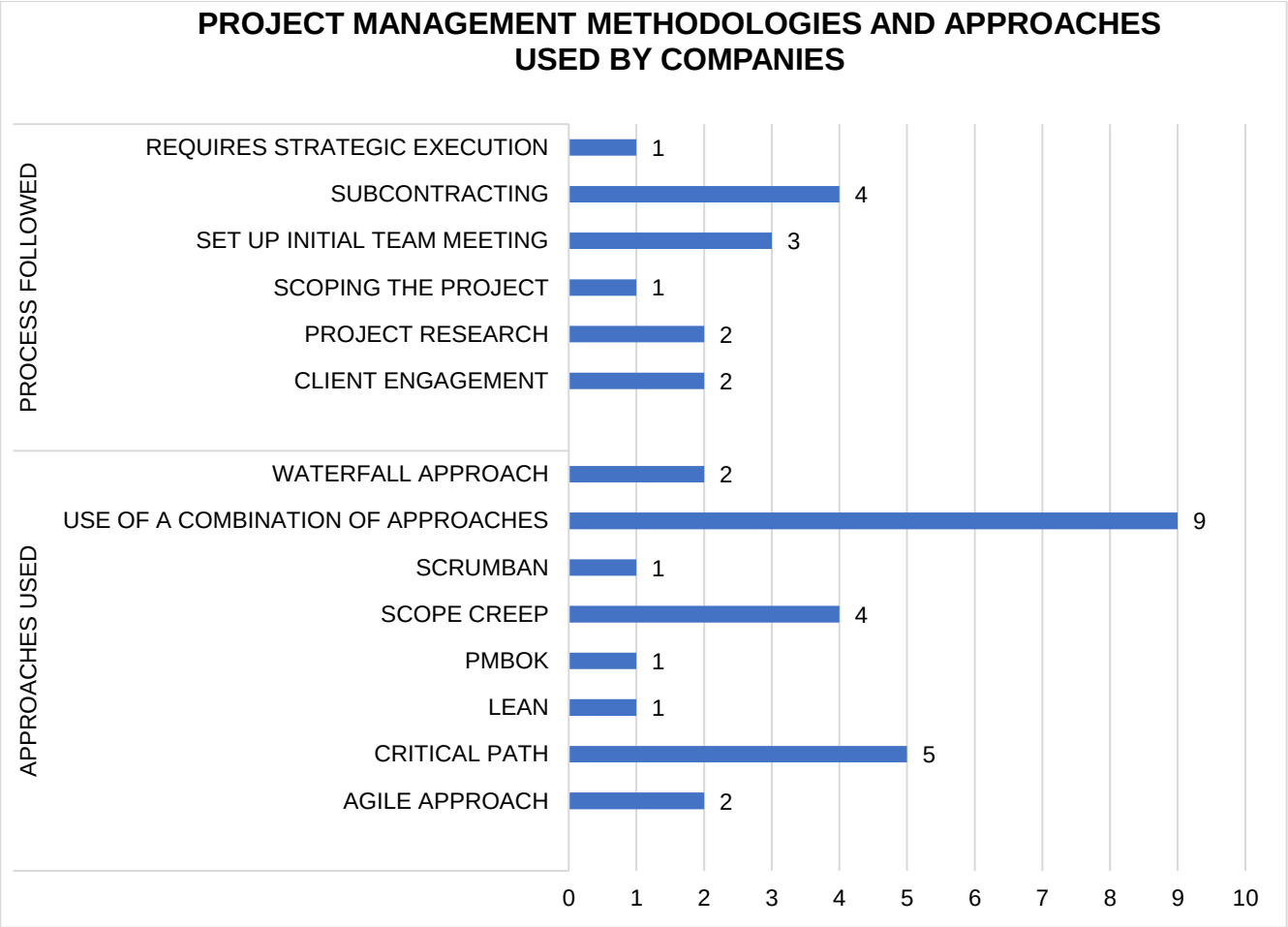
Figure 7.2: Main Themes



7.5 Summary of the themes

This section discusses the study's results according to the three main themes and sub-themes that emerged from the coding process and data analysis. The coding process followed Saldaña's (2009) coding cycle, using descriptive coding and Atlas.ti 22 coding methods. This coding technique aligns with analysing qualitative text data by reorganising the data meaningfully, as Creswell (2015) employed. After creating the codes, they were systematically sorted inductively into a codebook according to the category, type, and relationship (Elliott, 2018; Gibbs, 2007; Miles & Huberman, 1994; Theron, 2015). After that, initial codes or labels were assigned. These codes were then refined. Some were combined, whilst unrelated codes were removed. After that, the concluding number of parent and child codes were developed into themes; the results were generated from the exploratory grounded approach to data.

Figure 7.3: Project management methodologies and approaches used by companies



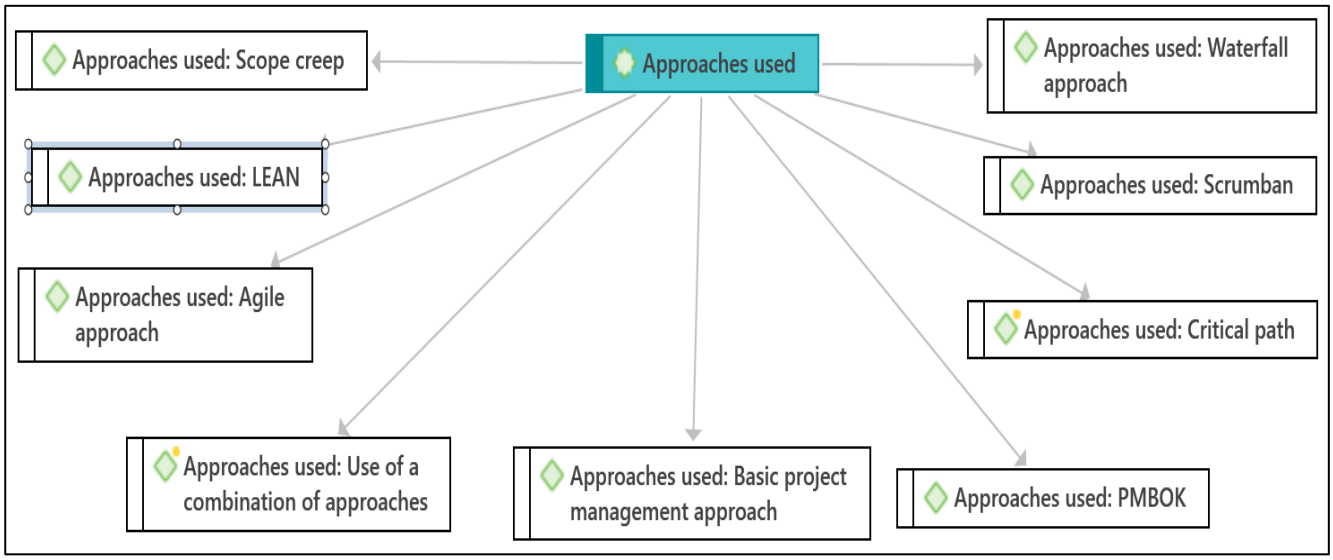
A project management methodology is a collection of guiding concepts and practices for arranging projects for optimal performance. Every approach comes with its own unique set of primary advantages. This section of the report investigates the project management methodologies used and the processes followed by participants in their respective businesses. An example of how engaged participants were in both techniques and processes is shown in the figure below. According to the graph, participants mentioned critical and combination techniques nine times.

7.5.1 Theme One: Approaches used

From the data-coding process, participants provided an overview of the various approaches to project management used in the respective businesses and the advantages that resulted

from their adoption of particular strategies. The diagram below demonstrates these multiple approaches.

Figure 7.4: Approaches used



7.5.1.1 Waterfall approach

Researchers and scholars have identified several project management disciplines, each adhering to a guide or principle. The waterfall or traditional project management methodology, which "*is a sequential, linear process of project management, consists of several discrete phases, with no phase begins until the prior phase is complete, and each phase's completion is terminal"* (Hassett and Burke, 2017). The progress of a project is seen as flowing steadily from top to bottom (as in a waterfall) (par 4.5 and figure 4.2), and it is the only way to revisit a phase is to start over at phase one (Santo, 2020). The highly sequential waterfall project management methodology has the following key phases: the requirements phases and the design, implementation, and verification process (table 4.1).

The Waterfall project management methodology is a prominent methodology used in infrastructure development, as indicated by both **Participant 1** *[w]e are currently using the waterfall method[ology]* and **Participant 10** [*w]e are currently using the Waterfall method[ology]. We, as developers in infrastructure, are not ready to change. When we build,*

we use the waterfall, the old methodology, and we find that it works for us quite well. Participant 10 further states that an organisation has no intentions to alter the building strategy since it is effective.

However, waterfall or traditional management methodologies are not always influential in infrastructure development (Hassett and Burke, 2017), and the application depends on the features and complexity of the environment in which they are developed (Arshad & McCormick, 2018). The challenges identified in this discipline include the waterfall project management methodology not allowing the project manager to return to a previous phase. Scope creep continues to be a challenge in the waterfall methodology (par 4.8). It negatively influences project results due to project scope revisions or project task extensions beyond what was initially negotiated (figure 4.9).

In project management, "scope creep" refers to any change in the project's scope that happens after the project has started, whether gradual or abrupt (par 4.8.2). This may occur if the project's scope is not well specified, documented, or controlled (Project Management Institute, 2020). It is often hazardous (Picciotto, 2020; Warburton & Cioffi, 2014). “Scope creep occurs after the project has been formalized, i.e., a "contract" has been established with schedule and cost obligations, that changes to scope involving corresponding changes to time and cost commitments are both disruptive and costly (Davis & Radford, 2015a). **Participant 2** admits that scope creep is a concern for the waterfall methodology, impacting productivity and project quality. Regarding this, the participant explained:

> *It is difficult to deal with issues like scope creep when using the waterfall methodology. How [do] you deal with issues like compromising quality and the issue of management of resources? Sometimes it is difficult to determine if you need to add more resources to complete a phase of the project when changes have been added. A change in a project means that the next phase of the project might have to be accelerated at some point. The only way you can accelerate is by employing an increased number of resources which is often costly and affects our profit*.

Infrastructure development projects are typically planned meticulously before construction starts, and stages are executed in sequential, linear order (par 6.3). This indicates that one phase cannot begin until the preceding one is complete (Segebart, 2019). Since these stages are executed sequentially and the whole project is planned, mid-project adjustments are much more expensive (Nisha, 2020). Changes in the control procedure of the project are often referred to as change control (par 4.7). Change control is the process through which all requests to change the approved baseline of a project, programme or portfolio are captured, evaluated and then approved, rejected or deferred (Davis & Radford, 2015a). Change control is essential when the project is part of a broader program or portfolio since mismanaged change may have far-reaching impacts within an environment of planned change.

7.5.1.2 Critical path approach

The critical path method, often called CPM, is a strategy that identifies the tasks necessary for a project's completion and determines the scheduling flexibilities (Caravel, 2019). The critical path method quantifies estimated timelines of tasks and activities, as well as the important decisions that influence the duration of each task (par 4.9.1); postponing a vital activity will cause the project to be delayed (Orumie Ukamaka, 2020a). In project management, a critical path is the most extended series of activities that must be completed on time for the project to succeed. The critical path is task-order focused (Caravel, 2019). Including the project buffer, which ensures that the due date is not missed (par 4.8.3), is one of the most significant contributions to the critical path in project management. The critical path methodology is the most effective tool for constructing schedule networks in project management(Atin & Lubis, 2019a):

> *I make use of the Critical Path method. This method helps with scheduling and understanding how critical activities can be put together, such that jointly you are able then to have proper management and proper monitoring of each and every activity during execution and to plan right through to close out* (**Participant 12).**

Gantt charts (4.3.4) and the critical path technique are crucial project management tools. Both aid in tracking the progress of a project and managing the related activities to keep it on schedule and within budget. To establish the critical path on a Gantt chart, you must list all project tasks and activities using a work breakdown structure (par 4.8.1), calculate the length of each task, identify all dependent and crucial activities, and calculate any lag time between tasks (Segebart, 2019). The significance of the critical path methodology is highlighted by **Participant 7, Participant 4** and **Participant 14**:

> *One of the main methodologies we use in our projects is when you start a project. We do a work breakdown structure. It's called WBS. So, the work breakdown structure actually shows you all the streams of work that need to be done. And then, from there, you create a flowchart or Gantt chart…So from the Gantt chart, we are able actually to zoom in on a critical path. So, the critical path actually is that path in a project, which, when one link breaks, it affects the completion date of the project. So, you start looking at that and seeing which is the critical path. Then the critical path needs to have more attention. At the same time, all the other activities on the other side also need to run concurrently with the critical path. So, at the end of the day, you become a lot more aggressive in terms of the critical path and ensuring that you actually meet the deadline. So, the Gantt chart is one of the tools that we actually use to achieve that. And then, we do a resource histogram, which is part of the Gantt chart as well because the resource histogram actually helps us to actually see how many people we need for each and every activity* (**Participant 7).**

> *When you utilize a Gantt chart in conjunction with the critical path approach, you can follow the path's tasks throughout a certain time period, so enabling you to maintain your project on schedule and prevent potential issues. While your critical path analysis helps you create more accurate scheduling estimations and choices, your Gantt chart maintains this schedule and monitors the time and progress of your project* (**Participant 4).**

The Gantt chart plays a crucial role in the project's success because it shows the parts that necessitate immediate attention. Using Gantt charts, it is possible to monitor project tasks against a defined timeframe (**Participant 14).**

A Gantt chart, a chronological view of a project that monitors individual project tasks, dependencies, resources, and remaining work, visually represents the project's progress and displays the dependent tasks and resources required for each activity (Segebart, 2019). Through the use of a visual Gantt chart, one may monitor the critical path on a schedule with flexibility, enabling the project manager to adjust the project plan more quickly as the project proceeds and to have a more accurate depiction:

We normally use a Gantt plan which then details every step of the project, if there's anything that you need to tweak or if there's anything that you need to change in the project, the Gantt plan will give you some information as to which part of the project is not coming together with the other parts (**Participant 3).**

Critical path milestones are required for the critical path methodology (figure 4.10). In the critical path approach, milestones are a collection of accomplished activities (Davis & Radford, 2015a). When employing the critical path method, the project manager must accomplish specific milestones that indicate when one set of work (or phase) is complete, and the next may begin. Most initiatives fail because they lack clearly defined goals and milestones for measuring their development. In the context of a project, a milestone is a date by which you intend to have accomplished an important objective or goal. By dividing large-scale objectives into smaller, more manageable chunks, milestones generate momentum and propel initiatives to completion (par 4.9). **Participant 5** highlights the importance of milestones on the critical path method:

A milestone is a specific point in the life cycle of a project that is used to measure how far the project has come toward its goal. In project management, milestones are used to show when a project starts or ends, when it's time for an outside review or comment, when the budget is checked when a major deliverable is due.

Currently, for my project, I would say that the project management approach is more on the engagement side and managing people, just making sure that you are reinforcing the key requirements but not policing the different stakeholders, like your sub-contractors and even the client. So, I try to have a minimal type of strategy, like the key objectives back to milestones. What's more, important the activities may vary depending on one professional to another, but it's more the milestones approach and maintain the quality in delivery. (**Participant 5)**

The critical path method of project management will likely benefit organizations and project managers with restricted access to resources and expertise (par 4.9). The significance of a critical path analysis becomes more apparent in big or complicated projects, which may be challenging to manage effectively. When a complex project is disseminated and subdivided into several smaller tasks, it is much simpler to track progress and determine whether or not there will be delays or resources are being mismanaged (par 4.9.1). Using the critical path approach makes it much simpler to plan activities (figure 4.10) that are not on the critical path and makes the most efficient use of your available resources.

7.5.1.3 Lean approach

Lean project management is the application of lean ideas to project management, such as lean manufacturing, lean construction and lean thinking. Lean project management is an Agile technique that maximizes customer value by removing waste from each project phase (par 4.8.2); nevertheless, this strategy is not generally employed in construction or infrastructure development projects but has since grown more popular (Steyn & Stoker 2014). **Participant 3** was determined to know a Lean approach, even though he did not discuss a great deal about how they implement this method in his projects.

There's a lean method that we use in our projects which is also the most outstanding project management approach that you can use in infrastructure projects (**Participant 3).**

In addition, Participant 3 advocated for lean as a strategy that is available as one of many alternatives on par with the scrum methodology. *It's a methodology you can use besides the other new methodologies like the scrum* (**Participant 3).**

Lean as a project management method emphasizes continual improvement (par 4.8.3). The Kaizen process enhances workplace efficiency, quality, safety, and culture. It focuses on creating value from your customer's viewpoint, through reducing waste (Morris, 2011) and assuring continual improvement through project efficiency and delivering more with less.

7.5.1.4 Agile approach

Agile project management, a project management methodology that uses an iterative approach to developing projects, provides an opportunity to respond to inputs immediately and formulate coherent adjustments at each step (Kaufmann *et al.*, 2020). Agile project management methodology is a continuous, cyclical process that differs considerably from the waterfall as elements within this methodology encourages experimentation and adaptability (Conrad, 2019). The widely used six (6) phased approach, which consists of identifying the requirements, planning, designing, developing, releasing, tracking and monitoring, is a new phenomenon in infrastructure development (par 4.9.3).

The hazardous waste industry participants viewed the agile methodology as a solution-oriented methodology. Participants emphasized that the agile methodology enables project teams to anticipate challenges and propose appropriate solutions (par 4.9.3). **Participant 1** and **Participant 3** reported using the agile approach technique in their respective organizations and projects.

> *Since we are in the hazardous waste management industry, we use the agile, so for argument's sake, let's take the microchip shortages. It has enabled us to say, what happens if we are running into another scenario where our supplier has to shut down, or our supplier has a shortage? … we redesign a PC board that does not require us to rely on one supplier, so if one supplier is gone so, whether it is a supplier from the USA or from or a supplier from the UK, we can choose the supplier without redesigning the*

board, so agile project management allows us to make such changes in our projects because it's adaptable (**Participant 1).**

It's a tool that we normally use in project management because it facilitates every aspect of the project to be faster, to be precise, to be delivered on time. Also, it allows you to actually take turns in if there's anything to rectify. It pinpoints you exactly which problems are there within the project, and then you rectify all those problems, and you move ahead, restarting and re-looking at whatever can come out of the project. But the agile management system pinpoints exactly, so my perception of that it's a very good tool it's usable it's user-friendly and it's easy and it's adaptable through all the project management cases (**Participant 3).**

The continuously evolving environment and changing project landscape allow project managers to operate more efficiently and effectively in all project management processes. With the ever-changing environment, agile project management will enable teams to adjust and modify to deliver the best possible end product (Saini *et al.,* 2017). An agile project management methodology allows teams to work more iteratively and flexibly in all project management processes, enabling teams to respond more quickly to changing project needs and produce results more rapidly (Ribeiro & Fernandes, 2010). Agile project management spans many project management approaches since its emphasis on human communication and feedback, adapting to change, and generating functioning outcomes encompasses several methodologies (par 4.9.3). In agile project management, there is no universally applicable agile strategy. Instead, all agile techniques adhere to the same agile concepts and essential ideals (Nisha, 2020), enabling project teams to function constructively and collaboratively within the limits of a project's timeframe and budget, allowing project teams to operate swiftly in a continuously evolving environment.

7.5.1.5 A combination of approached

Business organisations operate in an environment where conventional procedures have developed through time and, where compliance with vast commitments and mandated, standards are necessary. This implies that, for projects, there is an emphasis on selecting

techniques that clearly outline the plans and project objectives (Miković *et al.,* 2020). Hybrid project management, a strategy for merging planning strategies, enables project managers to integrate distinct aspects from different methodologies (Warburton & Cioffi, 2014)

Most of those who participated in the survey said that, when it comes to project management, they apply many strategies instead of just depending on one. Combining conventional approaches for specific subprojects with aspects of the hybrid project management methodology enables businesses to discover optimal solutions for their particular requirements (Picciotto, 2020) (par 4.2). This may increase the advantages of the project by, for example, obtaining improved outcomes, completing the objectives rapidly, or reducing costs (Arshad & McCormick, 2018).

> *We always try to incorporate an agile approach as well because, as you know, the landscape changes so quickly, so if you're not [using] agile and not willing to change, and you are set on your waterfall approach to say this is how we structure our project, and you don't see any changes, you might get stuck, and you might get knocked down where and remember this environment is very competitive* (**Participant 1).**

> *So currently, we are using a little bit of the waterfall method, depending on how big the project is and also, we implement a lot of agile because we just, we incorporate the two methods together, this is why at times when it comes to our big projects like our like the construction of bridges, we normally take the approach of making sure that our scope is defined, we've got everything in terms of project management so we use a hybrid type of approach* (**Participant 4).**

> *Now that I think about it, we don't one approach I think I use a combination of approaches, I believe that that works a lot with our company. And we've even started to look at the new PMBOK version seven so we can also adapt our projects. PMBOK version seven basically tries to look at deeper stakeholder management and systems thinking similar to agile. This very important as there*

is an emphasis on project changes and complexity… because it has to do with a lot of adaptation to the situation that we're facing right now, in the country and throughout the globe. And so, I think adaptability and resiliency is one aspect and change that's also been introduced in the seventh edition (**Participant 6).**

Participants also mentioned using various aspects of fundamental project management methodology with additional methodologies. According to the participants' comments, the basic project management method includes the implementation of project management aspects or pillars in the project, which include an evaluation of the work's scope, time, quality, and resources with agile project management iterations consisting of successively accomplished small sections of the task (Alexander, 2019).

It's just the basic project approach. I mean, obviously guided that the principal roles, you know? Which are basically your initiation, you identify the need for a project, you do the scoping of that project, you do a feasibility study - whether you need it or you don't need it, if you need it you take it further to the planning phase; from the planning phase you go further to the design phase, and then from the design of the implementation, and it's the handover closeout phase of the project. So, each and every one of those aspects is very important and key to a successful project; you can't skip any phase; otherwise, the project is doomed to fail if you do that. But with every phase, we make sure that the project can adjust if needs be so we plan for this and sign off each phase to make sure that the stakeholder is satisfied (**Participant 13).**

A basic project management approach of understanding the scope, doing a needs analysis, and understanding what it is that we need to employ in terms of being able to deliver on that meaning looking at the resources, both financially and in human resources. So that's our basic approach, which is common practice and common approach, but we ensure our teams are self-organized and have the right experience to estimate the work that is required. Our teams give comments during reviews and retrospectives so because we complete work in small phases

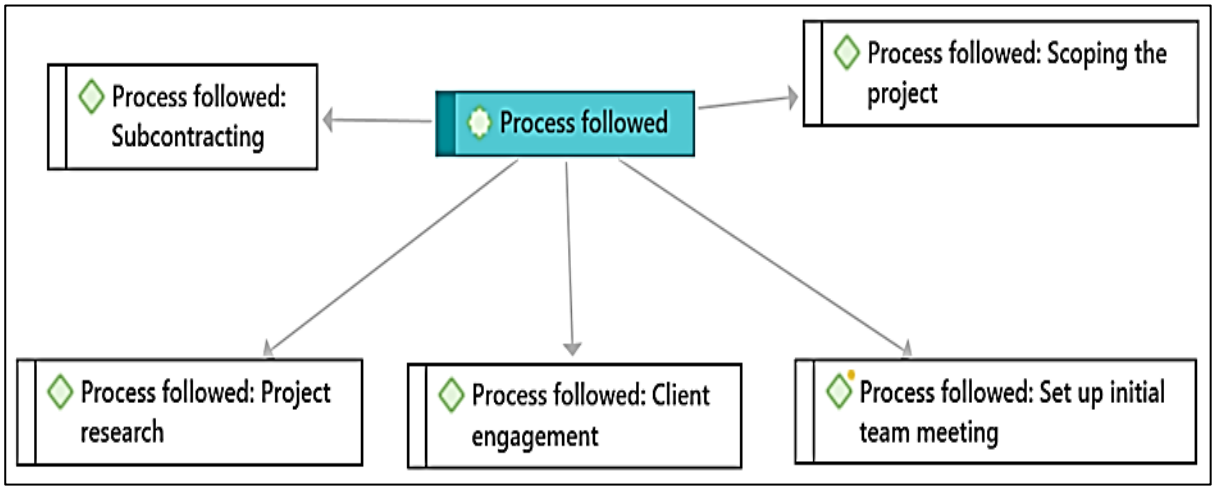
we trust our project teams, this is important, especially in the construction and the infrastructure development space that we operate in (**Participant 15).**

Customers' expectations remain unpredictable and ambiguous due to a changing environment driven by global variables (Nisha, 2020). As a result, organisations may be often needed to adapt their operations. A change-responsive hybrid project management strategy may have a favourable effect on the project. A hybrid approach has several benefits, including improved collaboration with users and more frequent, implementable intermediate outcomes, regular meetings to review progress, and retrospectives (lessons learned) after each status update meeting (Kaufmann *et al.,* 2020).

7.5.2 Theme Two: Project management process followed.

From the data-coding process, participants provided an overview of the project management process followed in the respective businesses. The diagram below demonstrates some of the project management processes cited by the participants.

Figure 7.5: Process followed



7.5.2.1 Stakeholder/Client engagement

In project management, stakeholder engagement is essential for project success. In the earliest phases of planning and development, the views and ideas of key stakeholders are

immensely beneficial (Kerzner, 2017). Effective communication and collaboration with project stakeholders facilitate the translation of stakeholder expectations into project objectives (Sifumba *et al.,* 2017). The constant maintenance of the communication process with stakeholders and the importance of ensuring that the project stakeholders are informed of any changes impacting the execution of the project is of the utmost significance since it effectively helps to enhance the efficiency and productivity of the project team (par 4.6). **Participant 9** mentions this in their remarks:

> *Firstly, it's important to make sure that we understand the client's brief, and it's also important that we understand who our stakeholders are. Obviously, what the client wants sets off the plan, this is important as it determines how we set up the timeline of the projects, as preparing the budget for the client in terms of what the deliverables are supposed to be is of utmost importance. And obviously, before we get to the point of execution, stakeholders must be involved. Stakeholders for construction projects and infrastructure development may include community members. Those people must be involved too. Stakeholders such as community members and the general public can make or break the project if they have not been adequately consulted* (**Participant 9).**

Effective stakeholder engagement enables companies to identify groups that may not support the initiative (par 4.6). Knowing who supports and opposes the project provides a chance to understand better the motives, influences, and behaviours of those opposed (Kerzner, 2017). It is widely accepted that including customers and other project, stakeholders is one of the most important components of project management. This implies that the employees responsible for executing the project thoroughly understand customer and stakeholder expectations.

7.5.2.2 Setup initial meeting

The inaugural project meeting is often referred to as the project kick-off. This is the first meeting between the project team and the client. This meeting provides the opportunity to set shared objectives and the project's purpose (Warburton & Cioffi, 2014; Stewart & Willy,

2020). This meeting is an opportunity to create shared objectives, and the project's aim, and the project kick-off is the optimal time to set expectations and develop team spirit (Keinz *et al.*, 2021a). Several participants emphasized the importance of arranging an initial meeting with the team and everyone contributing to the project (par 4.5). This meeting aims to ensure everyone knows their various project responsibilities and the timeframes associated with those tasks. Regarding this issue, **Participant 1** provided the following information:

> *So, what you try and do is: given a specific project, you bring everyone to what we'd call a bonfire meeting. In this meeting, we involve everyone that is going to be needed on the project, and bring them to the forefront at the beginning of the project, not at the later stages when we need them. So, everyone needs to have an input at the beginning, so they understand where they fall in the timeline of the project is here. This helps us a lot so when we need to start now preparing for that next phase of the project so that there is similar motivation in the project. We don't want to go into a project and not everyone knows their involvement. In the project kick-off, everyone involved needs to be sitting in the same room at the beginning of the project* (**Participant 1).**

As Participant 1 pointed out, this preparatory meeting is of the highest significance, yet, it will also postpone the actual execution of the project (Barbosa *et al.*, 2021a). According to Participant 1, this is because the client and the project team have their own ideas about how the project should be executed; consequently, these viewpoints impact the project's scope. **Participant 1** illustrates this:

> *It does work. Sometimes it takes the process a bit long because at the beginning, everyone wants to have that input and to kick start the project may take even longer so this process sometimes takes time. After the project kick-off meeting, it becomes easy because everyone has had an input. When everyone has been able to have their inputs no one can say IT or HR was not informed because everyone will be informed because at the beginning, everyone is involved, and it takes time to get the project going, but once it is going, it's seamless* (**Participant 1).**

7.5.2.3 Project Research

In project management, research is essential since every project depends on using resources such as personnel, equipment, money, and time. Without thorough research and planning, it is impractical to ensure that a company distributes and utilizes its resources most efficiently and effectively (Braun & Clarke, 2016; Segebart, 2019). Through inefficient project research and planning, the overall planning and coordination of a project from conception to completion, which is intended to satisfy the client's needs and ensure completion on schedule, within budget, and following specified quality standards (table 4.1), may be skewed (Melo *et al.*, 2021). Research is imperative in the planning process (table 4.2), and its importance is highlighted by **Participant 11** in the following statement:

> *The approach that we've adopted in our system is one way; it is kind of a structured approach. So we'll have junior management or junior team members doing a bit of our research. Then we'll move to mid, let's say there's a new project that we're looking to adapt or work on, rather, we'd have our junior staff members do more research about the project, what it will entail, what factors or risk factors we need to look out for, it would move to more mid-level management where they do a little bit more intensive research, also adding on to what the junior team members have looked at* (**Participant 11).**

Managing a project and establishing contingency plans to prevent both expected and unanticipated occurrences is made simpler by completing comprehensive research into the actual project to identify risks that may emerge.

7.5.2.4 Sub-contracting

Collaboration is crucial to the success of infrastructure development projects; in project management, the necessity of knowledge sharing and information is one of the most important aspects of a successful contractual partnership (Orumie Ukamaka, 2020b; Zakaria *et al.*, 2014). Subcontracting is the practice of assigning or outsourcing a portion of a contract's obligations and duties to a third party, known as a subcontractor. It is prevalent in industries where complex projects are the standard practice. This process

is advantageous to project management. Participant 7 implies that cooperation with other contractors increases productivity and ensures excellent work.

> *But what you find there are times where you don't do the work yourself as a company, but you sub-consult or sub-contract the work to another company, you still use some of the tools, but you actually manage more the company itself than the work on that ground, just to ensure that the work gets done on the ground. We don't do it ourselves. But I will make sure from our side, we will make sure that it's done - how you give the contractor the dates, that this should be finished by this date and this date, start and finish. Thereafter, you get the company to give the company the contacts for the people they're going to be working with on the ground, whether it's a counsellor and all of that* (**Participant 7).**

The willingness of contractors to collaborate is highly advantageous for the project (Atin & Lubis, 2019b) because collaboration promotes teamwork, fosters cooperation between team members, and stimulates information sharing, thereby enhancing the quality and timeliness of project completion and encouraging improved communication among project members (par 4.4.1).

7.6 Comprehensive knowledge of project management methodologies

This section details participants' knowledge of different approaches and the technical and practical distinctions between those who are acquainted and those who are not. As shown in the table below, twelve (12) individuals indicated familiarity with other approaches. Even though most participants underlined overall knowledge, just three (3) participants expressed dissenting views. The retrieved data revealed nine (9) contributions under the practical category difference and four (4) contributions under the technical category difference.

Figure 7.6**:** Comprehensive knowledge of project management methodologies

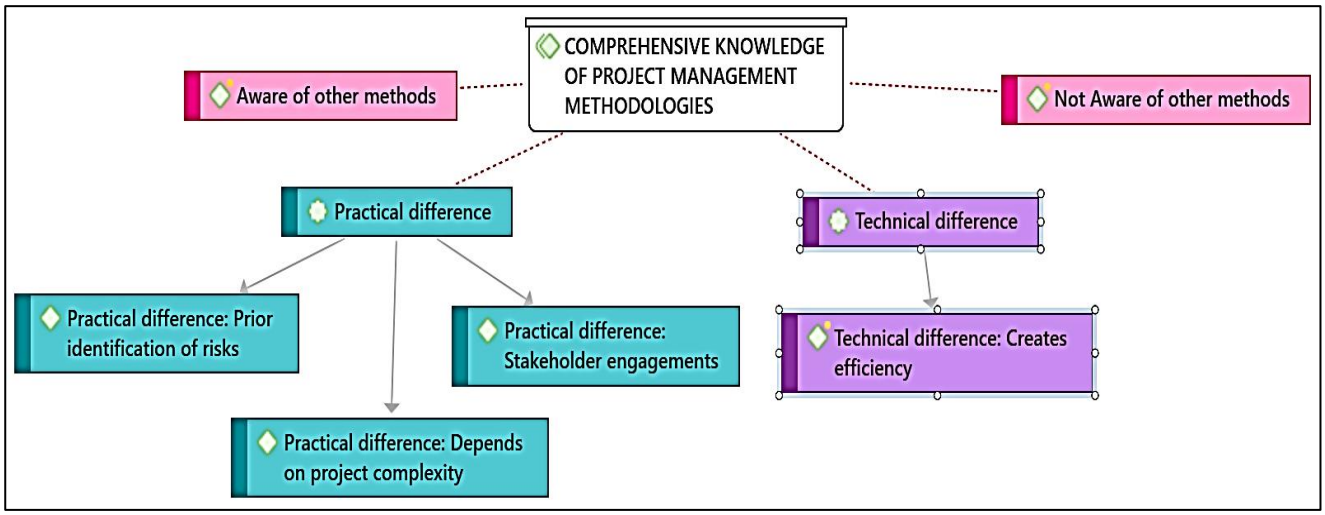


Table 7.6: Knowledge of project management

COMPREHENSIVE KNOWLEDGE OF PROJECT MANAGEMENT		REFERENCES
Aware of other methods		12
Not Aware of other methods		3
Practical difference		9
	Depends on project complexity	3
	Prior identification of risks	4
	Stakeholder engagements	2
Technical difference		4
	Creates efficiency	4

7.6.1.1 Aware of other methods

In infrastructure development projects, it is essential to be aware of alternative project management approaches, as these may contribute to reducing project risks, increasing availability and durability over a project's lifecycle (Orumie Ukamaka, 2020b), and enhancing the customer experience (par 4.5 and figure 4.2). Thereby making the infrastructure investment worth making (Alexander, 2019). The participants' awareness of different techniques that might enhance or improve infrastructure development programs

was investigated. Participants had differing perspectives on the issue, and some participants illustrated their awareness of other approaches but did not apply them because participants had confidence in the existing method. For instance, **Participant 1** elucidated:

> *So, I'm aware of them. I just don't use them, as I said. We use a waterfall methodology and incorporate agile, so that is what I'm exposed to. That is what we use. I'm aware of the other ones but don't really use them, so I don't have good knowledge of them* (**Participant 1).**

Adding to the above statement is **Participant 9**, who also said: *Other project management methodologies and approaches…Theoretically, I am aware, but practically we use the old project management methodology.*

In addition, **Participant 10** pointed out that they are aware of different techniques but lack a comprehensive understanding of agile, lean, scrum or scrumban. However, the participant continues to employ the waterfall methodology.

> *I understand there is a new one in the field, but I do not know much about other methods. So, I'm yet to look into agile as soon as I get a chance but at the moment, I know and have a slight understanding of it, but I prefer to use what I know which is the waterfall methodology* **Participant 10.**

Participant 11 supports the abovementioned claim by stating that they just learned about the other project management approaches through networking and found it intriguing. However, I was never educated on the methodologies or approaches.

> *"Yes, absolutely. Recently a colleague or network friend of mine is in IT and works in project management and IT and has recently exposed me to, or spoken of a project management methodology called agile, which I've found really interesting. While I haven't really explored it through formal education, I think just discussing it here has*

really kind of exposed me to the different methodologies that exist in project management."

Participant 12 reiterated the sentiment that quite a few approaches are employed globally but are not used in South Africa. This participant revealed that:

I'm aware of many more, which are done worldwide, but I think here in South Africa, they're not in practice at that level because I do most of the government projects, and with government projects, we are limited to using certain methodologies, and such methodologies are what I normally prefer on a daily basis. But yes, I'm very much aware of other methodologies (**Participant 12).**

The existing conception of project management is merely on the threshold of expansion. Although project managers have been managing projects using some of the current project management concepts and practices for many years, there is still a gap in the ability to use them (Davis & Radford, 2015b; Orumie Ukamaka, 2020b; Zeitoun, 2000), and project managers continue to encounter a number of the challenges.

Project management systems for incorporating lessons learnt and learning as a discipline are insufficient to meet the current demands (par 4.6). Organizations should gradually reach a position where they recognize the availability of alternative project management methodologies (Landau, 2021). Using a single project management strategy is not the only method to manage projects effectively (par 4.7).

7.6.1.2 Not aware of other methods

Project management as a discipline is confronted with the difficulty of attaining all project goals and objectives while adhering to predetermined restrictions (scope, quality, cost and time), optimizing the allocation of essential inputs, and integrating everything to fulfil predetermined objectives (Zuo *et al.*, 2018). Despite the continued presence of different project management techniques, project managers often may not employ conventional

project management ideas and practices. This may be due to a lack of awareness of contemporary, increasingly creative approaches and methodologies.

The coding process revealed that although the majority of respondents indicated awareness of various approaches that might improve infrastructure development, a minority of respondents disagreed and stated that they were unaware. Even **Participant 3** indicated that *the techniques that SMEs use or employ in their projects are the greatest; in reality, individuals may seek different methodologies, and we don't know of any other but the one we use*. The following passage clarifies that:

> *I think all the project management methodologies are designed to make the project successful over and above if they are not followed to the letter, then the project will fail obviously. But there are no other new methods that you can find except the proven methods of project management. We just need to follow the right steps and apply all the principles in terms of realizing the end of the project but if not, then, unfortunately, it's going to fail. We as a company don't really know of other methodologies, we only know the one we use no other* (**Participant 3).**

Participant 4 noted that they are only familiar with the waterfall methodology and cannot recall hearing of any others. *I only know about the waterfall currently, so I'm not sure, and if I have been exposed to other methodologies of PM so I can't really comment***.**

In addition, **Participant 8** pointed out that they are not familiar with other approaches but are well-versed in project management and the significance of effective planning and execution. *I'm not aware of other approaches but I know with project management, planning is very important, and so is the execution.*

Every project manager knows that employing a technique is vital to success. Project management methodologies are procedures designed to give project managers direction and instructions for completing tasks throughout the project. Depending on the methodology, techniques for managing difficulties that may develop throughout project

delivery may vary. Adopting a project management methodology aims to optimize time and resources. Consider that although there are a variety of approaches from which to consider, there is no “correct" methodology (Huljenić *et al.*, 2005; Zeitoun, 2000; Zuo *et al.*, 2018). That is, no single approach will be ideal for every job. Projects differ in scope and requirement. Hence appropriate implementation will also vary.

7.6.1.3 Practical difference of approaches known

Depends on project complexity

This section will understand the technical and practical differences between the approaches participants use in the organizations and those they have been exposed to. Every project is unique; every project is extraordinary, peculiar, and individual (par 4.5.1). Every project is unprecedented and has never been accomplished before. The Project Management Institute (PMI) defines a Project as “a temporary endeavour undertaken to create a unique product, service, or result” (Project Management Institute, 2020)

A project has unique characteristics that differentiate it from continuous operational activities. Projects are transient, not routine business processes, with distinct beginning and ending dates. The completion of a project occurs when its aims and objectives are met (par 4.5.1). These objectives are the driving force behind the project and all planning and execution efforts performed to attain them. The project may be terminated when it is determined that its aims and objectives cannot be achieved or its product or service is no longer required (Warburton & Cioffi, 2014).

Due to the distinctive features of each project, it is critical to recognize the individual project's level of complexity to manage it effectively. In this section, some contributors have addressed the fact that the complexity of a project may lead to differences in the actual application of methodologies. **Participant 3** explains:

> *The technical and practical differences for different projects you have to have a different project plan, different project design, different project scope, different project timelines*

for different projects, you can even use different methodologies for different projects (**Participant 3).**

Similarly, **Participant 12** hypothesized that each project must be completed based on its scope of work, that a project's implementation must be extensively evaluated to prevent poor implementation, and that various techniques or approaches may be utilized for different projects.

Honestly, it depends on the complexity of the project. However, I must say that a normal project methodology that is used on the construction of a particular hospital or community hall, is different from the methodology you'd use in the construction of a bridge all projects are totally distinct. You may use a certain methodology, which is guided by the type and the scope of work that you are involved with (**Participant 12).**

7.6.1.4 Prior identification of risks

Project complexity is the aspect of a project that makes it difficult to understand, anticipate, and maintain control over, even with relatively comprehensive knowledge of the project system. "The uncertainties confronting "complex" projects are likely to be more interwoven, dynamic, and fast-paced, or susceptible to socio-political risks with unclear consequences."

Due to the billions of rands spent yearly on infrastructure development, this sector requires project-driven businesses. However, project management's reputation in this sector is usually negative since projects are often late, over budget, and technically ineffective (table 4.2). These hazards arise with project complexity since it is harder to comprehend the implications of risks inside such initiatives. Participants said that in this field of business, risks are unavoidable, and it is the organisation's responsibility to utilize risk management to identify the risks in advance. Organisations in this sector must illustrate how these identified risks would affect the overall project and what tactics may be employed to mitigate or prevent the risks. **Participant 9** revealed the following:

Differences, obviously, risk management is one of the most important in construction. Like I mentioned earlier, its important to determine what are some of the reasons why

SMEs and projects implemented by SMEs get delayed, or are not finishing? Maybe some of the SMMEs are not experienced in dealing with risk because that's the one thing, people don't manage the risk. There is always risk in construction, and if you don't identify the risk, and put a risk rating or understand how this risk affects, firstly, your project, how does it affect your cash flow? Your business may fail and so will the project. With government projects risk management is very, very important. Obviously, factors such as payment, for example, delayed payments or non-payment are major reasons why most of these projects also don't finish because it affects your cash flow as a business servicing the government. This is a very big risk, and a lot of other risks exist as well if you don't identify those risks, you don't plan for it; it will definitely affect the projects and execution and eventually delay the project **Participant 9.**

In **Participant 14's** former position, the participant was instructed to apply risk management assiduously, particularly in infrastructure development projects, to minimize project delays caused by risks.

"Risk management is one where theoretically, I'd say it's fine, it tells you to identify risk from the onset, this should also be done throughout the project, but practically, people don't do it if they don't have experience. My background, I came from working at a big construction company, where this is emphasized, we had a whole session, and dedicated meetings, and procedures and processes that were in place to manage risk, because from the onset, from tender stage right up to completion, it's always about managing risk, and that's what I realized, that's what made some of these big companies very successful because they were able to identify the risk. I mean, and there are lots of risks in infrastructure development. Let's look at one simple execution risk of one project, risk in terms of safety as an example but this in one risk in one phase image the magnitude of the risks combined in all of the combined phases (**Participants 14).**

Moreover, **Participant 6** said that the new approach, as opposed to the traditional approach, employs continuous risk management and stakeholder engagement to reduce disputes and keep up-to-date and knowledgeable about any developments.

Technical and practical differences. Okay, maybe. I'm trying to think of an example, but let's say stakeholder engagement and risk management is one of the practical examples. This is an ongoing process. It's a continuous process in any project. That is why, if you see within a construction environment, there are always site project meetings. There are always meetings with the various stakeholders because you've got various stakeholders that you have to manage, be it the stakeholders from the client's side or the community where the project is actually taking place, or stakeholders for various subcontractors and contractors. It important that you update them because this is one form of risk management. Keep everyone in the project involved in the project (**Participant 6).**

The following statement validates the participant's assertion by Williams (2018) that risk analysis for complex projects is challenging. These challenges arise with project complexity since the impacts of risks in such projects are difficult to comprehend. The causal chains are responsible for management actions, project participants' objectives, the project's socio-political intricacies and the interconnectedness feedback are not shown by focusing just on the risks (Caravel, 2019; Mavenlink, 2021; Sherman, 2018; Fewings & Henjewele, 2019; Williams, 2018). Common practice based on decomposition-type techniques often indicates incorrect risks.

7.6.1.5 Technical differences between approaches known

Creates efficiency

Delivering high-quality projects on schedule and within budget has been and will continue to be the primary challenge for any project manager. The critical path method has been the standard practice for planning and executing projects. This is the foundation of traditional or waterfall project management (Miramond, 2019; Orumie Ukamaka, 2020a). Agile project management is being pioneered (par 4.10) and is gaining traction when iterative approaches and client demands are prioritized (Alexander, 2019). Hybrid Project Management increases efficiency and productivity. The utilization of high-level project phases is scheduled using the waterfall method, and project phase work is executed using the Iterative approach. Agile

is iterative, while the waterfall approach is linear, and if challenges arise, they can only be resolved by utilizing a mix of both methodologies (Landau, 2021).

According to **Participant 4** observations, it appears that

> *Yes, I do. I am quite aware of how to use both agile and waterfall, when it comes to the waterfall methodology versus the agile methodology, there's a huge difference between waterfall, with waterfall we get to do a recon right at the end of the project as in but with agility, we fix the project, we determine how to proceed with the project using agile so I'm aware the advantages of those two* (**Participant 4).**

Participant 10 supported the above statement and stated: *It's the way that we run our projects, with government projects it's important that you deliver a project in small iterations because leadership can change at any point, so we make sure that we have signoff when the iteration is complete, but we use waterfall for planning the entire project* (**Participant 10).**

Participant 12 also added:

> *I think the technical differences is how efficiently some methodologies and approaches work towards a project, and how quickly you can get a project done with newer adaptations of approaches. So, the ones that I have used in the past have been a little bit slow, and we've had like a very mild uptake. And projects have come to a Start Stop kind of motion. But having looked at different methodologies, international methodologies as well that I have then used, I've come to realize that they are approaches that allow for projects to move more efficiently, and do away with the whole start-stop motion, where we're able to work very efficiently and quickly as possible* (**Participant 12).**

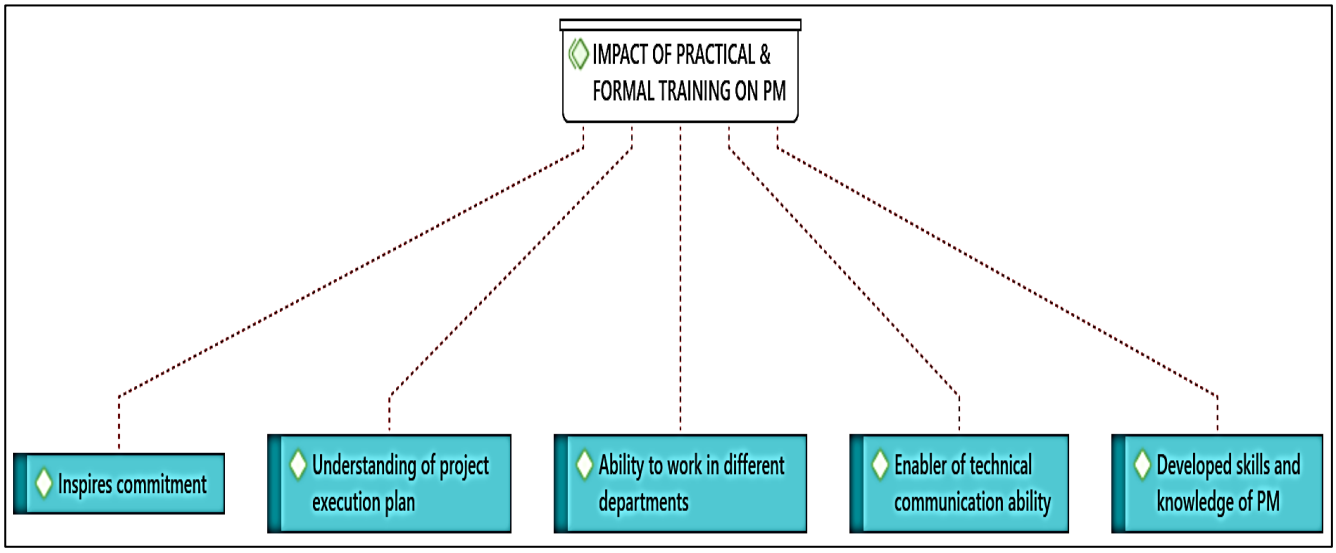
Hybrid project management promotes adaptability over adherence to a comprehensive plan, the creation of value over formality, and customer participation over contract negotiation (Miramond, 2019). In hybrid project management, high-level strategies are favoured over

precise task breakdown schedules (Zuo *et al.*, 2018). Hybrid project management focused on collaborations and problem-solving.

7.7 Impact of Practical and Formal Training on Project Management

Participants discuss their experiences with the practical and formal projects in this section. Figure 6 is an illustration of the impact of practical and formal training on project management

Figure 7.7: Impact of Practical and Formal Training on Project Management



7.7.1.1 Developed skills and knowledge of project management

Knowledge and skills in project management are required attributes and competencies; project management skills emphasize team objectives and maintaining a good culture. The knowledge and abilities acquired in project management assist in providing leadership, balancing priorities, supervising resources, and measuring progress toward objectives (Al-Hajj *et al.*, 2018; Brière & Auclair, 2020; Keinz *et al.*, 2021a). Important project management knowledge and abilities enable project managers to produce actual value in response to business opportunities (par 4.5.1). Project management skills and expertise guarantee that the project's objectives closely coincide with the enterprise's strategic objectives.

Acquiring project management skills and knowledge is essential because project managers contribute to the leadership and direction of projects while also ensuring clear lines of responsibility (4.6.2). Therefore, project managers need to gain an appreciation of project management, information, knowledge and skills. Illustrated below are how participants acquired skills, vast knowledge, and an appreciation of project management. **Participant 2** maintained:

> *I studied project management as a module but over and above that the exposure to the various sectors of various facets of construction and infrastructure development projects has further capacitated me and accorded me with the skills, knowledge and information that is deemed relevant for the project management aspect of our work* (**Participant 2).**

According to **Participant 8**, the training helped them develop credibility, enabling them to advise customers with the acquired expertise effectively.

> *I've got a diploma in administration; the knowledge of project management helped me with what I'm doing currently. As a project manager in my division, I am able to advise stakeholders and my manager (programme manager) when the project will not be delivered. In this field, because the projects are large, we have a lot of project managers for one project, so I deal with stakeholders and client liaison. Project management helps me communicate with our clients and the project team that I am responsible for efficiently because I understand the project in its entirety, and I also understand the importance of my role* (**Participant 8).**

In addition, **Participant 14** conjectured that obtaining project management knowledge had a beneficial influence since she learned the significance of properly providing service and prioritizing customers, as well as how this impacts the reputation of the organization.

> *So, it's been quite helpful. Because I mean, for each different project or, client, that you are going to be meeting with, you're going to need to have a clear plan of what are the*

tasks that are involved the deadlines, and closely manage that. So, I think that has really helped it to be able to at least deliver what the clients are wanting as close as possible to the timelines, but also trying to stick as much as possible with their budget as well. So, it's been it's been quite helpful (**Participant 14).**

Moreover, **Participant 15** said that the information they got from project management courses was crucial to their ability to comprehend what is necessary before starting a project and managing money.

So, in essence, I think the education and the formal training has equipped us with the understanding and knowledge to be able to comprehend the scope of project and be able to deal with factors that contribute to a project understanding how to manage people, understanding how to manage the finances, understanding how to be able to put all those resources together and be strategic in the approach so that you can at least deliver and achieve the objectives of the project. So that is the benefits of the experience the benefits of the formal training and on the job experience and skills that we've acquired as part of the process (**Participant 15).**

Effective project management is essential because it ensures that an appropriate strategy s in place for achieving strategic objectives (par 4.6). The skills and knowledge obtained in project management are necessary because they provide that reasonable expectations are established for what can be achieved and that risks are adequately managed and minimized to prevent problems from arising (Kaufmann *et al.*, 2020). A project manager ensures the appropriate reporting and monitoring of a project's progress through knowledge of the work breakdown structure, critical path method, waterfall methodology, and agile project management (Wang *et al.*, 2021). Through effective project management, the project team will determine the successes and failures of past projects.

7.7.1.2 Understanding of project execution plan

Understanding project execution is vital to the success of any project since it creates the methods to execute, monitor, and manage projects (Singh *et al.*, 2021). As a project

manager, understanding project execution ensures awareness and knowledge of project goals and how they will be achieved. It is acknowledged that project management involves many processes, including a project execution plan (PEP) that outlines the project's execution, monitoring, and control. Participants said that the project execution plan is one of the most essential aspects of project management that they have learned. **Participant 3** details:

> *Understanding and experience normally come out in project management or when you have to do projects that are complicated in terms of managing, designing the project, drawing the strategy, project plan, project charter and also in terms of managing the total project also in terms of appointing the right people to the right places so that they can manage the different elements of the project. Knowing how to execute a project is of utmost importance* (**Participant 3).**

> **Participant 9's** insightful explanation bolsters the preceding argument: *So, in the consulting environment, as you know, it's part of planning for projects, designing and then before you actually get to the point of execution, where you come to construction, where it's the actual execution of the project itself. Definitely, the project management budget I've got has been very useful because I've been applying it from concept feasibility studies right to preliminary design, design, tender adjudication and project lifecycle onto construction management and the actual construction itself. If I hadn't done the studies, I would not have been able to execute, especially on big projects* (**Participant 9).**

A project execution plan is valuable for implementing and completing significant work activities (Aston, 2021). Developing a project execution plan assists in outlining the activities, resources, and deliverables necessary for the effective completion of a project (Miramond, 2019). Understanding the components of these plans may assist the project manager in ensuring that the project team accomplishes its objectives and shareholders' expectations (par 4.6).

7.7.1.3 Inspires commitment

Successful project teams consist of people dedicated to achieving the project's objectives. In companies, the significance of project management cannot be over-emphasized. When done correctly, it improves the operation of every aspect of the organisation and the project team (par 4.7). It enables teams to concentrate on tasks (Orumie Ukamaka, 2020b). With diverse projects with a vast scope of work, chaos may be inherited; thus, knowledge and understanding of project management are essential since effective planning as the vital role of project management minimizes confusion, increases teamwork, and inspires dedication (Davis & Radford, 2015a).

Participants indicated that formal training taught them to engage with clients before beginning a project. Participants indicated that they could communicate with clients, increasing their confidence and having acquired knowledge and skills. This has inspired commitment from the project manager and team, as the team understands the project's direction. For example, **Participant 4** cited:

> *My formal training and me working on my certification have allowed me to gain more insight on project management and how to deliver. The understanding of project management has built confidence in the team. When I've drawn project plans, because of the knowledge I have now, I am confident enough to present them to the client. My team believes in me they are committed to something they can see* **Participant 4***.*

> The formal training has also motivated **Participant 7** to demonstrate dedication and discipline when assigned a job. It is necessary to complete the project and any complications that might cause delays should be reported. *"I think maybe just start with at school, we get given assignments, we get given homework, and they have deadlines. If you don't meet that deadline, there is a harsh punishment for that. As you get older, the consequences are even harsher, and when you get to the working environment, it becomes a financial mistake. Because if you do not meet the deadline, the consequences are you don't get to submit that invoice for that stage. So, as a result, in terms of your projections and your cash flows, they get hampered because now they*

have to be delayed and delayed. So basically, project management teaches you to be disciplined. It teaches you to make follow up on things and ensure that those things are being done, as well as your commitment and the meeting of deadlines. If I do this right, I'm confident (**Participant 7).**

In addition, one participant said that the academic and practical training enabled them to comprehend everything and interact with other stakeholders without feeling excluded. **Participant 1** articulated:

So, it helps when you are sitting, and you have all departments sitting in one room, and then they start speaking, everyone starts speaking their lingo of terms in the group so if you have done management or a project management course, you now understanding the marketing lingo, the accounting lingo, so you don't get lost when they are speaking their terms, you understand them and you grasp them, it's not about mastering it. It is about being able to contribute and understand where the conversation and project are going. I'm inspired every day because I understand (**Participant 1).**

One participant discussed that the project management training imparted skills and knowledge that enabled them to use it in several areas. **Participant 6** maintained:

"I think project management training has helped me in many ways because it covers a lot. I've covered basically every single part of the organisations, they teach us about HR, marketing and communication, finance and operations management and how all these departments impact and affect the project. I've been able to apply the necessary rules as well in the skills that I've learned from our training and my education in particular and my experience. Because of PM training it allows me to be able to work in all sectors, so I'm fortunate. I've worked in the different three spheres of government as well as private sector, project management has allowed me to work in all spheres of government and private sector. So, in all sectors is basically where I have been fortunate to be able to use that experience (**Participant 6).**

Project management is concerned with producing outputs that optimize an organization's advantages. Understanding project management concepts offers a clear focus on project goals (table 4.3), the capacity to manage and minimize risks, and the ability to regulate quality (Barbosa *et al.*, 2021a; Melo *et al.*, 2021).

Participants said that the value of project management skills enabled them to obtain control over existing projects while maintaining them on schedule and within budgetary constraints.

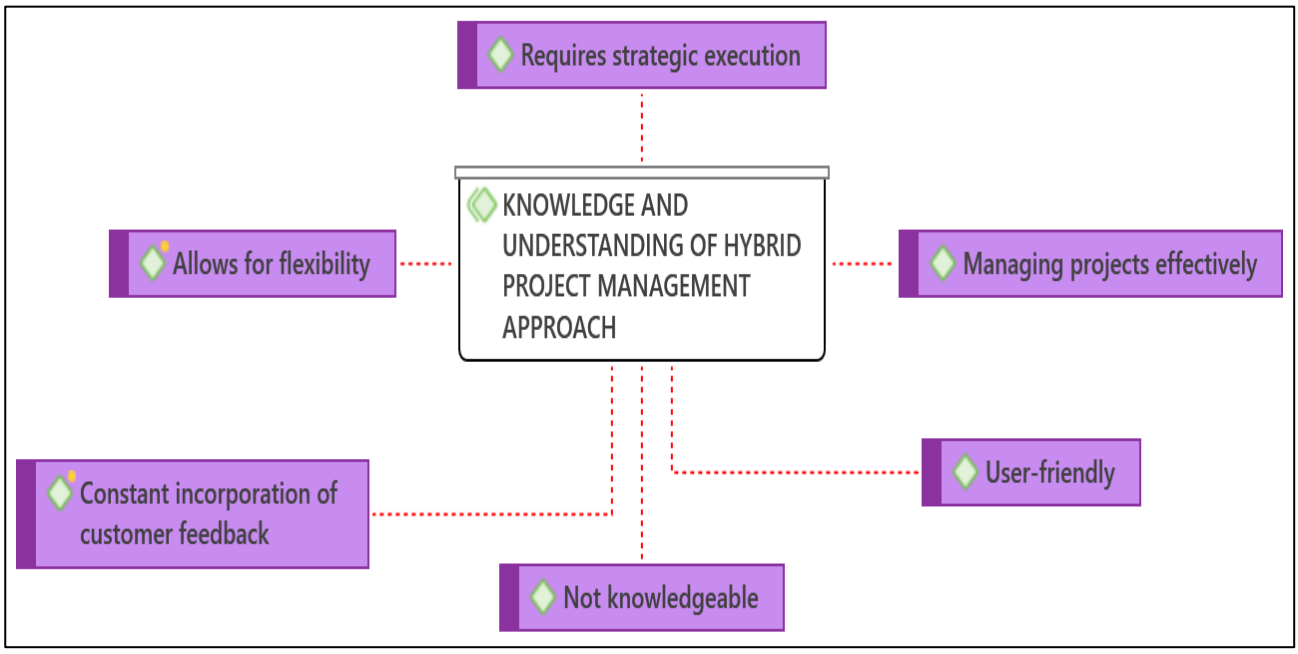
To remain competitive, firms in the infrastructure development industry must rapidly adapt to an ever-changing business environment (Ribeiro & Fernandes, 2010), necessitating the implementation of long-term corporate success and expansion plans. Without adequate knowledge and abilities in project management, project managers may be unable to implement organizational plans. Assuming that the company's purpose, vision, and value are reflected in the project's strategic alignment with the organization's mission, vision, and value, the advantages of project management will be realized (Nisha, 2020; Brière & Auclair, 2020). This positively influences team management since the team is aware of the project's mission and its impact on the organization.

7.8 Knowledge and understanding of hybrid project management

This section of the study investigates participants' understanding of hybrid project management. Hybrid Project Management is a unique project management approach that blends traditional and agile methodologies (Aston, 2021).

Hybrid combines the completeness of work breakdown structure with the lean features (figure 4.6) of agile to create a new approach for project management that is comprehensive and efficient. Agile project management is an iterative method of project management that emphasizes continuous releases and the incorporation of client input with each iteration (Segebart, 2019). The waterfall technique is an approach to project management that stresses a linear flow from start to finish (Kaufmann *et al.*, 2020). This style, which engineers often use, relies on meticulous planning, extensive documentation, and sequential execution.

Figure 7.8: Knowledge and understanding of hybrid project management



The participants discuss the adaptability that hybrid project management affords. In doing so, they emphasize its significance, given that initiatives often encounter unanticipated conditions and challenges. In response to being interviewed about this project management approach, participants said it provides flexibility, is user-friendly, includes managing projects efficiently, integrates continual customer input, and necessitates strategic execution. Participants gave the following responses:

> *We always try to incorporate an agile approach as well because, as you know, the landscape changes so quickly, so if you're not agile and not willing to change, and you are set on your waterfall approach you might get stuck. So we structure our projects in such a way when using these two methods together we see progress in our projects* (**Participant 1).**

> *This statement was further alluded to be **Participant 4** in the following statement: But I think the concept of agile project management and traditional project management for*

us has more flexibility and liquidity in how we deal with our projects to adapt to changes. I think the concept of agile project management together with traditional project management, sounds like a better approach given the current circumstances and the external and internal influence we are experiencing with projects (**Participant 4).**

So, from a project management perspective, our projects can adapt to any changes that are happening in the project as smoothly, and as quickly as possible maybe it's because of the different methods we use. I seem to be working (**Participant 14).**

In addition, **Participant 8** mentions the user-friendliness of this particular project management style and states:

Our team especially is definitely familiar with agile, remember with infrastructure project we have teams who focus on different things, so they use agile and we focus on construction we use waterfall. It all one project as long as the job is done. Combining these two creates a user-friendly system. As long as we deliver, our clients don't care which one, we've used in which department **(Participant 8).**

In addition, participants noted that agile project management facilitates successful project management. The following passages are instances of the preceding: *I think it is a good approach and one that will assist project managers though maybe not in all projects. I think the majority of the project if they adapted to have agile project management, or a hybrid of agile project management and the normal project management will assist project managers in managing projects effectively* (**Participant 2).**

To narrate or to give you a snapshot of the combined approaches, this is more of a top-down approach in the sense that it takes cognizant not only of the forefront but then of everyone in the project. Sorry, not top-down, but a bottom-up approach. In a sense, the reality is that if you are then involved as a project manager in the project, then you will not understand what is going on. The two approaches will confuse you if you don't have

a grip of the situation…of course, you need to get to a point where you understand your resources and the value that they play in the project (**Participant 12).**

Similarly, **Participant 3** notes that hybrid project management facilitates efficiency, accuracy, and on-time delivery across their many initiatives. The participant explains as follows: *It's a tool that we normally use in project management because it facilitates every aspect of the project to be faster, to be precise, to be delivered on time* (**Participant 3).**

The gathered data highlights that participants are knowledgeable about customer collaboration, an essential aspect of hybrid project management. For instance, participants indicate the understanding they have of this aspect of hybrid project management and state the following:

Hybrid, I think it has more customer collaboration rather than individual interaction. It's not a linear process, only like the traditional methodology, but it's more than that. We spoke about it a month ago, me and my colleagues say the difference between tradition or the old method is that with agile, it's a recurring cycle where you need to come back, it requires feedback constantly, and that's how you become more improved and you develop more. So, I think it's a very interesting one for me. The old traditional model helps you plan properly, but agile helps a lot because it really involves responding well to change and whatever the plan you put in place, so it includes a lot of delivering value, basically collaborating with customers (**Participant 6).**

The above respondent's remark is further supported by Boogaard (2022) "*the advantage of hybrid project management is that it enables project manager to combine the most effective aspects of many approaches*". This allows project managers to capitalize on the strengths of their selected methodologies while avoiding their possible flaws or hazards. In the conventional understanding of hybrid project management (combining agile and waterfall project management), projects are planned using the Waterfall methodology and a work breakdown structure (WBS) and managed using the flexibility of the agile method (Mostafa

et al., 2016; Saini *et al.*, 2017; Segebart, 2019). This gives teams an understanding of the tasks required and the project's scope.

> *I was recently made aware of it. I think I mentioned earlier from a network colleague who works in the IT space and introduces me to hybrid project management. And to also just further answer the question, my understanding of it is that it uses timeous feedback from consumers or from customers but by the time you received feedback you would have planning. It doesn't simply just use the feedback as and when needed, but uses it almost immediately, to make changes as soon as possible on the project* (**Participant 11).**

> *With government projects it's essential that you do two things, firstly, you plan. Government employees what to see a Gantt chant or word breakdown structure as part of your planning document, it's the way it has always been done. But your projects need to adapt to move with the times Covid taught us that. With government projects you need to get customer feedback and that's what agile allows us to do for me its something that I'm also getting to learn about. I guess it makes sense. Because at each point, you're going to need to be able to get feedback from your customers on – so now that you've gone to Plan B, or Plan C, you've now changed your approach in that direction, how is their take? How is their response? And are we still moving in the right direction? And then that feedback keeps you refuelling you for the way forward* (**Participant 14).**

Moreover, **Participant 6** emphasizes the need to use agile project management and waterfall project management in infrastructure projects since customer participation enables adequate project advancement. The respondent states the following:

> *Agile pm should be used by other companies in infrastructure projects because of the continuously feedback that you get and collaboration as well both within the project team and the stakeholders all the time. That is the one thing that lacks in waterfall there's never much feedback and retweeking and evaluation and going back changing things in the project as it progresses* (**Participant 6).**

The following literature supports this assertion: agile frequently allows re-evaluation and modification (par 4.8.1). However, it may be challenging to plan infrastructure development utilizing short sprints (Boogaard, 2022). The detail-oriented nature of the waterfall methodology may be overly rigid and restrictive (Levitt, 2011). This is problematic because project managers do not comprehend the complete project (Saini *et al*., 2017).

In addition to what other participants have noted, **Participant 1** suggests that one must be strategic in the execution of projects when integrating agile and waterfall project management methodologies since too many rapid changes might negatively influence projects. The participant's arguments are:

> *I think it's good if well managed; funny enough, with project management, you need to manage your projects well because the mistake that we make as project managers is that we change too quickly, and the changes that you make too fast have an inverse effect on what you were trying to do. The combination of these two project management approaches also has a risk on infrastructure development projects. Yes, I use both but I'm very careful because I fully understand the traditional methodology it is what I have been using for years but waterfall alone does not always work, sometimes, you find yourself in a tight spot and you have no choice but to use agile there. At first it was intermediating I must say I didn't know what I was doing but now I understand them too now but I understand the risk as well. Project managers need to know what they are dealing as this will make or break your company*

Even though hybrid project management enables project managers to use the ideal components of their preferred project management methodology, it does not come without obstacles. Planning a project using two distinct processes may be difficult since both approaches have varying timelines (Keinz *et al.*, 2021a). This necessitates more in-depth planning to ensure all requirements are fulfilled, and time is a rare concept in infrastructure development projects.

Challenges associated with hybrid project management include securing stakeholder support (par 4.9.1), which is essential when introducing a new project management technique (Boogaard, 2022). Your project sponsor may be unfamiliar with your hybrid technique and need further assistance communicating progress updates to other project stakeholders (Keinz *et al.*, 2021a). Communication is a challenge inherent to infrastructure development projects since the scope of communication becomes increasingly complicated in significant projects, especially when two distinct project management approaches are used (Barbosa *et al.*, 2021a). As the project manager, thoroughly understanding the selected methods or elements of the chosen approach is of the highest significance.

Finally, it should be highlighted that not all research participants understand hybrid project management. Participants demonstrate a basic understanding of the project management process in certain circumstances. The following passages provide evidence:

> *So, I am familiar with the concept, but I do not fully understand the project methodology's elements and implementation. I feel like in some projects, we adapt it without even knowing that this is the concept or the methodology* (**Participant 2)**.

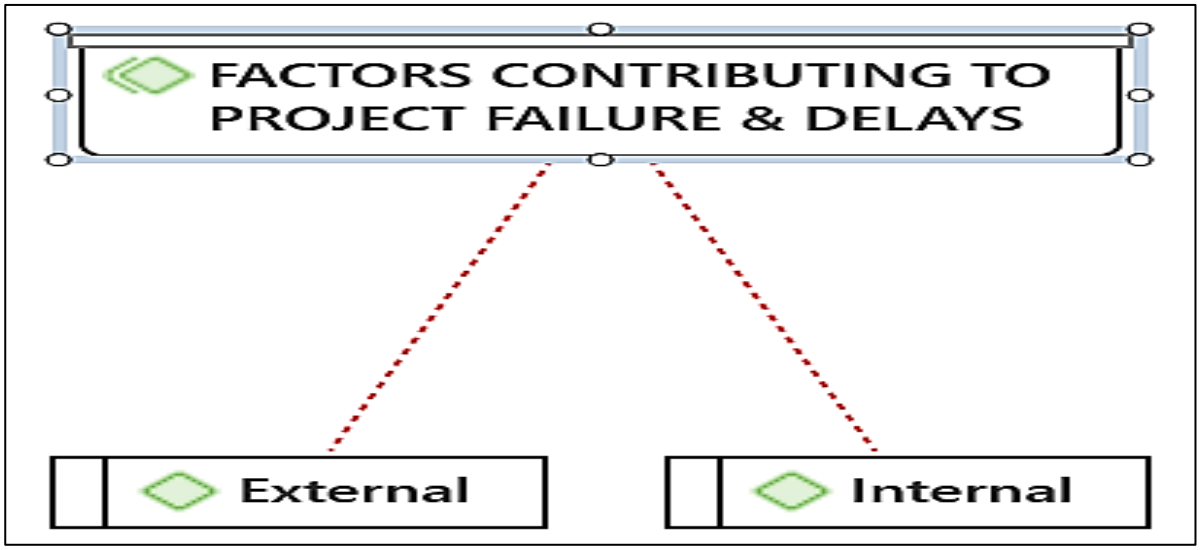
Hybrid project management is a relatively new technique, and some project managers in the study find it challenging to understand hybrid project management. Its bespoke approach enables project managers to integrate a short emphasis on each project component with an extended focus on the project's outcome (Wójtowicz, 2021). Hybrid project management enables project managers to blend approaches to develop something more effective for a particular project (Aston, 2021). Hybrid project management may also be an excellent transition approach for organizations that have used the "conventional" project management technique for an extended period. Challenges are transitioning a project from a conventional to an agile methodology(Miramond, 2019). However, hybrid project management enables project managers to customize the project management technique and strategy for each new project.

7.9 Factors contributing to project failure and delays

Delay in Infrastructure development projects has been seen as a worldwide concern and is the most prevalent, costly, and hazardous challenge encountered by private and governmental building projects(Nisha, 2020). Infrastructure development project delays are one of the most significant obstacles faced by the worldwide industry, and projects should ideally operate on a regular schedule with no delays. The sector has seen several notable projects fail to meet deadlines. Delays in infrastructure projects reduce economic activity, lower employment opportunities, and deter foreign investors. A delayed project will always negatively affect the contract's outcome (The World Bank Group, 2021).

The section that follows investigates the causes of project failure and delays. These variables were divided into two categories: external and internal. External factors are those outside the control of the firms implementing the project, such as the actions of the project's owners and sponsors and environmental hazards, such as floods. The internal issues include problems within the enterprises that lead to the failure and delays of projects, such as project team dynamics, interrupted communication channels, insufficient resources, and poor community and stakeholder participation.

Figure 7.9: Factors contributing to project failures and delays

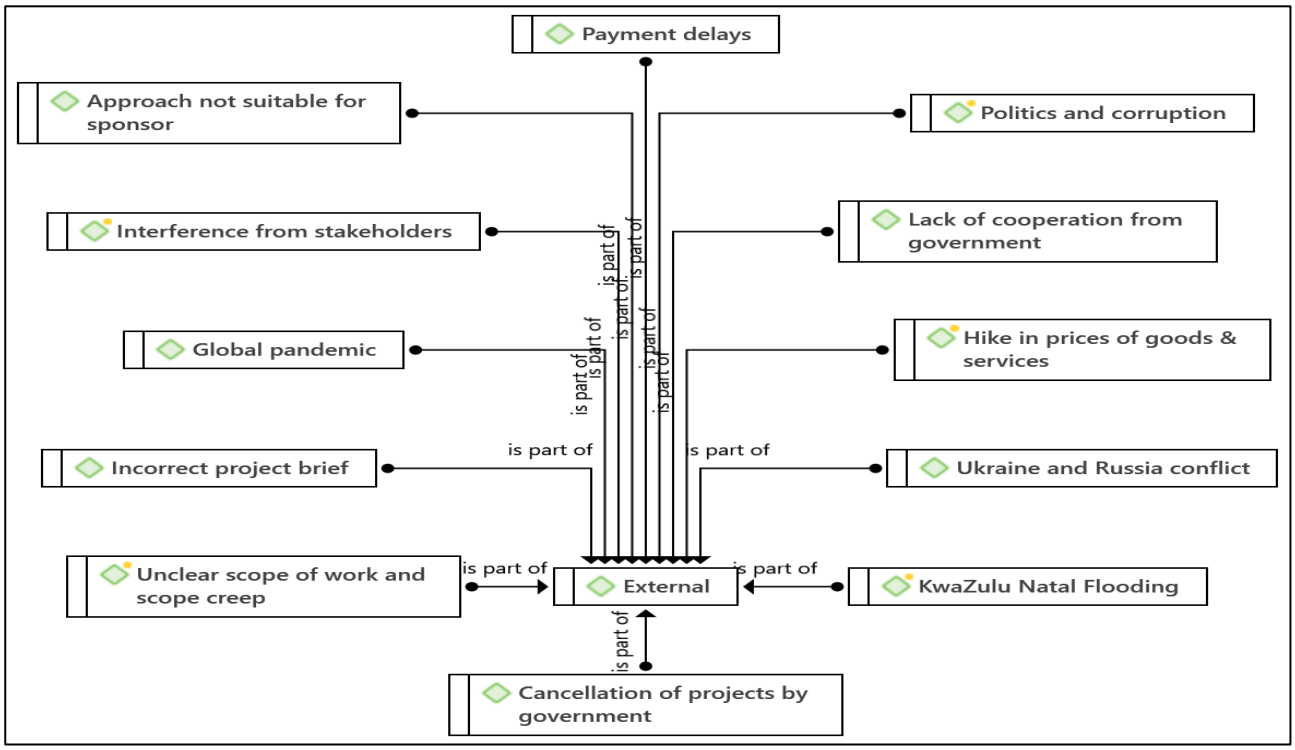


7.9.1.1 External Factors

Infrastructure development is notorious for its recurrent issues of fragmentation, low productivity, schedule and expense overruns, poor safety, substandard working conditions, and inadequate quality, resulting in project failure (Ruijter *et al.*, 2021). In infrastructure development, the ultimate objective of any commercial activity is to achieve success. Organizations must consistently deliver high-quality projects on time and under budget to thrive in the infrastructure development environment. Numerous practitioners and academics have sought to analyse and define the determinants of project failure or success, but this hasn't been proven easy (Oladinrin *et al.*, 2012). The criteria most researchers agreed on were inadequate project objectives and goals specification and management difficulties (figure 4.9).

The figure below illustrates the external variables reported by the research participants as contributing to project failures and delays.

Figure 7.10: External factors contributing to project failures and delays



7.9.1.2 Global Pandemic

The virus has affected more than 213 countries and territories with significant morbidity and mortality and thus was declared a pandemic by the World Health Organization in March 2020 pandemic" (Eskandari *et al.,* 2021). The pandemic spread to multiple countries, continents, regions and communities and has holistically affected citizens and the population (par 2.6.4). COVID-19 is not only a worldwide pandemic and public health calamity. The pandemic has significantly impacted the global economy and financial markets (Ika *et al.,* 2020a). COVID-19 has dramatically resulted in revenue reductions and increased unemployment and has caused severe disruptions in industrial organizations, manufacturing and transportation services. The pandemic has also impacted psychological, social, and demographic factors (Karmakar M *et al.,* 2021; al Mutair *et al.,* 2021).

The pandemic had a substantial negative influence on the global financial outlook as lockdown and other limitations imposed, notably in the second quarter of 2020, have nearly eliminated the economic gains made before the outbreak (Schäffler & Abrahams, 2021). Due to the worldwide pandemic, which led to a national lockdown, many businesses were forced to halt their everyday operations to comply with the government's mobility restrictions to prevent the spread of COVID-19 (Statistics South Africa, 2021b). Numerous government and commercial building and infrastructure projects were impacted (par 2.7.3). According to **Participant 2**, the global pandemic had a detrimental effect on the delivery of projects.

> *For starters, during the pandemic, we had level 5 lockdown at some point, and everything had to stop happening. So firstly, that affects the project, the scope delivery was adversely impacted, and you will not be able to deliver the project at the time initially set out in the project plan* to (**Participant 2).**

During this period, the activities of several industries were interrupted because they were considered "non-essential". Infrastructure development as a project-based industry is not isolated from global factors. These highly influential factors are essential to determine the success or survival of SMEs in this sector. SMEs in the infrastructure development industry

could not operate and generate profits (Sohi *et al.,* 2016). **Participant 9** referred to this by stating:

> *The infrastructure development industry was affected greatly when the pandemic started for about a year. Everyone was at home. There were no projects, nothing happening. This obviously, that affected everybody, but my business was affected a lot since it was not an essential service; there was nothing, we made no money, nothing. There was no income generated during that period* (**Participant 9).**

The data analysis also demonstrated that the effects of the worldwide pandemic were compounded by the country's persistent problems, such as load shedding and limited internet infrastructure access. **Participant 11** indicates that the transition to remote employment during this period negatively impacted project delivery.

> *The global pandemic, also, in general, with a lot of organizations having to move to a work-from-home basis, that also changed the way projects were delivered. I mean, internet communication, internet reliability, load shedding as well, have kind of been factors that we've had to take into consideration and how efficiently the project runs* (**Participant 11).**

In response to the pandemic and its negative effect on the overburdened South African health system, the South African and provincial governments accelerated various infrastructure healthcare programmes to address the impacts of Covid-19 on the overburdened healthcare system (par 2.7.5). Healthcare facilities, clinics and Covid-19 module facilities were built in the plight of increasing healthcare faculties in many provinces, including Gauteng. The statement by the Premier of the Gauteng Province is an indication of healthcare facilities that were constructed in response to the surge "*A number of clinics and healthcare facilities were constructed as a part of the Gauteng government's plan to revitalise health infrastructure and improve the quality of health care services in the province*" (Makhura, 2021).

Participant 7 was one of the fortunate participants to develop a healthcare facility, which implies that during this time, Participant 7 was able to generate profits. However, owing to the urgency of the project, Participant 7 illustrates the tremendous strain on the organization.

> *For us we were lucky, we were awarded a tender to build a healthcare facility, put the pressure we had from the government, and stakeholders was enormous. For a project of that magnitude, it would've taken us at least 2-3 years. It took us a year. We also had to work around restrictions. Remember, at some point, everything was closed. Suppliers, both local and international, were not operating. Even if you got a supplier from overseas to deliver, the ports were closed. The pressure was terrible, construction workers had to have permits to be on the road, but we completed on time. We were lucky to make money when most construction companies could not generate anything* (**Participant 7).**

The pandemic and other economic disruptors, such as the economic, political and social unrest, natural disasters, and the Russia-Ukraine conflict, have substantially influenced the province's financial outlook. According to the data, the size of the Gauteng GDP decreased by approximately ZAR80.9 billion in 2020, reaching ZAR1 035.7 billion. "*This is a level last recorded in 2012, when the province's economy was valued at ZAR1 012.1 billion*" (Statistics South Africa, 2021b). Due to the organizationally complex and highly fragmented infrastructure development projects, schedule delays and cost overruns are often ascribed to project complexity (Sohi *et al.,* 2016:252). Due to economic factors such as the worldwide pandemic, sociopolitical turbulence, natural disasters, and the Russia-Ukraine war, many projects have changed, failed, or been suspended. The unprecedented economic disruptors and their effects continue to challenge the viability of economies worldwide, with infrastructure development initiatives being particularly impacted.

7.9.1.3 Natural Disasters

Commonly infrastructure programme delays are a common phenomenon, "*usually there are many reasons to experience a delay in infrastructure as pre-design, design and execution phase usually leads to time overrun in work. Completion of infrastructure projects on time seems to be challenging tasks in large-scale projects. It has been observed that about 90%*

of government infrastructure projects fail to achieve on time completion" (Krishna and Nisha, 2020: 79). These delays are a common occurrence, especially now as a result because of natural disasters. The impact of natural disasters has resulted in the effectiveness of the delivery of projects (OCHA, 2022; Tandon, 2022) as well as the national agenda in terms of employment creation and economic growth, as infrastructure development programmes are predominately dependent on human resources used to deliver projects.

Like the rest of the world, South Africa is also not immune or shielded from the influence of global forces and challenges affecting the rest. Like the rest of the globe, South Africa was devastated by recent natural catastrophes. Natural disasters have significantly impacted infrastructure development plans (par 2.6.5), resulting in the temporary or permanent suspension of many infrastructure projects for lack of economic feasibility or insufficient human and financial resources to accomplish such projects. The historical consequences of the pandemic have a web-like influence on the country's natural calamities**. Participant 11** describes the negative impacts of natural disasters on the organization.

> *As an organization and an SME, we've had a number of disruptions affecting our business in the last 2-3 years. Our projects were severely impacted by the global pandemic, and then it was the KZN looting and then it was natural disasters not only in KZN but in the Western Cape too. We are a business in Gauteng but global problems and problems in other provinces affect us too. So, we had to put quite a few of our projects on hold, because at that time it was not a priority for the business to launch new projects. And it was the priority to take care of its employees at that time. This impacts us, impacts our growth as a company* (**Participant 11).**

Between 2010 and 2019, the economy of Gauteng grew by an average of 1.9% each year (Statistics South Africa, 2021b). This has been inadequate to meet the socio-economic challenges the province is now facing (South African Market Insights, 2020). The outbreak of the pandemic and the rise in natural catastrophes have exacerbated these issues, making it more difficult for the province to address them. Before natural disasters, investments had been made in infrastructure in several provinces, which have now been damaged, as

Participant 7 explains. Budgets formerly dedicated to SMEs' growth and new infrastructure projects must now be directed to repairing and reconstructing essential facilities destroyed by natural catastrophes.

> *It's been terrible if you look at the disasters. The road infrastructure, which would have just been upgraded and done, have all been washed away during the floods. The government have made provision to funds to be allocated to SMEs but now those funds must now be allocated to fixing that infrastructure; government is cancelling our projects because of this. Natural disasters are terrible. They affect our lives, our employees' lives and those of their families* (**Participant 7).**

The destructive effects of natural catastrophes in South Africa (such as droughts, floods, hailstorms and wildfires) have resulted in significant social and economic losses, expected to worsen due to climate change (Tandon, 2022). From 1900 to 2022, more than 100 disasters were recorded, resulting in over 2 500 fatalities, 21 million people impacted and losses of approximately $4.5 billion(OCHA, 2022). Unexpected heavy rains caused floods in KZN and Eastern Cape provinces in 2011. Unexpected severe rains brought floods that killed 91 people and cost more than $100 million in damages; in 2022, at least 123,808 people were severally impacted, 448 lost lives, and more than 30,000 were displaced (le Roux, 2022; Tandon, 2022; The World Bank Group, 2021). As temperatures rise, severe weather is anticipated in South Africa and the respective provinces.

7.9.1.4 Cancellation of projects by a government official

The infrastructure development industry is known to be “dynamic and complex in nature because of the increase in client expectations, technology advancement and development process. Infrastructure development projects are naturally complex because of the extensive nonconformity of project sites, high-pressure demand in construction time and cost, and increased complexity on construction methods” (Osuizugbo, 2019). Typically, government authorities will commission a project. Still, changes in client expectations may result in the termination of a project by those who commissioned it and might negatively influence the organization. This is one of the primary reasons why businesses must cease

operations. **Participant 15** relates how governments undertaking construction and infrastructure development projects might make decisions when they no longer want the project to continue, leading to the financial ruin of the small enterprises performing these projects. In addition, the companies lose everything since they lack the financial means to contest this in court.

> *Yes, we do get challenges like I alluded to earlier on, you get appointed for a project, and then you start with the work, you probably get paid for the first phases and the second phase, but at some point, they say that the project is no longer required, and the project is cancelled. So, because we're a small firm, we obviously can't go and litigate against that particular department. And as a result, we end up losing out on the projected income that would have achieved from finalizing the project. And at some point, you've spent resources but you're unable to recoup those expenses because the project has been cancelled or has been suspended* (**Participant 15).**

Infrastructure development projects are often enormous and vital to the economy, but the absence of ethical leadership is one of the most significant obstacles to public service delivery. The success of a project is directly impacted by the government's propensity for leadership turnover. The impact of project failure in infrastructure development projects, as alluded to by Eja and Ramegowda (2020), includes income loss to the state, cost overruns, financial loss by residents, inadequate infrastructure, and low community empowerment. Consequences included sluggish economic growth, sector-specific underdevelopment, loss of foreign funding and grants, stricter donor rules, incumbent leadership losing elections, and financial institutions losing faith in the state.

7.9.1.5 Inflation

South Africa's economy depends on various elements, including inflation. Inflation is a significant indicator of future economic situations (par 2.8.3). Inflation's impact on economic development cannot be disregarded since it reacts favourably and adversely (Eja & Ramegowda, 2020a). The inflation rate also impacts infrastructure development projects since inflation impacts the anticipated project budget, resulting in project modifications and

cost overruns. This impact is attributable to the yearly adjustment of construction materials costs, labour pay, and equipment rental rates, generating considerable concern among stakeholders (Osuizugbo, 2019).

When the general price level of an economy rises, each unit of currency can buy fewer goods and services; consequently, inflation corresponds to a reduction in the purchasing power of money, which has an effect on infrastructure development projects. **Participant 5** and **Participant 11** discuss inflation's impact on the project.

> *The conflict between Ukraine and Russia is large because we in South Africa feel the impact, the wave of that war is spreading around; the high cost of petrol is due to the increasing price of oil. When those two things increase, it affects a lot of things negatively. High petrol costs mean your transportation costs go high, now this means that when you cost the project you cost it at a certain price but with changes in the petrol price pushes the company delivering materials to increase their prices you now have to recoup those fees somewhere. So, you will pass the costs on to the customer, or you will have to absorb those costs. If I absorb those costs, it affects my profit* (**Participant 5).**

> *I also think projects change due to the economy because that's also changing quite a bit. As soon as we see strains like the petrol cost, the price of food in general, this can cause a natural strain, especially for us. We've kind of seen the strain applying to simple things as petrol because project managers are not able to get to projects as efficiently because of the cost of petrol. And we've had to factor in having to pay for fuel costs which change the budget, which we had initially proposed to our clients. So those are some of the changes that may cause delay and in worst cases, failure of the project* (**Participant 11)**.

The conflict between Russia and Ukraine has had evident impacts on South Africa, primarily due to the two nations' involvement in providing crucial essential commodities that maintain the region's infrastructure and socioeconomic sectors. In addition to the post-COVID

inflation, the economic disruption induced by the continuing conflict, in the form of sanctions and physical blockage of trade routes, has resulted in a sharp increase in commodity prices (African Media Agency, 2022). The conflict has intensified and highlighted the problems of over-reliance on imported construction materials in infrastructure development projects. The cost of construction materials has surged (African Media Agency, 2022; Tariq & Shujaa Safdar Gardezi, 2022). **Participant 6** elaborates on this statement:

> *Then now what we find is, the normal Ukraine and Russia situation has also impacted the economy very much because as you know, that's a vital resource, then it has a knock-on effect on the rest of the countries, particularly in the way that they are structured in terms of hierarchy. You know, there's, in particular, where we stand as South Africa, and that's the third world. And, again, it alleviates in sort of pressed prices. I mean, you can see how the prices are rocketing in terms of energy, which is your Petrol, even building material in specific. Sometimes prices increase every month. In this year alone, between January and February, we had two price increases in terms of building materials. So, we've had to do a price increase report on those. So, it's just the way that the frequency of increases of prices is skyrocketing. And that just makes life very difficult. Even if you're an investor yourself, it becomes very difficult to invest in any project right now* **(Participant 6).**

In conjunction with the adverse effects of COVID-19 on food and energy costs, which have already exacerbated inequality, poverty, and marginalization (African Media Agency, 2022; le Roux, 2022; The World Bank Group, 2021), these price hikes have the potential to spark more internal discontent and instability. The climate favourable to social and economic progress is threatened by insecurity.

7.9.1.6 Payment delays

In infrastructure development projects, all contract parties share the objectives of completing infrastructure development projects on time, under budget, with the best quality, and in a secure way. However, it is well-recognized that payment delays pose a significant obstacle to the success of infrastructure development projects (Ansah, 2011; Tariq & Shujaa Safdar

Gardezi, 2022). Delay in payment for services performed on infrastructure development projects is a crucial cause of concern (Bajjou & Chafi, 2020; Elhusseiny *et al.*, 2021a). It produces severe cash-flow issues for contractors, which may have a disastrous impact on the contractual payment chain. This statement is explained by **Participant 15**

> *I think the delay in the payment of the invoices is a frustration for a number of organizations that are involved in in doing business with government, and as a result, we end up being under serious financial constraints because you obviously are banking on those invoices being settled for you to also further settle invoices with your creditors as well* (**Participant 15).**

Significant factors that may contribute to the success of a project include the practice of efficient and timely payment in infrastructure development projects. One of the few factors that impede the completion of projects is the practice of delaying payment for services done on infrastructure development projects (par 2.8.6). Withholding or delaying payment causes financial difficulties for construction firms, and its effects are often so severe that some businesses are forced to cease their operations (Elhusseiny *et al.,* 2021b). Non-payment or late payment results in a domino effect; for instance, if the contractor is paid late, the subcontractors or suppliers who are contractually obligated to provide products or services will also be paid late (Dadhich *et al.,* 2015).

7.9.1.7 Politics and corruption

The intricate and complex nature of infrastructure development involves a diverse number of stakeholders with varying degrees of knowledge and experience in the project, and the inherent complexity of infrastructure development projects may be affected by corruption, particularly in developing countries (Hossain *et al.*, 2022; Musarat *et al.*, 2021). Political intervention and project corruption create delays and hinder project managers' efficiency. **Participant 5** and **Participant 10** emphasize the impact of politics and corruption resulting in information distribution delays and provide several translations of the original message.

Also, with the government, certain people make the decision who is not directly involved with the project. There are people in government who make decisions but are not responsible for implementing or approving the project because these people are politically influential, they make these decisions. There is a huge gap for example when project information is requested from the contact person the delay in getting feedback from that person becomes a problem because they have to liaise with the project owner and with their political affiliates. By the time the information comes back, and the risks register is updated because the scope has changed, we have lost a lot of time, scope with government projects continuously changes. Corruption in government is also the reason why our projects also get delayed (**Participant 5)**.

With government projects, a lot of information is lost in translation because decisions are made by executive of a political party but information gets diluted in a sense that the executive makes the decision, but the information doesn't get to you immediately. It still goes through government processes sometimes it must be approved by another political party by the time you receive the information it may have changed drastically from the executives' decision, remember each time an executive makes a decision, things get lost in translation because the phases are too long, like the approval process is just too long, too many people involved in the approval process of a project causes delays, government officials also what to see what money they can get from you **Participant 10.**

Cooperation between project owners and government employees ensures that the work will be completed on schedule and the project's objectives are met. The data analysis process also indicated that the difficulty of a lack of collaboration from the government in these initiatives frustrates project managers and limits the proper implementation of the projects. **Participant 6** further describes how top management's failure to prioritize decision-making hinders these initiatives.

The prioritization of senior management is a major problem with public sector project each project has its own stakeholder levels of interaction. Obviously, the critical one being senior management's, involvement. But often senior management doesn't come to the table (**Participant 6).**

Participant 7 described how the government's lack of financial commitment to building and infrastructure projects creates delays and project failures since the expenditures incurred are the responsibility of SMEs.

> *For infrastructure projects you would normally find the government issues out a tender, the tender then closes, appoints the company which is normally an SME and only to find that there is not enough funds on the project. So as a result, you find that the contractor starts working, he's able to claim the first invoice after that is being told that some of the funds have been diverted to other departments. So as a result, then he cannot carry on working under those circumstances. So, he's got people on site, he's got site camp and everything, so it becomes an issue. That's one of the reasons the projects get delayed* (**Participant 7).**

Corruption and lack of sponsor engagement are of particular concern for infrastructure development projects in which the public sector functions as client/owner or the principal contractor. Corruption and political interference in government projects diminish cost, time efficiency, and the advantages offered (Musarat *et al.*, 2021). Corruption is a primary concern for public policy. It is one of the most significant impediments to developing nations' growth and the enhancement of the quality of life in industrialized nations. Eliminating corruption is one of the world's most important ongoing challenges.

7.9.1.8 Approach not suitable for the sponsor

Delays in public sector infrastructure projects always significantly affect all parties involved. These obstacles include stakeholder influence that leads to disputes, contract cancellation, and litigation. Delays in infrastructure projects have forced the public sector to spend more than the budgeted amount since most public projects are often mismanaged, resulting in significant delays and cost overruns (Ametepey *et al.*, 2018; Musarat *et al.*, 2021). Leadership changes often result in a shift in the project's stakeholders, and a strategy that one sponsor deems appropriate may be regarded as inappropriate by another sponsor,

creating project delays. Participant 2 elaborates on how sponsors influence project design and how delays and failures may be linked to an inadequate strategy.

> *Well, ordinarily, the project has included much engagement with the sponsor. Or vice versa, often our projects involve regular engagement with the sponsor. And by the time you are finished with the phase, the sponsor may have changed, the new sponsor then comes and says no, but I would have wanted this to be like this, then it delays you because in some instances, you might have to go back and do the work, which will be a cost of resources, cost of material and all of those things* **Participant 2***.*

Project delays have monetary repercussions. Sponsors' influence and adjustments often result in expenses (Ametepey *et al.,* 2018). Overruns are usually caused by factors such as the payment of interest to contractors, the inflation-driven rise in the cost of materials, and fluctuations in market exchange rates. In paying interest on delayed projects, the government loses a large amount of money that might have been allocated to other meritorious initiatives (Hossain *et al.,* 2022; Johnson & Babu, 2020). The negative effect of public project delays on the economy is significant and must be addressed with the greatest urgency.

7.9.1.9 Poor scope definition

Poor scope definition at the outset of an infrastructure project may lead to cost overruns and schedule delays. Consequently, all project plans, schedules, cost and quantity estimates, procurement and quality mechanisms are often derived from the project's initial scope (Goldstrong, 2021; Muneeswaran *et al.,* 2020). Poor initial project scope definition, underestimate of inherent risks and uncertainties, project finance challenges, a change in the client's interests, or force majeure may cause a change in project scope. This might result in a variation order, affecting project deliverables, the budget, and/or the whole project team (Amoatey & Ankrah, 2017).

Important to the effective execution and completion of a project is the project owner's accurate characterization of the project's scope or what is expected of the project.

Consequently, any modification or change to the project's scope during execution will need a revision of the whole original project setup, including the updated budget, construction methodology, construction schedule, procurement plan, and quality assurance plans, resulting in increased time, resources, and costs compared to the initial baseline (Goldstrong, 2021). **Participant 7** provides an example of a failed project owing to inadequate scope definition. Additionally, the participant emphasizes how poor project owner monitoring might result in project failure.

> *So, the other issue is change of scope without formally following the processes for changing the scope. I'll give you one example the project of the statue of King Shaka at King Shaka International airport; that project was done and completed, and when it was completed the people who approved it approved it based on what they saw on a smaller scale and something like that but when they got to the airport they saw King Shaka in between these cows, they were very much unhappy about it because somebody from the dignitaries complained that King Shaka looks like a herd boy, rather than a King. So, imagine the amount of money that had been spent on this project. If you can see if you go to King Shaka, you will find that King Shaka himself is no longer there, the cows are still there. I mean, that on its own it's part of the delays, part of the wasteful expenditure* (**Participant 7)**.

Participants in this research also encountered problems with project owners providing an unclear scope of work; in some cases, this was coupled by scope creep when more project needs were added. **Participant 3** mentions how this may also affect the project's budget.

> *Other reasons are that somewhere along the line, you find many managers changing the project, giving it another direction, and that takes a lot of budgets and then the actual project is not realized the mandate is not being reached. That happens mostly in government projects then the people just discard it and run away* (**Participant 3)**.

Consequently, any update or alteration to the project's scope during execution will need a review of the initial project configuration (Kadry *et al.*, 2017; Sambasivan *et al.*, 2017).

Participant 2 outlines how sponsors alter the project's scope depending on their preferences, desires or new requirements.

> *When you are working on a project, it is not something that is cast and stone. But sometimes you will have, for example, a project sponsor will say, I have decided to add the following. It is expected that you can include that in the project, even though you had initially agreed on the project and the scope. So, I think one of the aspects that change or delay a project* (**Participant 2)**.

Participant 14 suggests that the project owner should provide a detailed initial scope of work to ensure the organization can design and plan correctly.

> *So, I think sometimes the scope is not clear to begin with, so what exactly are you meant to be working on or achieving? I think that sometimes it becomes an issue, because then you get that whole thing of scope creep, then all of a sudden, while you have already started, there's all these additional things now that have to be added on, that were never catered for or planned for as part of the project. And I think those things, then start to add delays, because now you might realize that, actually now incorporating these two additional things requires us to maybe fix things that we had done already, that we had started with. And it now changes the project in totality. So, I think not understanding the full scope to begin with, those are some of the big things* (**Participant 14)**

To achieve proper control over changes to the project's scope, it is vital first to recognize that change is unavoidable and might be helpful to the overall project's success. Incorporating a proper shift in scope management into a proactive strategy involving project stakeholders and including their demands throughout the project's lifecycle (Goldstrong V, 2021; Musarat *et al.*, 2021) is the most important thing to accomplish.

7.9.1.10 Interference from stakeholders

During the early planning phase of a project, it is vital in project management to establish the critical success factor in partnership with the project sponsor (par 4.7) and to design key

performance indicators in the form of milestones that will assess the achievement of the project's scope (Goldstrong, 2021; al Hadithi, 2018). However, stakeholder interference may be a barrier to the success of a project. Participants underlined how time-consuming stakeholder interactions might be the time that should be devoted to the project. **Participant 5** explains how this might affect the project's budget and lead to uncertainty on what is necessary to accomplish the project.

> *I believe that most of the projects could fail because there is a lot of engagement and there's not enough time put into production. When there is a lot of engagement, there are a lot of meetings, a lot of coordination meetings or stakeholder engagement, and it is all about planning and planning and planning, but that could cost you on the production side. There is no production, in fact, and there is not enough time to implement what was discussed. Constantly meeting could cause a lot of changes and create a lot of confusion* (**Participant 5)**

Goldstrong (2021) suggested that, to minimize disagreements in public projects, it is vital to request permission for modifications from the sponsor continuously and to communicate those changes to stakeholders in a timely manner. The scope is often “frozen” to concentrate on planned future deliveries.

In conclusion, external variables outside the control of the organization executing the project, such as the activities of the project's owners and sponsors, as well as environmental risks such as floods and other natural disasters, may impede the project's development. Infrastructure development projects are, by their very nature, complicated undertakings with several obstacles that directly affect their performance. Infrastructure development is notorious for its persistent challenges of fragmentation, low productivity, schedule and cost overruns, poor safety, substandard working conditions, and insufficient quality, ultimately leading to project failure.

Infrastructure development projects are essential to a country's infrastructure and industrial development, so their successful implementation can positively impact the economy. Consequently, the government should continue to prioritize the implementation of these

projects and the continuous support of SMEs. In infrastructure development, the end goal of every business operation is success. Organizations must continuously deliver high-quality projects on schedule and within budget to succeed in the infrastructure development environment.

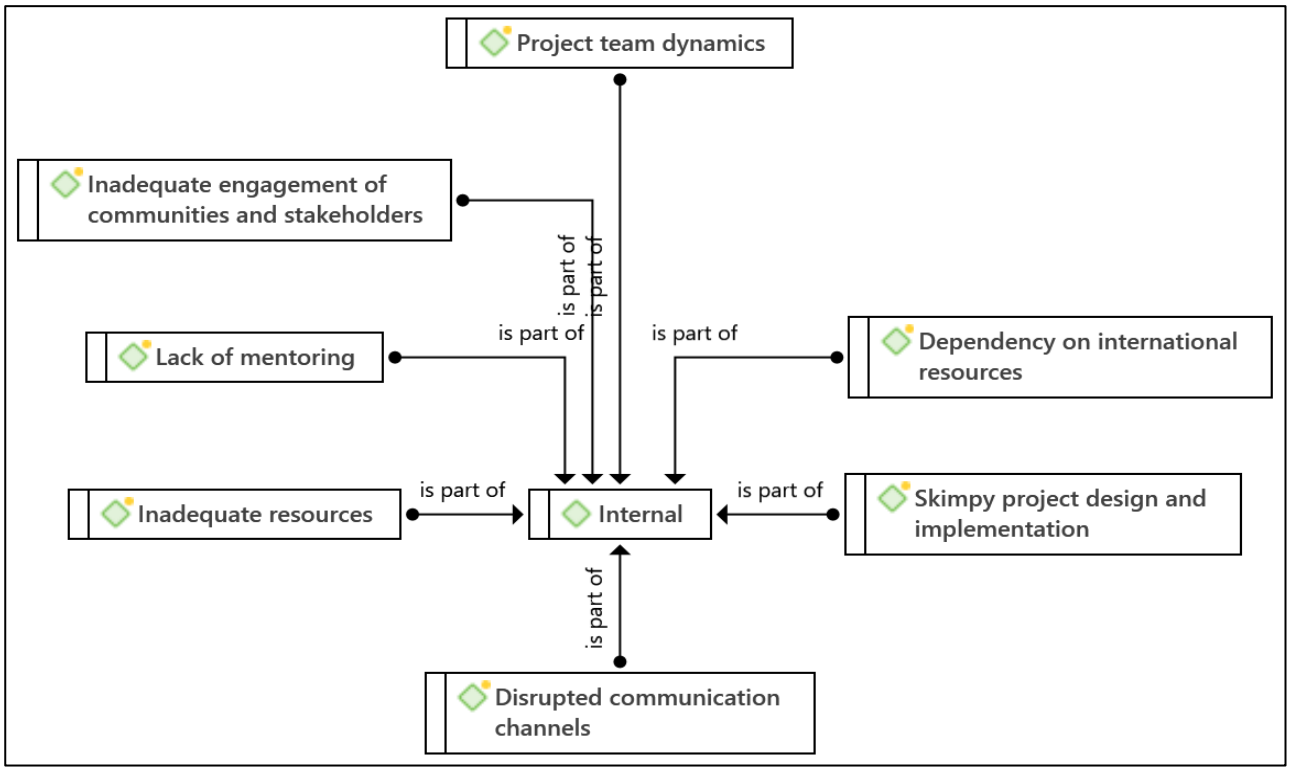
7.9.1.11 Internal factors

Many institutions worldwide, in both developed and developing nations, struggle with the delayed completion of projects. The global infrastructure industry's past demonstrates that most projects experience severe schedule and cost overruns (Flepisi & Mlambo, 2021). This implies that the difficulty posed by the delay in project delivery needs undivided attention to assure project success since it engenders more antagonistic relationships, arbitrations, cash flow issues, and anxiety among project stakeholders (Annamalaisami & Kuppuswamy, 2022; Shrivas & Singla, 2022).

Internal issues may impede the success of a project, and it is necessary to explore these internal variables to ensure that they are adequately managed. People, not processes or methods, determine the achievement of a project's goals. This demonstrates that project managers and internal variables play a crucial part in assuring the success of a project and that it is of the utmost importance that they are managed so that the projects are completed.

The graphic below illustrates the internal variables reported by the research participants as contributing to project failures and delays.

Figure 7.11: Internal factors contributing to project failures and delays



7.9.1.12 Inadequate Resources

Resources are crucial to the success of a project; without enough or appropriate resources, the project faces the risk of failing to fulfil the planned scope, be completed on time, and remain within the budget. In addition, the project team members are under additional pressure to meet unachievable objectives due to a shortage of resources. Insufficient resources impede the project team from achieving its objectives (Hamza *et al.*, 2022). The scarcity of resources may be a result of failure to adhere to the project's original estimates and commitments, or it may be the consequence of organizational changes that result in budget reductions (par 2.8.6), a greater requirement for project deliverables, or the availability of project team members (Flepisi & Mlambo, 2021). A project will be more likely to succeed if it has sufficient resources, such as the equipment and materials needed for construction, labour, and human capacity. **Participant 15** emphasized that insufficient resources result in building and infrastructure project delays and failures.

You understand that in every project there's a need for resources, you've got, obviously human resources, you've also got financial resources, and you've also got equipment and tools that you will need. Those are the key factors that contribute to project. If you don't have some of these, you won't be able to reach the set objectives. Often what we see is that when project team members are under pressure they often pull out of the project or no longer want to be a part of the project, this results in the shortage of resources for the specific projects. People leaving a project may be a result of many things like not enough budget allocated and the expectations but the client has changed as a result, then the project will then obviously delay or end up not being completed at all. So those are the factors that really determine or impact the achievement or the finalization of the project, in the sense that they can obviously delay or hinder the delivery of that project **Participant 15**

Without enough or appropriate resources, the project faces of risk of failing to achieve the planned scope, complete on schedule, and remain within the budget. In addition, the shortage of resources increases the pressure on the project team members to accomplish unrealistic expectations. Eja and Ramegowda (2020b) advise that if the resource shortage is likely to hinder the project's performance seriously, the project manager must interact with the stakeholders. The project manager must promptly explain the concerns and their impact on the project's results. Collaborating with the functional managers and project owner to acquire enough resources or redefine the project's scope

7.9.1.13 Project team dynamics

Teamwork and the management of teams are crucial factors that contribute to the efficient management of projects. The difference between successful and failed performance may be attributed to the team's efficiency. Teamwork in project management increases efficiency and production, thus, ensuring that all team members work cohesively and consistently to provide shared responsibility (Ametepey *et al.*, 2018; Flepisi & Mlambo, 2021). The project team's dynamics might also contribute to project failures, as Participant 3 and Participant 11 stated. A significant hurdle to teamwork is often the team members' various professional

aims and interests. However, project success often demands team members choose "what's best for the project" above their interests.

> *Sometimes what we see is that with large projects a number of people are involved in the project and you have to make the project work but sometimes you just don't get along with other teams. Team dynamics come into play, often what we see is that with large contracts every one is an expert, and nobody wants to be told what to do. Often communication within teams becomes a hindrance to project success as well. If project teams are not communicating, you can see it as team members become frustrated* (**Participant 3).**

A lack of commitment to the project is one of the most common obstacles. Still, several other factors can contribute to a team's lack of commitment, such as team members' professional interests, a sense of insecurity associated with projects, a lack of clarity regarding the rewards that may be forthcoming upon successful project completion, and intense interpersonal conflicts (Muneeswaran *et al.*, 2020). Ineffective communication among team members is also a significant factor contributing to delayed project delivery or even project failure, as Johnson & Babu's (2020) statement supports the argument alluded to by Participant 3.

Significant sources of role conflicts include overlapping and unclear work responsibilities, which may lead to the restructuring of teams and the subsequent departure of team members from different positions, a significant contributor to project delay. The lack of a well-defined project team is also a contributing issue.

> *When there are numerous changes in team structure, people resign. It's that simple. Changes in team structures discourage team member, especially if team members are not aware of their role and where they fit in* (**Participant 16).**

> *What we often see with large projects is that people are not afraid to move on from one organisation to the next organization these people are experts and specialists, if they*

don't know their responsibility in the project, they simply move on they are in demand remember when a project team member leaves an organisation, they leave with all that intellectual knowledge on the project. A new person will have to be trained or another team member will have to hold and carry that capacity in a while. This will cause strain and friction with the project team. Nobody wants to do more than what is expected of them (**Participant 3).**

Unrealistic project objectives are one of the most often cited hurdles to teamwork. When team members also doubt the efficacy of team leadership, it exacerbates friction within the team even further.

It fails because of unqualified people that are handling the project, unqualified people find it difficult to delegate the tasks between the different members of the team (**Participant 12).**

The effective administration of projects relies heavily on teamwork and team management (Flepisi & Mlambo, 2021). Frequently, pertinent factors, such as how team members were selected, might lead to doubts about the competence of team leadership. In other cases, functional managers assign project employees to teams, and the project manager has little or no involvement in the selection process, resulting in team resistance. Teamwork is essential in project management (Hossain *et al.*, 2022; Johnson & Babu, 2020; Warburton & Cioffi, 2014); when done effectively, it enhances the efficiency and effectiveness of delivering project outputs.

7.9.1.14 Dependency on international resources

The South African infrastructure development initiative relies on non-renewable resources such as fossil fuels, minerals, and manufactured commodities from developed nations (Hossain *et al.*, 2022). This dependence has created difficulties for infrastructure projects since commodities and services are often exported from nations like Russia. Participants in this research examined how this impacted their organization internally, with **Participant 1** stating:

We ran short of material to start with, and some parts of the project, such as certain machinery, have got to be imported from either Ukraine or other countries around Ukraine or countries around Russia. Once you've managed to acquire the resource, it now becomes a problem to export it to South Africa. Our industry is a specialized industry it requires resources which are not produced in South Africa or even Africa. Without those resources the project is halted, we sadly had to restructure our because and unfortunately, staff were retrenched because we couldn't afford to keep various parts of the business operating with any income **Participant 1.**

Participant 9 made further references to this assertion. *As a large organisation operating nationally, we rely on international resources. No resources no work is conducted, no work, no income. This greatly impacts our profit margins*

Conflict provides a chance for Africa to rethink its strategy (Sanni-Anibire *et al.,* 2022) and implement practical steps to boost industrialization, regional integration, and food security in the area. On the other hand, Shrivas and Singla (2022) believe that the crisis may allow African nations to step up and replace the commodities and supply chain gaps left by the conflict and epidemic. For example, African nations with vast gas reserves, such as Algeria, Nigeria, and Egypt, may exploit the current market gap to extend energy access on the African continent while simultaneously ensuring the European Union's energy supply as it transitions to a low-carbon economy.

7.9.1.15 Disrupted communication channels

Effective communication is a crucial aspect of project management (Ayarkwa *et al.*, 2022), enabling projects to proceed successfully and on schedule. It assures team members agree with the project's objectives and know precisely what is expected. It also contributes to the development of trust, resulting in enhanced collaboration from project inception to completion (Keinz *et al.*, 2021b). Without excellent communication, it would be exceedingly difficult for project managers to properly manage their teams and coordinate their efforts to bring a project to a successful conclusion. Participants expressed their frustration as

companies that needed to utilize technology and the internet for communication during the conflict and pandemic encountered a hurdle due to the widespread adoption of remote work. A participant said that the loss of communication links caused the delay in project completion. This worsened the existing inequality gap in South Africa because of the lack of suitable internet infrastructure in South Africa.

> *Also, in terms of global pandemic exposed us to how humans took physical activity for granted, and now you must be restricted to a certain level of engagement, and that would mean that we have to rely on technologies. We are living in a continent where technology is still far behind. However, with the global pandemic, we are forced to use those tools, so now you have to learn new software, you have to learn new skills, and those skills wouldn't be valid if you don't have the right structure or the right resources and this continues to be a challenge in South Africa. Communication has become mechanical, and we had to use it to make decisions, but it does not feel natural, and the whole pandemic took that away from us, the human engagement it's hard to manage a project remotely. Even worse, it causes delays and misunderstandings* ***Participant 5***

Communication is one of a project team's most essential tools for effective project management (par 2.8.5). Communication is the most critical part of project management since coordinating activities requires constant communication. To coordinate activities, project managers and project teams must collect and distribute voluminous information to members and stakeholders (Abhari & McGuckin, 2022). Without this communication, it is conceivable that efforts will be repeated by several individuals or teams working on the project, crucial objectives and milestones will be missed, resources will be misallocated, and the project's scope will expand beyond what was initially envisioned (Flepisi & Mlambo, 2021; Nisula *et al.,* 2022).

7.9.1.16 Inadequate engagement of communities and stakeholders

Community stakeholders are essential elements that may influence the success or failure of a project. Community stakeholders often have a vested interest in a project as they may be impacted by it (Ahlfänger *et al.*, 2022). In infrastructure development projects, community

stakeholders can frequently provide organizations with first-hand information on how a problem affects the local people daily. This is of utmost importance as **Participant 4** attests to the significance of community members as contributors to a project, stating that *information offered by community members is often utilized to enhance project proposals that are often presented to government officials*. However, obtaining personal experiences from this level of community members may be time-consuming. While this approach *provides a "human voice" to an issue, which can aid in lobbying and campaigning in subsequent project phases, it also creates project delays.* **Participant 1**.

The opposition of community stakeholders may often lead to project delays or failures since community members' resistance can negatively impact project teams (Guertler & Sick, 2021b). The project is halted if a company often encounters resistance from community members since government programs frequently prioritize the community.

> *The Local Business Forum and the other people were involved, these are the people who can force the project to stop, and because there was no community engagement, the project had to actually stop. So, in that case, then you find there will be a problem. The project would be stopped for a long, long time. You can think about the Durban BRT, this project. I don't know if it's 15 years or 10 years, but the project was stopped by the community. There are securities there who are guarding these ticket stations day in, day out, the infrastructure was finished, but there are no buses running on it. So those are the issues. It now looks like a wasteful expenditure because it costs the government billions. And it's not operational* (**Participant 2).**

In infrastructure development, organizations must support community members and stakeholders in various ways (Stefan *et al.*, 2021a). For instance, community stakeholders may act as project champions by sharing their personal experiences with a broader audience made accessible through a project, which is often advantageous for the organization implementing the project.

What is more important is that you include the community in all your projects. After all government projects are for the people. These are the people who can be an advocate for the project, they can empower your organisation. The most important thing is to identify community advocates, yes this causes delays as you and your project team now has to go to the ground and find these people, but would you rather have a delay, or would you rather have non-payment due to your project being set aside where the project only serves with half the purpose. Sometimes You'd even find that if your project is set aside, it won't serve a purpose at all. Because there was no making sure that whatever is being identified in terms of the project does meet the needs of the communities. I think that's the fundamental flaw of many of the projects that space (**Participant 5).**

Moreover, community stakeholders may provide input on the acceptability and practicability of project plans concerning their local community and even perhaps offer recommendations that might guide the development and execution of the project (Barbosa *et al.*, 2021b). Incorporating community stakeholders' impact from the earliest phases of a project ensures that the requirements and views of stakeholders are represented in the project. This increases the chances of success by providing that individuals impacted by the project see it as appropriate.

7.9.1.17 Inadequate project planning and execution

The planning process is one of the most crucial phases in project management. This phase allows the project planner or project manager to strategically create and map an accurate and well-defined plan to tactically assure the execution of the project and the achievement of the objectives that must be reached within the time and financial restrictions (Kreitner, 2009) that have been established in advance of the project. Having a solid project plan is crucial to the project's success. The planning process involves the drafting of a detailed and diligent project roadmap.

A project plan is an ultimate roadmap, it details all the activities you will be embarking on this is of utmost importance (**Participant 1).**

A project schedule is an all-encompassing document that allows the project manager to define the project activities, sequence activities, estimate resources, and estimate durations (Koontz & Weihrich, 2006). The all-inclusive project schedule includes activities, deliverables, and milestones. This document enables the project manager to identify and track the progress of the project activities. During this project planning phase, crucial tasks or primary tasks are identified and documented as technical requirements in the project schedule. The inability to execute this phase may result in project delay or failure.
Participants have noted, however, that managers often alter the project plan without consultation, altering the project's direction, which may result in delay or failure. *Other reasons are that somewhere along the line, you find many managers changing the project, giving it another direction, and that takes a lot of budgets, and then the actual project is not realized the mandate is not being reached* (**Participant 3).**

The project plan and schedule aid in providing a comprehensive report and facilitate effective communication throughout the project (Koontz & Weihrich, 2006; Murray-Webster, 2019; Richardson & Jackson, 2018). However, project managers who devote excessive time to the planning phase can create issues detrimental to the project.

> *I will say that most projects will fail because time is spent doing too much planning and no time to implement the project. Also, not planning at all or failure to plan correctly could also have an impact in the long run* **Participant 13**

Many benefits can be derived from drafting a comprehensive project, which entails formulating documents as the documents assist the project manager or planner with tracking the project's progress. This ensures that the project remains on track and mitigates all risks that may evidently hinder or affect the project delivery (Burke, 2014).

Participant 6 suggests that integrating approaches and concepts of project management might enhance project execution. Combining two or more unique features of multiple project management approaches to create a new approach might benefit the project (Miramond,

2019; Wójtowicz I, 2021). The project will get a customized approach with a hybrid project management methodology.

> *Using integrated methodologies as well and principles could lead to project success, because you'll find that generally people just stick to one aspect of a system anyway. They don't integrate it with other approaches. They don't integrate approaches. Often, project managers just use basic principles and don't integrate it with other methodologies that go beyond the actual methodology, not doing so can actually lead to project delays. I even see it in our organisation, you can see how this frustrates individuals* (**Participant 8).**

Participant 9 converged to add the use of project methodologies dictates project success. *There are lots of reasons why projects fail, but sometimes I would say it's not because of using the methodologies. It's the lack of use of all sorts of methodologies. It's definitely theoretically, as I said, people have got the knowledge, but you don't have the systems in place and the checks and balances in place, you don't apply or don't implement them.*

Methodologies for project management strive to standardize, structure and organize work practices (Huljenić *et al.*, 2005). Project management methodologies help to concentrate all initiatives in the same manner and enable the team to replicate successful elements and learn from failures, resulting in continuous progress (A Nisha, 2020; Al-Hajj *et al.,* 2018; Martinsuo *et al.,* 2020). In other words, a project management methodology is an instrument for increasing efficiency. Nonetheless, it is crucial to provide a scope and specification that do not exceed the project's requirements (Kraja & Osmani, 2015; Stefan *et al.*, 2021b).

Participant 13 noted the need to ensure that the project is fit for purpose and not merely rendering projects simply because they have been commissioned.

> *I think the main thing, for starters, projects fail because people try design and identify a project that doesn't fit the purpose. So, it's important that in the project planning phase,*

you actually make sure that you know what the problem is, you know what the services that you want to render in a certain community, and you understand them. And you talk to the communities make you aware of the detail. And then, once you have that insight in a context, all the steps in your project management phases will fall into place. I think a lot of the projects don't go according to plan because people don't understand the need, how badly they are needed and in what function is but understanding such a need comes with experience that why it is important for in our organisation that we mentor the young ones. Public sector projects are unlike private sector projects. You need to know and understand the dynamics (**Participant 13)**.

Project management must surround themselves with the proper people for support and direction to prevent project failures and delays in infrastructure projects. Mentoring is essential to project management because it helps project managers and junior project managers discover innovative solutions to problems (Kosmas, 2020). Mentoring aids project managers in expanding their understanding of the many project-related circumstances and techniques (Moola, 2020).

Interventions like mentorship would greatly assist the SMEs and SMMEs involved in infrastructure development projects. This could ensure timely project delivery. Participant 9 expressed that a lack of mentorship negatively impacts initiatives

We are and SME, but there are a number of things that SMMEs are not aware of and its very difficult to move up in this environment, there are a number of things that SMMEs are not exposed to. Link some SMMEs don't know how to set up some of the systems; big companies are efficient in that, because they've got this process and systems in place. If large corporates could actually pass these messages to the smaller SMMEs our country could grow. You will hardly find a big contractor that's actually mentoring a smaller SMME, telling them this is what you need to do in terms of processes systems (**Participant 9)**.

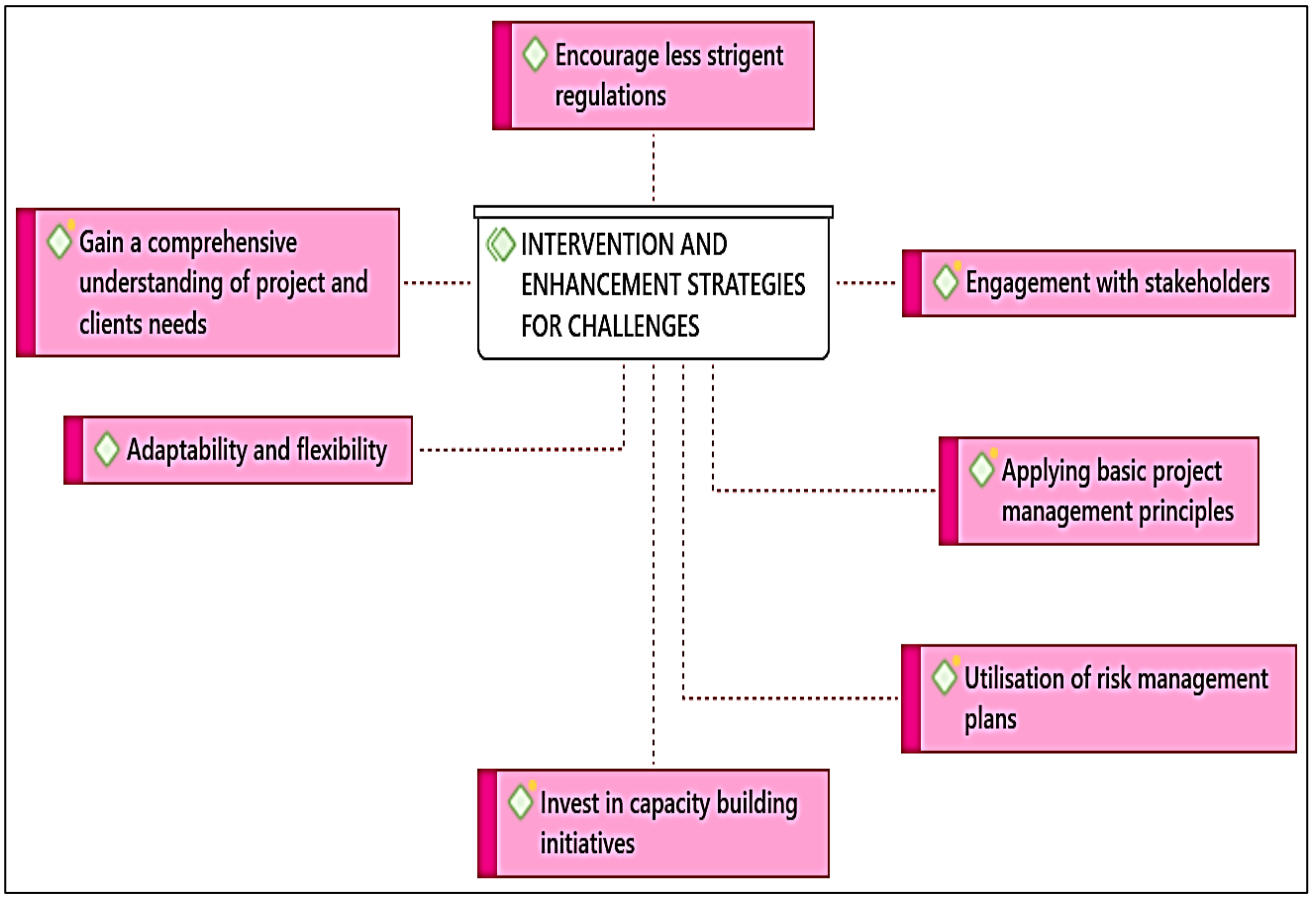
Enterprise development is a complicated, long-term process that aims to elevate entrepreneurs with market-impacting potential. The Small, Medium and Micro Enterprises sector in South Africa is a varied industry capable of rapid innovation and meeting local demands and mentoring is crucial to achieving success (Guertler & Sick, 2021a; Haraguchi *et al.,* 2017). Mentorship is essential to the success of SMMEs (Morina & Gashi, 2017) and should be included in any comprehensive company development strategy. The mentoring of SMMEs in project management reflects an organization's dedication to advancing the individuals' knowledge, abilities, and competencies.

In project management, internal issues may impede a project's success; thus, it is essential to evaluate internal aspects to ensure they are effectively managed. People, not processes or methods, determine the achievement of a project's goals. This illustrates that project managers and internal variables play a vital role in ensuring the success of a project and that it is of the highest significance to manage internal variables to ensure projects are completed effectively.

7.10 Intervention and enhancement strategies and challenges

The following section focuses on intervention and enhancement strategies for challenges encountered before or during a project's execution. These specific strategies have been highlighted as 1) adaptability and flexibility, 2) applying basic project management principles, 3) encouraging less stringent regulations, 4) engagement with stakeholders, 5) gaining a comprehensive understanding of projects and clients, 6) investing in capacity-building initiatives, and 7) the utilization of risk management plans. It can be understood that participants are aware of these strategies due to their first-hand experiences in dealing with the various challenges that infrastructure development projects are subjected to**.**

Figure 7.12: Intervention and enhancement strategies for challenges



Infrastructure development projects are often fragmented and organizationally complex. Infrastructure development projects are enormous in scale and have a significant economic impact (par 3.10). However, these projects are without challenges (Nisha, 2020). Challenges in infrastructure development projects range from internal problems such as insufficient planning and estimation, erroneous costing and corruption, ineffective communication, poor financial capacity, incompetence and lack of knowledge, poor contracting and contractor practices, frequent design scope changes and errors to external factors such as poor leadership and corruption and interference from sociocultural and political factors.

Infrastructure development projects are unique, and these challenges necessitate a strategic understanding of the business and the impact of projects on the country's political,

socioeconomic, and environmental factors (Ruijter *et al.*, 2021). As a result, infrastructure development projects necessitate tactical expertise and knowledge of the issues that arise during each project phase. In this industry, recognizing that project management is a technique of allocating and coordinating tasks to achieve specified organizational objectives is critical. Due to the unique character of projects and the ever-changing nature of project management, both the project manager and the project must be able to adapt to overcome project management issues.

Participant 15 emphasizes the need to be adaptable and flexible in infrastructure development projects to navigate and accommodate problems that arise throughout a project. The participant proposes:

> *I suppose that it's good to have a theoretical understanding of one project management methodology, but the nature of infrastructure projects requires to have an understanding of various methodologies because the nature of our business requires you to be able to put different methodologies to practise and this requires skill and knowledge not only of the methodologies but of the business itself. I think it's important for us to be able to adapt and be flexible, especially nowadays, we've been dealing with a number of issues like the pandemic which has impacted all of us at some point. If the project is very stringent and very rigid, you're unable to adapt to the challenges and changes. I mean, there were regulations that were passed by government to say, you can only have a particular number of people on-site, you can only start working at a particular level of the lockdown. So, if you're unable to adjust to that, it probably creates a problem. So, my view is that as a business operating in this sector you need a system, a methodology or even methodologies that allow you and the project to be adaptable and more flexible. Project managers should adopt approaches and methodologies that allow you to accommodate challenges so that we can roll with the punches for lack of a better word* (**Participant 15)**.

Participants also mention using fundamental project management principles to deal with project issues and impediments. For example, **Participant 2** suggests a hybrid/mixed

project methodology approach will help adjust and adapt to problems. The participant expresses the following:

> *I believe there are methodologies out there that can be adapted to suit projects. And they are even other methodologies that can allow us to be more fluid in dealing with projects, especially when it comes to external factors and impact, and if you can adapt, you will not have a problem. So I think there are a number of methodologies, maybe a sort of, if you can call it a hybrid or mixed approach, that can allow us to be able to be more fluid and effective in terms of adjusting and adapting to whatever we need to adapt obviously, taking into consideration the timespan the quality and also the resources that will require but I think we can be able to be more adaptable and more fluid in terms of our approach* (**Participant 2).**

Like any other profession, project management is changing progressively (par 2.2.2). Many organizations have observed project management as a means of connecting their projects to different strategies. Hybrid project management allows improvements in project execution efficiency, candidate identification, and building a stronger competitive edge (Miramond, 2019; Wójtowicz, 2021). “The aim of a hybrid approach from the waterfall, agile and lean approaches is to take advantage of the benefits of the approaches and eliminate their weaknesses. In a hybrid approach, all functions should work together to become more agile while keeping the predictability of the traditional approach. To meet the specific needs of a project, it is often necessary to use agile and traditional approaches. A hybrid of the latter two approaches may be the most advantageous path” (Lalmi *et al.*, 2021). “In a project, the need for a different approach might be clear depending on the characteristics, requirements, and demands. Keeping the right approach to thinking is important as an inappropriate approach can make the project fail” (Lalmi *et al.*, 2021).

It is critical to understand a hybrid project management methodology since using a method without first knowing the foundations might be detrimental to the project. In contrast to Participant 2, **Participant 13** believes that a straightforward approach to issues and

obstacles, i.e., adopting fundamental project management concepts, is best suited. The participant proposes:

> *I'm a firm believer of keeping it simple. Different methodologies could be tried, but I'm a firm believer that you just keep it simple. You follow all through the project management phases that are guided by principles* (**Participant 13).**

Similarly, **Participant 14** emphasizes the importance of project management training in that it provides one with the capacity to recognize and comprehend the intricacies of a project. The participant suggests that one's initiative is unlikely to succeed without this. **Participant 14** states as follows:

> *I guess it goes back to what I've just said. So, I think the whole point of project management is supposed to help you get a really, really deep understanding of what getting yourself into; what will be involved, what resources are required, and then the capacity involved in order to execute. So, if that step hasn't been done as accurately as possible, I think already, then the project is most likely not to go in the right direction, it is essential to know what you're doing. Knowing project management is one thing. Understanding it is another that is why you always have to ensure that you constantly attend training* (**Participant 14).**

The University of North Georgia (2022) strongly advised that organisations educate and train staff in the systematic project management and control approach. Structured project management provides critical approaches and resources for devoted managers to lead successfully amid unavoidable change. Leaders must be prepared for the difficulties that come with change.

> *There's a lot of practical training that's lacking, and people go to all these seminars, and we talk and brag about training and what you do, but it never really happens. In reality, on the ground, people need practical training, most importantly, financial training. When I say financial training, teaching us on the importance of cash flow, whether internal or*

external cash flow, which is a very important thing as most projects fail purely because of the education of cash flow (**Participant 6).**

Many project managers have learned their trade through trial and error on the job. "*Although failure often teaches leaders valuable lessons, the hidden cost of on-the-job training can harm an organization's growth in wasted effort, tangible costs, poor customer reputation, employee stress and also in failure to deliver the full goals of a project*" (University of North Georgia, 2022). Continuous training is a fundamental requirement in project management; however, comprehending industry regulations in infrastructure development is equally critical. A variety of rules govern infrastructure development. According to **Participant 4**, fewer stringent regulations are desired since they would make overcoming challenges easier. The participant said the following:

Construction projects are not as regulated as much as infrastructure projects and also water development projects. It is much easier for us; yes, there are regulations, there are certain things that we need to comply with, but not as much as when you do or when you build a bridge. You know there are certain things we have to keep in mind, for example, we've got regulations for cabling, we've got Eskom, we've got your rare field infrastructure, there is a lot of it, and sometimes its difficult to keep up with all of these regulations…Our stakeholders often inform us if regulations have been amended or new ones introduced (**Participant 4).**

Furthermore, participants emphasized the significance of engaging with important stakeholders and community members involved in and affected by the ongoing project. For example, **Participant 5** mentions human involvement as a technique for strengthening project management and, as a result, boosting challenge strategies. According to the participant:

I believe that in project management, there must be human involvement. It's important that, as project managers, you're understanding that human engagement is crucial, is one of the ways that project management could be improved. It's important to sometimes

focus in engaging more with the people, engage with different stakeholders on a level where they can understand. That will actually improve project management because you're not trying to manage the people, that's why you find that you get a lot of backlashes. Some project managers need to detach themselves from the systematic thinking of project management and focus of a human-centric approach to project management. As I said, it's important to engage with different stakeholders on a level where they can understand (**Participant 5).**

Stakeholders must be prioritized because they may provide input on the acceptability and viability of project plans concerning their local community, perhaps giving recommendations that might guide project development and execution. The participation of community stakeholders has influenced the project from the beginning. It is critical to ensure that the requirements and perspectives of stakeholders are represented in the project. This increases the chance of success by providing the project is deemed appropriate by the people it affects. **Participant 13** speaks to an aspect of interaction with the people from the communities where initiatives occur. The participant expresses the following:

...there should be direct communication channels between the communities and the project implementers. Project implementers need to take into consideration what service they are providing and how it will help the community. As implementers, you have to establish that link if there is no link between those two aspects, then the project will never pass or improve the lives of the people. If the link is missing or if you don't communicate with communities, how will you know what you are building will serve the community? There needs to be two-way communication. You can't have a directional or dictator mentality in this business. You must remember you are here to serve the people of South Africa and their communities. These are aspects of project management that project implementers overlook, you can't afford to ignore the community. If you practice that then the project is bound to be successful (**Participant 13).**

Furthermore, **Participant 7** emphasizes the need to include project stakeholders as early as feasible to minimize issues and mistakes later. The participant proposes that *you engage*

all stakeholders as early as possible in the project. They've learned that with the community projects community leaders are important **Participant 7***.* Community leaders may be difficult to recognize because they lack a public profile. If the project is in a different area or province, a project may need to organize site visits to identify and interact with community leaders(Smit, 2021)

> *…we have learned that if you don't include the community leaders, stakeholders or beneficiaries or anybody who could have an interest or affected by the project even if it's not directly related but they still an interest can affect your project. So, if you don't include all stakeholders, then you're going to have a problem because there are some who are going to jump in when the project has started and then they start saying, "We do not see the benefit of this project in our community." And then there are going to be questions of saying, hey, but we did involve the counsellor, and so forth. But the counsellor spoke on behalf of the whole community and only to find that it is not in sync with the community. The community wants something, the counsellor wants something else. So, it's important to involve all stakeholders in the beginning so that the project will run smoothly to the end* (**Participant 7).**

In addition to the previously mentioned intervention and enhancement strategies, participants alluded that gaining a comprehensive and in-depth understanding of project needs and client expectations is essential in avoiding challenges. For instance, **Participants 9** and **14** speak about the importance of identifying the client's requirements and expectations early enough to ensure fewer problems are encountered down the line. The participants state the following:

> *As part of the planning and as part of the strategy, firstly, identify how the client wants the participation of local communities to be like in the projects, identify that upfront, and communicate that so that the expectations are understandable* (**Participant 9).**

If a project is built based on specifications supplied by the client and the project team has been provided with detailed specifics of the deliverable, it is critical to retain the clarity of

their expectations throughout the project (Tabernik, 2002). To do this, it is vital to validate the client's expectations throughout the process constantly. The client's function must be understood since they should not be placed in a scenario where their top priority is not stated as an expectation. It is essential to communicate with the client about the project regularly and in detail(Tabernik, 2002).

> *Usually, clients will be wanting to get a quick breakdown of cost or timelines. But as service providers you mustn't just cut corners and try to give them the quickest quote. So really spend the time trying to understand even from the client, what exactly do they want, even if it means having two or three meetings, just to ask, "what do you want? And have you thought about this? And what happens if we do that, this eliminates the unnecessary back and forth when you're now in the project* (**Participant 14).**

Determining project needs through a process known as the project needs analysis is essential to the project planning phase since it serves as the foundation for a successful project (Gomes *et al.*, 2021; Warburton & Cioffi, 2014). **Participant 13** and **5** emphasizes the importance of understanding project needs. The participants expressed the following thoughts:

> *If they can spend time on understanding the needs of that particular project, think that's half of the battle won. Because all the other things will fall into place* (**Participant 13).**

> *The environment in which the project manager is operating is actually very crucial, he needs to be well invested, he needs to know what's happening around him and he needs to know what sort of conditions he needs for his or her project to succeed in terms of environmental scanning. He or she needs to know exactly what the client is expecting and how to manage risk* (**Participant 5**)*.*

Unmanaged risks can easily prevent a project from achieving objectives or even cause it to fail to succeed. Risk management is important during project initiation, planning, and execution; well-managed risks significantly increase the likelihood of project success

(University of Waterloo, 2021). Participants also emphasize risk management strategies when confronted with difficulties as an intervention and enhancement method. For example, **Participant 3** mentions the importance of having trained and qualified personnel on projects as a risk management method. The participant expresses the following:

> *In project management, it's crucial that you manage the risk. Remember managing a risk or managing the chance that something bad will happen that will hurt the project is important. Having the right people with the right skills is important having people that are qualified in terms of project management is important. With most government projects people don't always know what they are doing. They are in it for the money. For a project to succeed manage the risk* (**Participant 3**).

Moreover, participants highlight having the foresight and preparation for unanticipated events that may arise throughout the different stages of a project. In this sense, they refer to the requirement for project managers to be aware of variables that might impede project development. Participants' sentiments are as follows:

> *…with projects you are going to have unforeseen circumstances, so those ones are going to be blind spots, you do your best to cover the blind spots, but there's always going to be blind spots in a project, it's how you deal with them when they come* (**Participant 1).**

> *… we're already seeing petrol going up. So, if we're our project managers, and you'll know that our team is heavily reliant on travel, then we'll take those things into consideration and ensure that by the time, September December comes, we've already budgeted for a higher petrol price. Always plan ahead in project management* (**Participant 11).**

> *When you do work on projects, one of the big things you need to try to do think about is how do you have a contingency for those unexpected and unforeseen things that might occur? Just so that you cover yourself should it now rain more than what was forecasted*

or XYZ, what would that mean for the budget? So, I think trying to include things like that, where possible, could potentially help (**Participant 13).**

Planning and forecasting are essential components of project management (par 2.2.1). Forecasting enables the project manager or planner to monitor the project's progress, resulting in various advantages. This guarantees the project stays on schedule and mitigates any risks that may ostensibly impede or impair its completion (Burke, 2014). In project management, forecasting is the practice of predicting, estimating or assuming the likely outcomes of a project. These project estimates are generated by analysing historical project data and future performance projections. A good project forecast will identify potential issues and problems that may arise during a project (Koontz & Weihrich, 2006; Murray-Webster, 2019; Richardson & Jackson, 2018).

Participants also mention conducting environmental and market/economic analyses as part of risk management to ensure that project managers are better prepared for circumstances on the ground and that their respective projects are feasible. **Participants 11** and **13** stated the following:

The best way to improve our project it is to kind of do an analysis of the markets and analysis of the landscape of the economic landscape. While we aren't always able to accurately predict the way that things work and the way that things will work, doing a kind of breakdown, to understand or prediction per se, as to what will change in the near future can kind of help the project run more efficiently (**Participant 11).**

…you can't start a project without doing any environmental scanning, to check whether the conditions are conducive to allow for your project to be implemented. So, if you don't do that, you will find down the line that they are some other factors that are outside of your control. That will obviously be a deterrent or be the main problem to managing your project. Those are the key factors that you need needs to know when implementing a project. Obviously, as I said, some of them are outside of the control of a project manager. You can't do anything about them in terms of control. You can always control

destiny but at least you can be better prepared it's important to be well invested (**Participant 13).**

Every project depends on using resources such as personnel, equipment, cash, office space, and time. Without good planning, it isn't easy to ensure that an organization distributes and utilizes its resources most cost-effectively and suitably (Gomes *et al.*, 2021; al Hadithi, 2018; Tariq & Shujaa Safdar Gardezi, 2022). However, corruption often compromises the allocation and use of project resources. **Participant 9** indicates an element of corruption that affects the most, if not all, infrastructure projects. The participant discusses identifying plausible strategies to address this difficulty. The following passage demonstrates this:

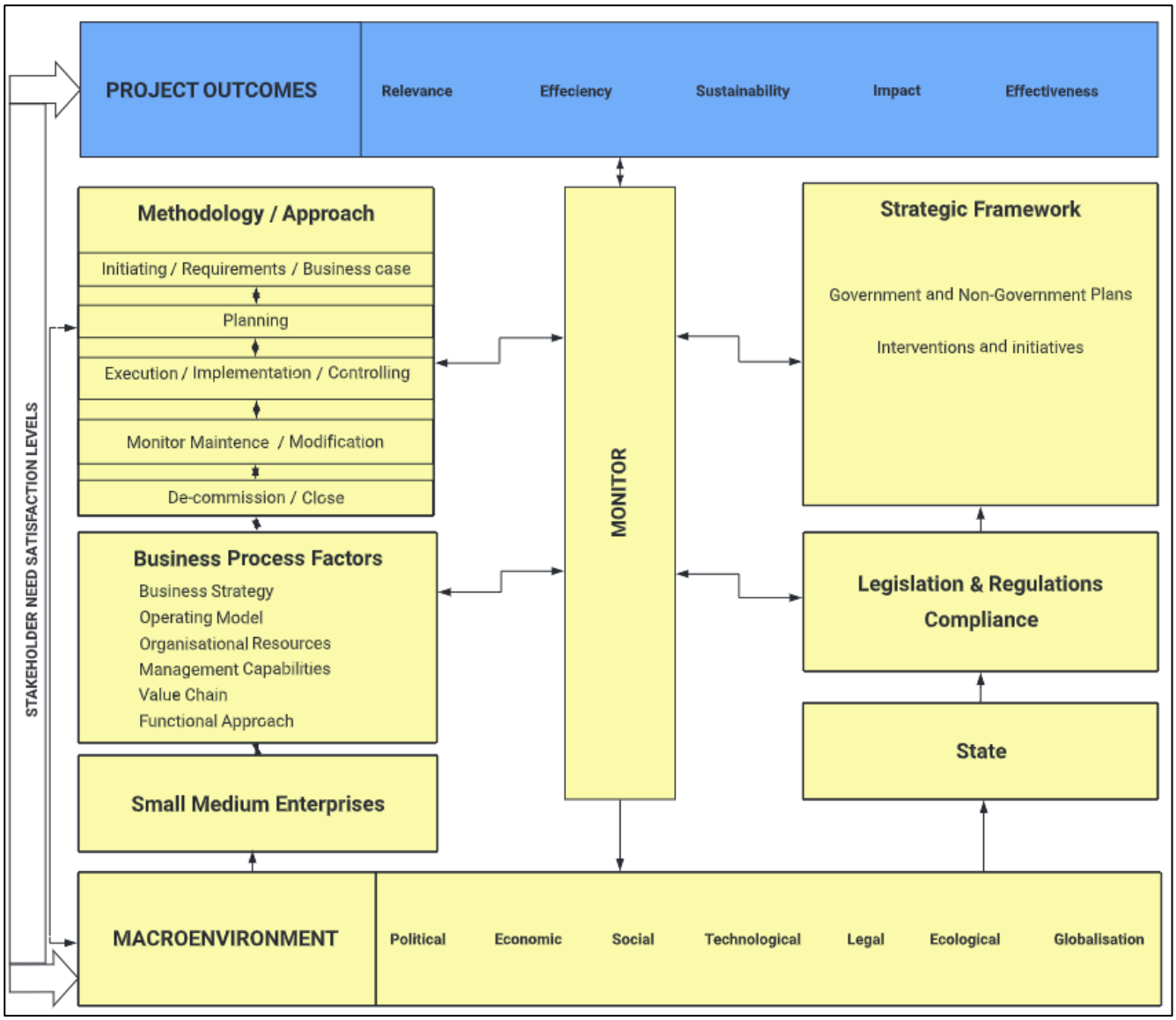
Corruption is a big reason why some of these projects are getting affected, and if there is a way, we can manage corruption. Well, there are ways to manage it, but if something can be done to minimize corruption, you will never take corruption entirely out of a construction site, but minimize it, set systems in place, and when people get caught, you know? You implement your processes and procedures, you know? Without compromise, irrespective of who they are. So, those are ways I think we can improve in the industry **(Participant 9).**

7.11 Modified proposed hybrid project management model for SMEs

The conceptual model has been modified to encapsulate the various contributions and elements identified from the research, specifically focusing on the contributions obtained from the interviews or engagements. These contributions have provided significant theoretical and empirical insight into understanding hybrid project management as a concept that is used for effective project management within the infrastructure development fraternity. The below diagrammatic representation of the model with a significant modification will be narrated to demonstrate the necessary factors within the model.

The modified model integrates the conceptual and modified elements within the model, articulated in Chapter 6.

Figure 7.13: Modified Proposed Hybrid Project Management Model for SMEs



7.11.1.1 Project outcomes and stakeholder need satisfaction levels

The project outcomes aspect of the model (highlighted in blue) outlines the expectations and deliverables key to project management for SMEs, as indicated in paragraph 4.6. This aspect clearly articulates elements that must be considered by the SME when subjecting the project to assessment following this model to ensure efficiencies and delivery of the objectives as presented in paragraph 4.7.

The model identifies the elements such as relevance, efficiency, sustainability, impact and effectiveness. The elements mentioned above are critical for SMEs to evaluate the project's implementation and to understand the progress and status of the project.

7.11.1.2 Relevance

In this project segment, the SME needs to assess the project's significance, what it aims to achieve and articulate its importance and reason for undertaking the project (Ametepey *et al.*, 2018). This is further expressed in paragraph 4.7.1. This segment will relay aspects such as a feasibility assessment and production of a feasibility report to clearly outline the importance and rationale of delivering the project.

7.11.1.3 Efficiency

The efficiency segment of the model is one of the project management outcomes in that it outlines the efficiency required for the effective undertaking and implementation of the project (Al-Hajj *et al.*, 2018; Melo *et al.*, 2021). This segment outlines the efficacy rates and standards required for the project aspects, such as what is needed for the successful delivery of the project from both human and material resources, as narrated in paragraph 4.5.1. This segment also establishes processes, such as conducting efficacy assessments on the resources available, assessing the performance rate of the resources and understanding the output levels of the resources to articulate the efficiencies of the project clearly, as discussed in paragraph 4.3.1.

7.11.1.4 Sustainability

Sustainability as a segment of the model is critical as it outlines the long-term maintenance and consistencies required in project management (Bajjou & Chafi, 2020; Hossain *et al.*, 2022). This means that the resources and materials to be used in the project must endure the project's duration and execution. The sustainability segment of the project requires assessing the quality and capabilities of the resources in the project (Brière & Auclair, 2020), as articulated in paragraph 4.5. In this segment, the standards and quality management systems must be employed to ensure that this is adequate and durable for effective project delivery.

7.11.1.5 Impact and Effectiveness

This segment relates to the project management process's value to the project delivery and process (Füller *et al.*, 2021; Guertler & Sick, 2021b). The impact and effectiveness segment addresses the process whereby the SME can assess the impact of the adopted project management process concerning the delivery of the set project objectives and goals described in 4.7 and Table 4.3. This assists the SME to be able to produce reports on the hybrid process adopted for the delivery of the project.

Overall, the project outcome aspect of the model provides for effective assessment and understanding of the deliverable and the adopted hybrid project management process. It articulates the project outcome considering the effectiveness, sustainability and relevance of the adopted hybrid project management process by the SME.

7.12 Chapter conclusion

Chapter Five analysed this study's research methodology and data collection method. The study adopted a qualitative research methodology approach. Chapter Five further outlined the data analysis methods and sampling techniques. The study area, design, and methods to maintain and ensure rigour and reflexivity were further explored. In chapter six, a proposed model for SMEs in infrastructure development programmes in Gauteng will be discussed further. The proposed hybrid project management model relies not only on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

In this chapter, a report on qualitative analysis was included. The qualitative analysis that provides a model examines the relationships between the theory and its resulting model.

Six themes emerged from the study after discussing project management and SMEs in infrastructure development.

These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure and delays, the impact of practical and formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies and approaches used by SMEs, are investigated similarly.

Chapter 8 will explore recommendations concerning addressing the findings and challenges identified in the study. Chapter 8 will further present the conclusion and recommendations of the study.

7.13 Chapter Summary

In this chapter, a report on qualitative analysis was included. The qualitative analysis that provides a model examines the relationships between the theory and its resulting model. Six themes emerged from the study after discussing project management and SMEs in infrastructure development. These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure and delays, the impact of practical and formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies and approaches used by SMEs, are investigated similarly.

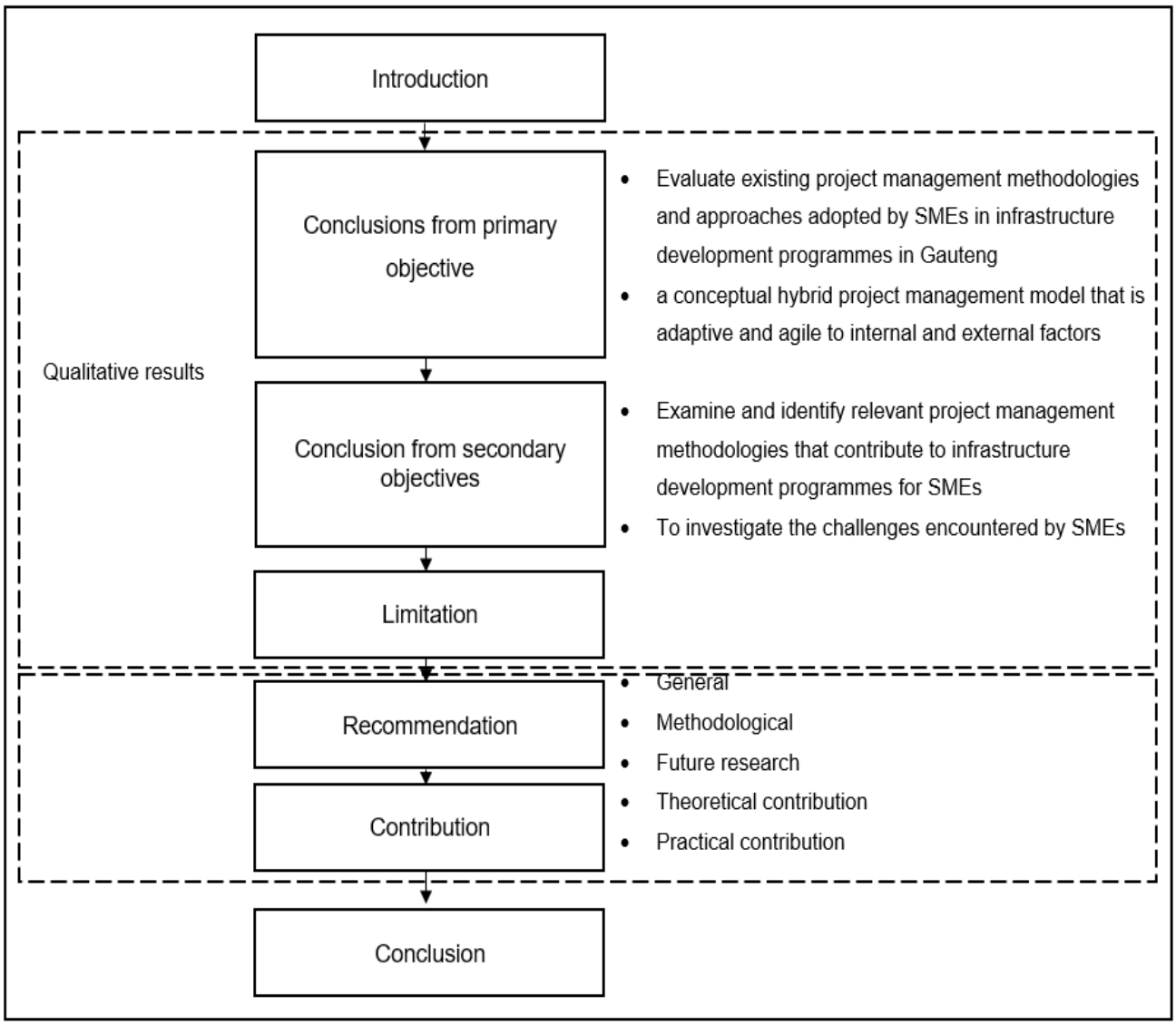
In this chapter, the fourth and fifth secondary objective of the study is addressed, namely to empirically investigate the application of project management principles used by SMEs involved in infrastructure development and to propose a usable project management model that will enable SMEs to successfully complete infrastructure development projects. The research has indicated that for SMEs to effectively operate and adopt a process or approach that will assist SMEs in delivering on the process, SMEs need to adopt or develop a hybrid project management model, which is mindful of all the factors which include the environment, legislative requirements and factors and processes that impact project

management. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

8. CHAPTER 8: CONCLUSIONS, RECOMMENDATIONS AND CONTRIBUTION

8.1 Introduction

Figure 8.1: Structure of Chapter 8



The previous chapter included a report on qualitative analysis. The qualitative analysis that provides a model examines the relationships between the theory and its resulting model. Six themes emerged from the study after discussing project management and SMEs in infrastructure development.

These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure & delays, the impact of practical and formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies and approaches used by SMEs, were investigated similarly. This chapter detailed the results of the research

This final chapter determines if the study accomplished the research objectives. Doing so may render a verdict on the study's contribution to research and practice. This chapter will explore recommendations concerning addressing the findings and challenges identified in the study. This chapter will further present the conclusion and recommendations of the study.

8.2 Chapter Synopsis

The study aimed to understand SMEs' project management knowledge and utilisation of project management methodologies and approaches in infrastructure development in Gauteng. The study adopted a qualitative research methodology and aimed to propose a conceptual hybrid project management model that is adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aimed to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects. The study consisted of eight chapters, of which chapter one focused on providing a technical layout of information about the study. Chapter One also included the problem statement, the research aims and objectives, the significance of the study, as well as the assumption and delimitations of the research paper.

The theoretical phase formed a project management framework for SMEs in infrastructure development programmes in Gauteng. Chapters 2 to 4 discussed the theory. To sufficiently address the study objective, the second chapter deliberated on the literature reviewed for the research. The definition and characteristics of Small and Medium Sized Enterprises

(SMEs), both globally and in developing countries, were provided in this chapter. Chapter Two discussed challenges prominent in SMEs and institutions' role in ensuring the stability and prominence of enterprises in the economy. Chapter two further highlighted the role of SMEs in the South African economy and the contribution that SMEs have to create jobs.

Chapter three provided a brief overview of the South African economy and the socio-economic and economic profile of the Gauteng province. The outline in chapter three was critical for this study as it established the foundation to demonstrate the interrelated linkages between the socio-economic and economic profiles currently existing in the province. This was imperative for the development of the study model. The Gauteng province's current socio-economic and economic profile and status, explored in this chapter, offered contextualisation of the province's level of development. Furthermore, the province's socioeconomic and economic review provided valuable information on the condition of the province, challenges, and difficulties that exist in the province. This assisted in holistically understanding the various industries and the impact of infrastructure development projects within the province.

Chapter four provided an analysis of project management. This included the various project management methodologies that exist. Chapter Four outlined the importance of project management as a fundamental aspect and discipline of planning and executing tasks and activities methodically and systematically to achieve goals and milestones within a certain period within certain budgetary constraints. Chapter four also referred to the systematic process of initiating, planning, executing, monitoring and controlling, closing and evaluating the effectiveness of an activity set within the parameters of what is classified in a scoped activity.

Chapter Five outlined the research methodology applied in the research. This included data collection methods, data analysis methods, and sampling techniques. The fifth chapter also explored the study area, study design, and the methods to maintain and ensure rigour and reflexivity. The research results were presented in chapter six, and a comparison between the findings from the literature review and those from the collected data formed part of

chapter six. This chapter detailed the results of the research. Arguments for and against progressive inputs to improve the study were highlighted, while the challenges were discussed in chapter six. The chapter included a report on qualitative analysis. The qualitative analysis provided a model that examined the relationship between the theory and its resulting model. Six themes emerged from the study after discussing project management and SMEs in infrastructure development. These themes included comprehensive knowledge of project management methodologies, factors contributing to project failure & delays, the impact of practical & formal training on project management, intervention and enhancement strategies for challenges, knowledge and understanding of project management and project management methodologies and approaches used by SMEs, were investigated similarly.

In chapter seven, a proposed model for SMEs in infrastructure development programmes in Gauteng was discussed further. The proposed hybrid project management model relies not only on traditional project management methodologies but also on agile methodologies. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

Chapter Eight explores recommendations concerning addressing the findings and challenges identified in the study. A summary of the results and concluding remarks are provided in chapter eight. Chapter Eight concludes the study. This chapter provides recommendations based on the findings and challenges identified in the study.

8.3 The research objectives revisited

The study aimed to address the research objectives effectively. This section outlines each objective and the progress thereof.

8.3.1.1 Understand project management knowledge and utilisation of project management methodologies and approaches by SMEs in infrastructure development in Gauteng

This study has offered in-depth knowledge and comprehension of the current project management processes. It approaches SMEs to utilise Gauteng infrastructure development initiatives through a review of the relevant literature and a qualitative research methodology. The finding in Chapter 6 in this regard reveals that existing project management methodologies and approaches employed by SMEs in infrastructure development programmes in Gauteng are:

- Waterfall methodology
- Critical Path Method
- Basic project management approach
- LEAN Method
- Agile methodology
- Hybrid project management methodology

In addition, the research has yielded important information and insights into the best practice approach for the benefit of SMEs.

8.3.1.2 Propose a theoretical project management model for SMEs involved in infrastructure development in South Africa.

The theoretically proposed model for SMEs undertaking infrastructure development projects took into consideration certain factors and principles deemed necessary for effective project management. This outlined some of best practice processes within the project management fraternity. In essence, the theoretical proposed model sets a guideline for effectively conceptualising and outlining a project management approach for SMEs undertaking infrastructure development projects. This was done by identifying the theoretical background, best practices and other relevant theoretical information in project management.

8.3.1.3 Propose a usable project management model that will enable SMEs to successfully complete infrastructure development projects

The research has indicated that for SMEs to effectively operate and adopt a process or approach that will assist SMEs in delivering on the process, SMEs need to adopt or develop a hybrid project management model, which is presented in Figure 7.13 is conscious of all the factors which include the environment, legislative requirements and factors and processes that impact project management. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aims to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

8.3.1.4 Examine and identify relevant project management methodologies that can contribute to infrastructure development programmes for SMEs

This study has provided an in-depth understanding of SMEs' current project management procedures and methodologies in Gauteng by reviewing the relevant literature and using a qualitative research methodology. In addition, the study has provided factual data and insights into the best practice approach for the benefit of SMEs.

8.3.1.5 To describe the environment where SMEs involved in infrastructure development projects operate and the nature of SMEs operating in South Africa

The importance of SMEs to the country's Local Economic Development is widely acknowledged. Small and medium-sized enterprises make significant contributions to job creation. SMEs first foster entrepreneurial skills, knowledge and attributes, which is essential because SMEs employ inhabitants of countries and provinces. As a result, this tends to decrease uncertainties and levels of crime. SMEs contribute to the development of industrial structural output and the establishment of resilient economic structures through the establishment of linkages between small and multinational organizations.

In South Africa, small and medium-sized businesses face a variety of challenges. The research revealed that the stimulation and growth of the South African economy is the priority on the government's agenda. However, it requires serious government, private sector and societal commitment. The role of SMEs is deemed fundamental in the economic development agenda, and therefore, SMEs' part is deemed essential in the economic development agenda; thus, the current approach, support and assistance accorded SMEs can be considered deficient. In this context, findings in Chapter 2 highlighted the following challenges:

- Inflation
- Interest rate
- Unemployment
- Taxation
- Political-institutional factors and political instability
- Access to capital

The study significantly addressed the objectives set out in terms of the approach for the study. This has been achieved through various research methodologies and structured research processes.

8.3.1.6 To empirically investigate the application of project management principles used by SMEs involved in infrastructure development.

The research engaged some SMEs undertaking infrastructure development projects which identified and outlined several key project management processes and elements currently being used in infrastructure development projects. The engagement with the SMEs has empirically confirmed that certain project management elements or aspects are critical for SMEs' successful undertaking of infrastructure projects in Gauteng.

8.4 Methodological conclusions

Although not originally intended to be a part of the research design, some practical conclusions were drawn from the research methodology and its implementation. Not mentioning these would diminish the value of the research, and the most crucial are listed below.

8.4.1.1 Further quantitative analysis

This research used qualitative analysis to understand the project management knowledge and utilization of project management methodologies and approaches of small and medium-sized enterprises in infrastructure development in Gauteng. Statistical methods, such as multiple regression or structural equation modelling, might be used to confirm the qualitative results if an additional investigation reveals them to be significant.

8.4.1.2 Time constraints

It became apparent during the qualitative analysis that implementing a hybrid project adaptive and agile management model (incorporating internal and external factors that influence and enhance the successful management of infrastructure projects impacted by economic disruptions) would increase the likelihood of success of infrastructure projects by increasing project value by driving change and improving and strengthening client engagement. Employing agile project management components is highly time-consuming for participants. In addition to the current project, a typical SME engages in other activities. The conceptual hybrid project management model anticipated this as one of the most significant moderating factors of the research. One of the highlighted restrictions is time. However, using the conceptual model enhances the likelihood of project success by decreasing costs, shortening project schedules, maximizing outputs, eliminating waste, and boosting project satisfaction. Adopting a hybrid model may be time-consuming but intended to increase productivity and optimize outcomes; training may foster teamwork and adaptability. In practice, the approach should be successful and will only enhance the productivity of project teams and overall client satisfaction.

8.5 Conclusion

The empirical component of the research has generated data that has assisted in highlighting the relevance and importance of a hybrid project management approach that not only relies on traditional project management methodologies but also on agile methodologies that are susceptible to internal and external factors influencing the effective management of infrastructure projects by SMEs. The most prominent theme of this study is the knowledge and insight of project management and the impact of a hybrid project management approach accentuating the business's ability to change from surviving to

thriving. The conceptual model strives to be adaptive and agile to internal and external factors influencing and enhancing the successful management of infrastructure projects affected by economic disruptors. This study demonstrates that the provincial government's entrepreneurial support and assistance initiatives to enhance the capabilities and effectiveness deemed appropriate for business development and growth for SMEs can contribute to creating sustainable employment and reducing poverty.

The studied literature presented several significant features within SMEs in infrastructure development. In this chapter, a review of the objectives was conducted, and it was determined that all objectives had been attained. In addition, the literature reviewed revealed that the emphasis on SME development for economic development purposes is not unique to South Africa. Several countries depend on them to stimulate and grow their economies. These countries have placed great emphasis on SME development and support. In addition, the research indicates that an adaptive and agile hybrid project management approach relies on not only traditional project management methodologies but also agile project management methodologies and is more susceptible to internal and external factors that could influence and enhance the effective management of infrastructure projects which are crucial to the growth and support of SMEs.

8.6 The contribution of the study

Evaluating the research contribution is challenging; nonetheless, by comparing the findings to the expected contribution, the following conclusions may be formed about the study's theoretical and practical significance.

8.6.1.1 Theoretical contribution

The research study contributes to the existing body of knowledge; insufficient information exists on the contribution of the project management approach to infrastructure development projects and programmes in Gauteng. The findings from this research report are helpful, and the conceptual hybrid project management model developed and presented in Chapter 8 is adaptive and agile to internal and external factors. The model influences and enhances the successful management of infrastructure projects affected by economic

disruptors. Additionally, the model aims to increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

8.6.1.2 Practical Contributions

This research further indicates that SMEs must be able to analyse the environment their business operates in by using or considering factors in the macro-environment and macro aspects of the model. Furthermore, SMEs must understand the political and economic, social, technological, legal, and environmental factors influencing them. In addition, SMEs need to determine the responsibility of the business and the potential impact of new legislation. As a result, once SMEs have reviewed this information, they will be able to adjust their approach so that, for instance, if there is a new political influence or interference, they can align and realign their project to optimise their success rate.

The ability to accurately evaluate the internal elements that impact the present and future is necessary for a small to medium-sized business as it allows for strategic planning and execution. For instance, how much human resources do they need or what is required for the project they can adjust to? Small and medium-sized enterprises (SMEs) need to be able to accommodate those two factors to meet the needs and requirements of the business. They further need to ensure they can assess and deliver on the project.

8.7 Recommendations for future research

Recognizing that the formal application of project management in infrastructure development projects by small and medium-sized enterprises is more frequent than initially understood, the researcher believes that future research on project management implementation should concentrate on specific challenges.

In this context, research should focus on the following areas:

- Investigate possible causal links between why a specific set of circumstances within an SME, a particular technique of change, or the change strategy, influences the choice for project management execution.
- What additional variables may affect the use of project management?
- Are the outcomes of this study relevant to other project-oriented sector departments (such as the residential and non-residential construction sectors)?
- Comparative research assesses if executing project management in the public sector differs considerably from private sector enterprises.

8.8 Chapter Summary

This last chapter presented an exploration of recommendations concerning addressing the findings and challenges identified in the study, the conclusions and a summary of the research, and recommendations for future research. This chapter will explore recommendations concerning addressing the findings and challenges identified in the study.

In section 8.2, a summary of the chapters in the research was provided; the purpose of the study was to investigate the project management knowledge and utilisation of project management methodologies and approaches by SMEs in infrastructure development in Gauteng. The study aimed to propose a conceptual hybrid project management model that is adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors. Additionally, the model aimed to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects.

The purpose of the study was to successfully conduct and answer the research objective that served as its foundation. In Section 8.3, the research objectives were provided to determine whether they were met. Significant progress was achieved to achieve the predetermined objective as the section outlines the status of each research objective.

In section 8.4, a summary of the empirical analysis generated data to highlight the relevance and importance of a conceptual hybrid project management model that is adaptive and agile to internal and external factors that influence and enhance the successful management of infrastructure projects affected by economic disruptors was discussed. The concluding chapter outlined that the research focuses on the knowledge and understanding of project management and the influence that a conceptual hybrid project management model strategy has on a company's capacity to further increase project value by driving change and improving and strengthening client engagement through employing agile project management components to increase the likelihood of success of infrastructure development projects. The conclusion further illustrated that the provincial government's entrepreneurial support and assistance activities might help establish sustainable employment and alleviate poverty.

Finally, the conclusion revealed that SMEs must be able to analyse the operational environment by employing or considering the macro-environment, the macro element of the model variables. In addition to understanding the economic, social, technical, legal, and environmental aspects that affect them, small and medium-sized enterprises (SMEs) must also comprehend the political elements that impact them. In addition, SMEs must identify their legal liability and the possible effects of new laws. Therefore, if SMEs have access to this information, they can modify their strategy so that, for example, if there is a new political influence or interference, they may realign and align their project. Small to medium-sized businesses must thus be able to correctly identify the internal factors that influence the current. Small and medium-sized enterprises (SMEs) must be able to adapt these two criteria to match the demands and requirements of the company, guaranteeing that they can evaluate their ability to execute the project.

In section 8.5, the recommendations were presented for future research. These suggestions are based on the researcher's knowledge of areas of project management implementation in public sector departments that need more consideration.

9. LIST OF REFERENCES

Abhari, K. & McGuckin, S. 2022. Limiting factors of open innovation organizations: A case of social product development and research agenda. *Technovation*.

Abisuga-Oyekunle, O.A., Patra, S.K. & Muchie, M. 2020. SMEs in sustainable development: Their role in poverty reduction and employment generation in sub-Saharan Africa. African J*ournal of Science, Technology, Innovation and Development*, 12(4), pp.405-419.

African Media Agency. 2022. *The Russia – Ukraine Conflict and its Impact on the Infrastructure and Built Environment Industry in Africa* . *The Guardian*.

African Union. 2020. *Coronavirus Disease 2019 (COVID-19) – Africa CDC*. https://africacdc.org/covid-19/ Date of access: 04 Jan. 2022.

Ahlfänger, M., Gemünden, H.G. & Leker, J. 2022. Balancing knowledge sharing with protecting: The efficacy of formal control in open innovation projects. *International Journal of Project Management*. 40(2):105–119.

Ahwireng-Obeng, F. & Piaray, D. 2009. Institutional Obstacles to South African Entrepreneurship. *South African Journal of Business Management* 45(3): 78-98

Allen, F., Qian, Y., Tu, G. & Yu, F. 2019. Entrusted loans: A close look at China's shadow banking system. *Journal of Financial Economics,* 133(1), pp.18-41.

Alsharef, A., Banerjee, S., Uddin, S.J., Albert, A. & Jaselskis, E. 2021. Early impacts of the COVID-19 pandemic on the United States construction industry. International journal of environmental research and public health, 18(4):1-20.

Amoah, S.K. & Amoah, A.K. 2018. The role of small and medium enterprises (SMEs) to employment in Ghana. *International Journal of Business and Economics Research*, 7(5), pp.151-157.

Appiah, M., Onifade, S.T. & Gyamfi, B.A. 2022. Building critical infrastructures: Evaluating the roles of governance and institutions in infrastructural developments in Sub-Sahara African countries. *Evaluation Review,* 46(4), pp.391-415.

Appio, F.P., Lima, M. & Paroutis, S. 2019. Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges. *Technological Forecasting and Social Change,* 142, pp.1-14.

Asgary, A., Ozdemir, A.I. & Özyürek, H. 2020. Small and medium enterprises and global risks: evidence from manufacturing SMEs in Turkey. *International Journal of Disaster Risk Science,* 11, pp.59-73.

Ashridge. 2017. Designing Operating Models. https://www.ashridge.org.uk/executive-organization-development/open-programs/designing-operating-models/. Date of access: 15 Jan. 2020.

Assouad, L., Chancel, L. & Morgan, M. 2018, May. Extreme Inequality: Evidence from Brazil, India, the Middle East, and South Africa. *In AEA Papers and Proceedings* (Vol. 108, pp. 119-123). 2014 Broadway, Suite 305, Nashville, TN 37203: American Economic Association.

Association of Project Management. 2018. What is project management. https://www.apm.org.uk/resources/what-is-project-management/. Date of access: 1 Oct. 2020.

Alexander, M. 2019. *Agile project management: 12 key principles, 4 big hurdles | CIO*. *CIO*. https://www.cio.com/article/237027/agile-project-management-a-beginners-guide.html Date of access: 28 Jun. 2022.

Alexander, M. 2021. *Mapping poverty in South Africa | South Africa Gateway*. *South Africa Gateway*. https://southafrica-info.com/people/mapping-poverty-in-south-africa/ Date of access: 10 Mar. 2022.

Al-Hajj, A., Khawarizmi, A., Company, H. & al Khawarizmi, /. 2018. The Impact of Project Management Implementation on the Successful Completion of Projects in Construction Sustainable city in the UAE View project Organizations Performance View project.

Allen, J.A. 1994. The constructivist paradigm: Values and ethics. *Journal of Teaching in Social Work*. 8(1–2):31–54.

Alstete, J.W. 2014. Strategy Choices of Potential Entrepreneurs. *JOURNAL OF EDUCATION FOR BUSINESS*. 89:77–83.

Aluko, M.A.O., Akinola, G.O. & Sola, F. 2004. Globalization and the Manufacturing Sector: A Study of Selected Textile Firms in Nigeria. *Journal of Social Sciences*. 9(2):119–130.

Ametepey, S.O., Gyadu-Asiedu, W. & Assah-Kissiedu, M. 2018. Causes-effects relationship of construction project delays in Ghana: Focusing on local government projects. In: Vol. 600. *Advances in Intelligent Systems and Computing*. Springer Verlag. pp. 84–95.

Amoatey, C.T. & Ankrah, A.N.O. 2017. Exploring critical road project delay factors in Ghana. *Journal of Facilities Management*. 15(2):110–127.

Annamalaisami, C.D. & Kuppuswamy, A. 2022. Reckoning construction cost overruns in building projects through methodological consequences. *International Journal of Construction Management*. 22(6):1079–1089.

Ansah, S.K. 2011. Causes and effects of delayed payments by clients on construction projects in Ghana. *Journal of Construction Project Management and Innovation*. 1(1):27–45.

Arshad, J. & McCormick, S. 2018. *Planning engineering and project management By Lec. Junaid Arshad 1 Lecture#03 Department of Engineering Management. - ppt download*. https://slideplayer.com/slide/8265907/ Date of access: 23 Jun. 2022.

Asia-Pacific Economic Cooperation. 2021. https://www.apec.org/about-us/about-apec Date of access: 18 Nov. 2021.

Aston, B., 2021. Why Is Project Management So Important to an Organization?. *The Digital Project Manager, January*, *15*.Atin, S. & Lubis, R. 2019a. Implementation of Critical Path Method in Project Planning and Scheduling. In: Vol. 662. *IOP Conference Series: Materials Science and Engineering*. Institute of Physics Publishing.

Atin, S. & Lubis, R. 2019b. Implementation of Critical Path Method in Project Planning and Scheduling. In: Vol. 662. *IOP Conference Series: Materials Science and Engineering*. Institute of Physics Publishing.

Ayarkwa, J., Joe Opoku, D.G., Antwi-Afari, P. & Man Li, R.Y. 2022. Sustainable building processes' challenges and strategies: The relative important index approach. *Cleaner Engineering and Technology*. 7.

Bailey, H.A., 2019, March. The challenge of late payment of SMMEs with a focus on South Africa. In *Bode, Freitag (Eds.): Universities, Entrepreneurship and Enterprise Development in Africa-Conference Proceedings 2018. Sankt Augustin, Germany, 13-14 September 2018* (pp. 19-36).

Bajjou, M.S. & Chafi, A. 2020. Empirical study of schedule delay in Moroccan construction projects. *International Journal of Construction Management*. 20(7):783–800.

Baker, F., Wigram, T., Stott, D. & McFerran, K. 2008. Therapeutic songwriting in music therapy: Part I: Who are the therapists, who are the clients, and why is songwriting used? *Nordic Journal of Music Therapy*. 17(2):105–123.

Bakos, J., Siu, M., Orengo, A. & Kasiri, N. 2020. An analysis of environmental sustainability in small & medium-sized enterprises: Patterns and trends. *Business Strategy and the Environment*, *29*(3), pp.1285-1296

Bala, H. & Feng, X. 2019. Success of small and medium enterprises in Myanmar: Role of technological, organizational, and environmental factors. *Journal of Global Information Technology Management*, 22(2), pp.100-119.

Bandari, V., 2022. BEYOND TECHNOLOGY: A HOLISTIC FRAMEWORK FOR SMART URBANIZATION IN DEVELOPING COUNTRIES. *Tensorgate Journal of Sustainable Technology and Infrastructure for Developing Countries*, *5*(1), pp.1-13.

Barbosa, A.P.F.P.L., Salerno, M.S., Nascimento, P.T. de S., Albala, A., Maranzato, F.P. & Tamoschus, D. 2021a. Configurations of project management practices to enhance the performance of open innovation R&D projects. *International Journal of Project Management*. 39(2):128–138.

Bary A.A. 2019. SME sector: A Key to the Egyptian Economic Development. *MPRA Paper 93034*. University of Munich

Beattie, A. 2014. 5 Biggest Challenges Facing Your Small Business. http://www.investopedia.com/articles/pf/12/small-business-challenges.asp. Date of access: 30 Dec. 2019

Berisha, G. & Pula, J.S. 2015. Defining Small and Medium Enterprises: a critical review. *Academic Journal of Business, Administration, Law and Social Sciences*. 1(1). www.iipccl.org Date of access: 12 Jan. 2022.

Bhandari, P. 2020. *An Introduction to Quantitative Research*. https://www.scribbr.com/methodology/quantitative-research/ Date of access: 1 September 2020

Bhattacharya, N., Lamond, J., Proverbs, D. and Hammond, F. 2013. Development of conceptual framework for understanding vulnerability of commercial property values towards flooding. International Journal Disaster Resilience Built Environment. 4(3): 334–351

Bhorat, H., Asmal, Z., Lilenstein, K. and Van Der Zee, K., 2018. SMMEs in South Africa: Understanding the constraints on growth and performance. *DPRU Working Paper* 201802.

Biney, E., Amoateng, A. & Ewemooje, O. 2020. Patterns of fertility in contemporary South Africa: Prevalence and associated factors Patterns of fertility in contemporary South Africa: Prevalence and associated factors PUBLIC INTEREST STATEMENT. *Cogent Social Sciences*. 7(1):1858575.

Birt, L., Scott, S., Cavers., Campbell, C., and Walter, F. 2016. *Member Checking: A Tool to Enhance Trustworthiness or Merely a Nod to Validation?* https://journals.sagepub.com/doi/abs/10.1177/1049732316654870?journalCode=qhra. Date of access: 30 September 2020

Biygautane, M., Neesham, C. & Al-Yahya, K.O. 2019. Institutional entrepreneurship and infrastructure public-private partnership (PPP): Unpacking the role of social actors in implementing PPP projects. International Journal of Project Management, 37(1):192-219.

Blanchard, O. 2019. Public debt and low interest rates. *American Economic Review*, 109(4), pp.1197-1229.

Bless, C., Higson-Smith, C. & Sithole, L. 2013. Fundamentals of social research methods: An African perspective. Claremont: Juta.

Brady, T., & Davies, A. (2014). Managing structural and dynamic complexity: A tale of two projects. *Project Management Journal,* 45(4), 21-38.

Braun, V. & Clarke, V. 2016. Mis(conceptualising) themes, thematic analysis, and other problems with Fugard and Potts. *International Journal of Social Research Methodology*. 19(6):739–743.

Braun, V. & Clarke, V. 2019. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*. 11(4):589–597.

Brenner, M.H. & Bhugra, D. 2020. Acceleration of anxiety, depression, and suicide: secondary effects of economic disruption related to COVID-19. Frontiers in psychiatry, 11:1-21.

Brière, S. & Auclair, I. 2020. Toward gendered projects in international development: Paradoxes, resistance and convergent approaches. *International Journal of Project Management*. 38(8):500–514.

Britannica. 2019. *Gauteng province, South Africa. Britannica*. https://www.britannica.com/place/Gauteng Date of access: 03 Jan. 2022.

Bongini, P., Ferrando, A., Rossi, E. & Rossolini, M. 2021. SME access to market-based finance across Eurozone countries. *Small Business Economi*cs, 56, pp.1667-1697.

Buehring, S. s.a. *What is a project?* https://www.whatisprince2.net/introduction/what-is-a-project Date of access: 06 Sep. 2021.

Bunyasi, W.G.N., Bwisa, H. & Namusonge, G. 2014. Effect of Access to Business Information on the Growth of Small and Medium Enterprises in Kenya. *International Journal of Business and Social Science*. 5(10):121–128. www.ijbssnet.com.

Caravel. 2019. *Project Management Methodology - Critical Chain and Critical Path project management methods are often confused*. http://www.caravelgroup.com.au/Caravel/Our-Approach/Critical-chain-vs-critical-path.asp Date of access: 27 Jun. 2022.

Caulfield, J. 2019. How to do Thematic Analysis. https://www.scribbr.com/methodology/thematic-analysis.com. Date of access: 20 September 2020

Centers for disease control and prevention. 2021. *Excess Deaths Associated with COVID-19*. https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm Date of access: 10 Jan. 2022.

Chandra, A., Paul, J. & Chavan, M. 2020. Internationalization barriers of SMEs from developing countries: a review and research agenda. *International Journal of Entrepreneurial Behavior & Research*, *26*(6), pp.1281-1310

Chaouk, M., Pagliari, D. & Moxon, R. 2020. The impact of national macro-environment exogenous variables on airport efficiency. *Journal of Air Transport Management*, 82(1): 137-148

Chege, S.M. and Wang, D., 2020. Information technology innovation and its impact on job creation by SMEs in developing countries: an analysis of the literature review. *Technology Analysis & Strategic Management*, 32(3), pp.256-271.

Chiloane-Tsoka, E. & Rasivhetshele, A.M. 2014. Effects of cost and benefit in regularising business procedures in Gauteng: The SMEs paradox – South Africa*. International Journal of Business and Economic Development*, 2(1): 138-146.

Cicea, C., Popa, I., Marinescu, C. & Cătălina Ștefan, S. 2019. Determinants of SMEs' performance: evidence from European countries. *Economic research-Ekonomska istraživanja*, *32*(1), pp.1602-1620

Cigu, E., Agheorghiesei, D.T., Gavriluță, A.F. & Toader, E. 2018. Transport infrastructure development, public performance and long-run economic growth: a case study for the Eu-28 countries. *Sustainability,* 11(1), p.67.

Ciric Lalic, D., Lalic, B., Delić, M., Gracanin, D. & Stefanovic, D. 2022. How project management approach impact project success? From traditional to agile. *International Journal of Managing Projects in Business*, 15(3), pp.494-521.

Cloete, M., Ellington, J.M., Jansen van Vuuren, A., Marais, E.A. & Masinga, P. 2021. Migrating From Face-To-Face to Online Learning During the COVID-19 Pandemic: The Experiences of Psychology Students at a Private Higher Education Institution in Gauteng. *Central European Journal of Educational Research*. 3(3):11–21.

Chiloane-Tsoka, E. & Rasivhetshele, A.M. 2014. Effects of cost and benefit in regularising business procedures in Gauteng: The SMEs paradox – South Africa*. International Journal of Business and Economic Development*, 2(1): 138-146.

Conrad, A. 2019. What Exactly Is Agile? A Definition of Agile Project Management. https://blog.capterra.com/definition-of-agile-project-management/. Date of access: 25 Oct. 2020

Construction Engineering and Management Solutions. 2019. Kanban Board to Manage Projects. http://cemsolutions.org/kanban-board-to-manage-projects/. Date of access: 25 Oct. 2020

Cooke-Davies, T., Cicmil, S., Crawford, L., & Richardson, K. (2007). We're not in Kansas anymore, Toto: mapping the strange landscape of complexity theory, and its relationship to project management. *Project Management Journal,* 38(2), 50-61.

Cooper, D., Dhiri, S. & and Root, J. 2012. Winning operating models. http://www.bain.com/Images/BAIN_BRIEF_Winning_operating_models.pdf. Date accessed: 10 Jan. 2020.

Crawford, J.K., 2021. *Project management maturity model*. CRC Press.

Dadhich, P., Genovese, A., Kumar, N. & Acquaye, A. 2015. Developing sustainable supply chains in the UK construction industry: A case study. *International Journal of Production Economics*. 164:271–284.

Dasgupta, S. & Singh, A. 2005. Will services be the new engine of Indian economic growth? *Development and Change*. 36(6):1035–1057.

Davis, B. & Radford, D. 2015a. *Going Beyond the Waterfall Managing Scope Effectively Across the Project Life Cycle*.

Davis, B. & Radford, D. 2015b. *Going Beyond the Waterfall Managing Scope Effectively Across the Project Life Cycle*.

De Guimarães, J.C.F., Severo, E.A., Júnior, L.A.F., Da Costa, W.P.L.B. & Salmoria, F.T. 2020. Governance and quality of life in smart cities: Towards sustainable development goals. *Journal of Cleaner Production*, 253, p.119926.

Delisle, J. 2020. Working time in multi-project settings: How project workers manage work overload. *International Journal of Project Management*. 38(7):419–428.

Department of Labour. 2021. 21st Commission for Employment Equity (CEE) ANNUAL REPORT (2020-2021).

Dijkstra, L., Poelman, H. & Vener, P. 2019. *The EU-OECD definition of a functional urban area* | *OECD Regional Development Working Papers* | *OECD iLibrary*. (11). Paris.

https://www.oecd-ilibrary.org/content/paper/d58cb34d-en Date of access: 13 Apr. 2022.

do Doanh. 2017. *What is Continuous Improvement (Kaizen)?* https://theleanway.net/what-is-continuous-improvement Date of access: 06 Sep. 2021.

Dollinger, M.J. 2009. Entreprenuership: strategies and resources. 4th edition. Prentice Hall: New Jersey.

Dyikanov, K. 2019. Small Business Start-Up Activities of Travel Agency and Tour Operator Owners Edited by. (November).

Eby, K. 2016. Everything You Need to Know About Agile Project Management. https://www.smartsheet.com/everything-you-need-to-know-about-agile-project-management. Date accessed: 10 Oct. 2020.

Eggertsson, G.B., Juelsrud, R.E., Summers, L.H. & Wold, E.G. 2019. *Negative nominal interest rates and the bank lending channel* (No. w25416). National Bureau of Economic Research.

Eja, K.M. & Ramegowda, M. 2020a. Government project failure in developing countries: A review with particular reference to Nigeria. *Global Journal of Social Sciences*. 19:35–47.

Eja, K.M. & Ramegowda, M. 2020b. Government project failure in developing countries: A review with particular reference to Nigeria. *Global Journal of Social Sciences*. 19:35–47.

Elangovan, N. & Rajendran, R. 2015. Conceptual model: A framework for Institutionalizing the vigor in business research. *Proceedings of the 3rd National Conference on Indian Business Management.* Sri Ramakrishna Institute of Technology. pp 1-32

Elhusseiny, H.O., Nosair, I. & Ezeldin, A.S. 2021a. Systematic processing framework for analyzing the factors of construction projects' delays in Egypt. *Ain Shams Engineering Journal*. 12(2):1501–1511.

Elhusseiny, H.O., Nosair, I. & Ezeldin, A.S. 2021b. Developing a user plug-in to assess delay causes' impact on construction projects in Egypt. *Ain Shams Engineering Journal*. 12(4):3553–3568.

El Madani, A. 2018. SME policy: Comparative analysis of SME definitions. *International Journal of Academic Research in Business and Social Sciences*, 8(8), pp.103-14.

Eskandari, A., Brojakowska, A., Agnieszka, M.B., Bander, J., Naga, V., Garikipatiid, S., Fishid, K. 2021. Retrospective analysis of demographic factors in COVID-19 patients entering the Mount Sinai Health System.

Fatoki, O., 2018. The impact of entrepreneurial resilience on the success of small and medium enterprises in South Africa. *Sustainability,* 10(7), p.2527.

Fewings, P. and Henjewele, C. 2019. *Construction project management: an integrated approach.* Routledge.

Filmalter, S.D. & Steenkamp, R.J. 2022. Towards a project management framework for ICT projects in defence institutions. *Scientia Militaria: South African Journal of Military Studies,* 50(1), pp.65-89.

Flepisi, L. & Mlambo, C. 2021. Factors influencing the late delivery of projects in state-owned enterprises: the case of Eskom. *South African Journal of Industrial Engineering*. 32(4):57–66.

Freeman, J.R. 2018. *Democracy and markets: The politics of mixed economies*. Cornell University Press

Friedman, E.M. & Parker, A.M. 2021. *An Early Look at the Impact of the COVID-19 Pandemic on Demographic Trends | RAND*. https://www.rand.org/blog/2021/04/an-early-look-at-the-impact-of-the-covid-19-pandemic.html Date of access: 07 Jan. 2022.

Galvin, P., Tywoniak, S. & Sutherland, J. 2021. Collaboration and opportunism in megaproject alliance contracts: The interplay between governance, trust and culture. *International Journal of Project Management*. 39(4):394–405.

Gauteng City-Region Observatory. 2021. *The Gauteng City-Region | GCRO*. https://www.gcro.ac.za/about/the-gauteng-city-region/ Date of access: 31 Dec. 2021.

Geraldi, J., Maylor, H., & Williams, T. (2011). Now, let's make it really complex (complicated): A systematic review of the complexities of projects. *International Journal of Operations & Production Management*, 31(9), 966-990.

Gherghina, Ș.C., Botezatu, M.A., Hosszu, A. and Simionescu, L.N., 2020. Small and medium-sized enterprises (SMEs): The engine of economic growth through investments and innovation. *Sustainability*, *12*(1), p.347

Giventash, L. 2021. *After protests and looting tear through South Africa, the nation wonders: What now?* https://www.nbcnews.com/news/world/after-protests-looting-tear-through-south-africa-nation-wonders-what-n1275585 Date of access: 28 Jun. 2022.

Goldstrong V. 2021. *Top 8 Reasons for Delays in Construction Projects*. *Schedule Reader*. https://www.schedulereader.com/blog/8-reasons-for-construction-project-delays/ Date of access: 04 Aug. 2022.

Golini, R. & Gualandris, J. 2018. An empirical examination of the relationship between globalization, integration and sustainable innovation within manufacturing

networks. *International Journal of Operations and Production Management*. 38(3):874–894.

Gomes, L.A. de V., Lopez-Vega, H. & Facin, A.L.F. 2021. Playing chess or playing poker? Assessment of uncertainty propagation in open innovation projects. *International Journal of Project Management*. 39(2):154–169.

Gray, C. & Stanworth, J. 2009. *Bolton 20 Years On: The Small Firm in the 1990s*. https://www.researchgate.net/publication/228314173_Bolton_20_Years_On_The_Small_Firm_in_the_1990s Date of access: 12 Jan. 2022.

Growthpoint Properties, 2011. Securing Finance: Bridging the expectations gap between SMME's and financial institutions. http://www.propertypoint.org.za. Date accessed: 10 Jan. 2020.

Guertler, M.R. & Sick, N. 2021a. Exploring the enabling effects of project management for SMEs in adopting open innovation – A framework for partner search and selection in open innovation projects. *International Journal of Project Management*. 39(2):102–114.

Gunduz, M. and Alfar, M., 2019. Integration of innovation through analytical hierarchy process (AHP) in project management and planning.

Gumede, L. & Badriparsad, N. 2022. Online teaching and learning through the students' eyes – Uncertainty through the COVID-19 lockdown: A qualitative case study in Gauteng province, South Africa. *Radiography*. 28(1):193–198.

al Hadithi, B.I. 2018. An investigation into factors causing delays in highway construction projects in Iraq. *MATEC Web of Conferences*. 162.

Hamdan, S. & Cheaitou, A. 2017. Supplier selection and order allocation with green criteria: An MCDM and multi-objective optimization approach. *Computers and Operations Research*. 81:282–304.

Hamza, M., Shahid, S., bin Hainin, M.R. & Nashwan, M.S. 2022. Construction labour productivity: review of factors identified. *International Journal of Construction Management*. 22(3):413–425.

Haraguchi, N., Cheng, C.F.C. & Smeets, E. 2017. The Importance of Manufacturing in Economic Development: Has This Changed? *World Development*. 93:293–315.

Hassett, J and Burke, E. 2017. Why the Agile Approach is so Important to Law Firms. *Of Counsel.* 36(10). 6-9

Hedborg, S., Eriksson, P.E. & Gustavsson, T.K. 2020. Organisational routines in multi-project contexts: Coordinating in an urban development project ecology. *International Journal of Project Management*. 38(7):394–404.

Higgs, C.J. & Hill, T. 2019. The role that small and medium-sized enterprises play in sustainable development and the green economy in the waste sector, South Africa. *Business Strategy & Development,* 2(1), pp.25-31.

Hossain, M.A., Raiymbekov, D., Nadeem, A. & Kim, J.R. 2022. Delay causes in Kazakhstan's construction projects and remedial measures. *International Journal of Construction Management*. 22(5):801–819.

Huljenić, D., Dešić, S. & Matijašević, M. 2005. Project management in research projects. In: Vol. 2. *Proceedings of the 8th International Conference on Telecommunications, ConTEL 2005*. University of Zagreb. pp. 663–669.

Hurd, I. 2009. Constructivism. *The Oxford Handbook of International Relations*. (September, 2).

Hussein, B. 2019. The influence of project characteristics on project success factors. Insights from 21 real life project cases from Norway. *Procedia Computer Science*. 164:350–357.

Hutton, G. & Ward, M. 2021. *United Kingdom Business Statistics*. https://researchbriefings.files.parliament.uk/documents/SN06152/SN06152.pdf.

Id, N.P., Foster, N., Hanifa, Y., Ndlovu, N., Fielding, K., … Vassall, A. 2019. Patient costs incurred by people living with HIV/AIDS prior to ART initiation in primary healthcare facilities in Gauteng, South Africa.

Ika, L.A., 2009. Project success as a topic in project management journals. *Project management journal*, *40*(4), pp.6-19.

Ika, L.A., Söderlund, J., Munro, L.T. & Landoni, P. 2020a. Cross-learning between project management and international development: Analysis and research agenda. *International Journal of Project Management*. 38(8):548–558.

Ika, L.A., Söderlund, J., Munro, L.T. & Landoni, P. 2020b. When project management meets international development, what can we learn? *International Journal of Project Management*. 38(8):469–473.

Imran, M., Salisu, I., Aslam, H.D., Iqbal, J. & 4, I.H. 2019. Sustainability in the Era of IR 4.0: The Mediating and Moderating Roles of Innovation Capability and Management Commitment. *Processes*. 7(211):1–25. www.mdpi.com/journal/processes.

International Monetary Fund. 2017. *Cost of Aging -- Finance & Development, March 2017*. https://www.imf.org/external/pubs/ft/fandd/2017/03/lee.htm Date of access: 10 Jan. 2022.

Ithia, A. 2015. The benefits of using target operating models in your business. http://www.businessoptix/blog/the-benefits-of-using-target-operating-models-in-your-business. Date accessed: 27 Dec. 2020.

Johnson, R.M. & Babu, R.I.I. 2020. Time and cost overruns in the UAE construction industry: a critical analysis. *International Journal of Construction Management*. 20(5):402–411.

Kadry, M., Osman, H. & Georgy, M. 2017. Causes of Construction Delays in Countries with High Geopolitical Risks. *Journal of Construction Engineering and Management*. 143(2).

Kalitanyi, V. 2019. Enterprise propellers (EP) and identity of SMMEs, informal business and cooperatives in Gauteng province of South Africa. *Acta Universitatis Danubius.* Œconomica, 15(1), pp.53-80.

Kanbanize. 2020. https://kanbanize.com/lean-project-management. Date accessed: 27 Dec. 2020

Kanwal, S., Rasheed, M.I., Pitafi, A.H., Pitafi, A. and Ren, M., 2020. Road and transport infrastructure development and community support for tourism: The role of perceived benefits, and community satisfaction. *Tourism Management*, 77, p.104014.

Karmakar M, Lantz PM & Tipirneni R. 2021. Association of Social and Demographic Factors With COVID-19 Incidence and Death Rates in the US.

Katz, J.A. s.a. *Fully Mature but Not Fully Legitimate: A Different Perspective on the State of Entrepreneurship Education**. http://0-content.ebscohost.com.ujlink.uj.ac.za/ContentServer.asp?T=P&P=AN&K=34375871&S=R&D=bsu&EbscoContent=dGJyMNLe80SeqK44yOvsOLCmr1GeprdSsK6

4S7KWxWXS&ContentCustomer=dGJyMPGssVGup7VRuePfgeyx44Dt6fIA Date of access: 20 Jun. 2019.

Kaufmann, C., Kock, A. & Gemünden, H.G. 2020. Emerging strategy recognition in agile portfolios. *International Journal of Project Management*. 38(7):429–440.

Keinz, P., Hienerth, C., Gemünden, H.G., Killen, C.P. & Sicotte, H. 2021a. Special issue: Managing open and user innovation by projects: Sensing, seizing and transforming. *International Journal of Project Management*. 39(2):97–101.

Kerzner, H. 2017. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. 12th ed.

Kerzner, H., 2019. *Using the project management maturity model: strategic planning for project management.* John Wiley & Sons.

Kessides, C. 2013. The contribution of infrastructure to economic development. https://elibrary.worldbank.org/doi/abs/10.1596/0-8213-2628-7#:~:text=Infrastructure%20contributes%20to%20economic%20development%20both%20by%20increasing%20productivity%20and,enhance%20the%20quality%20of%20life.&text=Infrastructure%20is%20thereby%20often%20described,for%20other%20capital%20and%20labor. Date accessed: 2 Nov. 2020

Khan, M.A. 2022. Barriers constraining the growth of and potential solutions for emerging entrepreneurial SMEs. *Asia Pacific Journal of Innovation and Entrepreneurship*, (ahead-of-print).

Khuluvhe, M. 2021. *Adulty literacy in South Africa*. *Department of Higher Education and Training Republic of South Africa*.

Kibuuka, P. & Tustin, D. 2019. The Key Triggers for the Transitioning of Informal SMMEs to Formal SMMEs: A Baseline Survey of the Gauteng Province–South Africa. *Psychology Research,* 9(1), pp.32-44.

Kihombo, S., Ahmed, Z., Chen, S., Adebayo, T.S. & Kirikkaleli, D. 2021. Linking financial development, economic growth, and ecological footprint: what is the role of technological innovation*?. Environmental Science and Pollution Research,* 28(43), pp.61235-61245.

Kim, H., Tanser, F., Tomita, A., Vandormael, A. & Cuadros, D.F. 2021. Beyond HIV prevalence: identifying people living with HIV within underserved areas in South Africa. *BMJ Global Health*. 0:4089.

Kimanzi, M.K. and Gamede, V.W., 2020. Embracing the role of finance in sustainability for SMEs. *International Journal of Economics and Finance,* 12(2), pp.453-468.

Koontz, H. & Weihrich, H. 2006. *Essentials Of Management*. New York: Tata McGraw-Hill Education.

Koskela, L. & Howell, G. 2002a. THE THEORY OF PROJECT MANAGEMENT: EXPLANATION TO NOVEL METHODS.

Koskela, L. & Howell, G. 2002b. *THE THEORY OF PROJECT MANAGEMENT: EXPLANATION TO NOVEL METHODS*.

Kosmas, N. 2020. The factors influencing SMEs growth in Africa: A case of SMEs in Zimbabwe. *Intech*. 32:137–144. http://www.intechopen.com/books/trends-in-telecommunications-technologies/gps-total-electron-content-tec- prediction-at-ionosphere-layer-over-the-equatorial-region%0AInTec.

Kraja, Y.B. & Osmani, E. 2015. Importance of external and internal environment in creation of competitive advantage to SMEs. *European Scientific Journal*. 11(13):120–130.

Krishna, G. S. A., and Nisha, J. S. 2020. Implementation of Agile Management in Construction of Different Infrastructure Projects. *International Research Journal of Modernization in Engineering Technology and Science.* 2(2): 79-89

Kreitner, R. 2009. *Management*. 11th ed. San Diego: South Western Educational Publishing.

Kukreja, S. 2018. *What is Management?* | *Management Study HQ*. https://www.managementstudyhq.com/what-is-management.html Date of access: 30 Sep. 2021.

Laine, T., Korhonen, T. & Suomala, P. 2020. The dynamics of repairing multi-project control practice: a project governance viewpoint. *International Journal of Project Management*. 38(7):405–418.

Lalmi, A., Fernandes, G. & Souad, S.B. 2021. A conceptual hybrid project management model for construction projects. In: Vol. 181. *Procedia Computer Science*. Elsevier B.V. pp. 921–930.

Landau, P. 2021. *The 12 Agile Principles: Definitions & How to Use Them*. *Project Management*. https://www.projectmanager.com/blog/agile-principles Date of access: 28 Jun. 2022.

Lans, T., Baert, H. & Mulder, M. 2008. *Entrepreneurship education and training in a small business context: insights from the competence-based approach*. http://0-content.ebscohost.com.ujlink.uj.ac.za/ContentServer.asp?T=P&P=AN&K=37172472&S=R&D=bsu&EbscoContent=dGJyMNLe80SeqK44yOvsOLCmr1GeprdSsKi4SLSWxWXS&ContentCustomer=dGJyMPGssVGup7VRuePfgeyx44Dt6fIA Date of access: 20 Jun. 2019.

Leap. 2020. *Project Management Methodologies Compared*. http://www.leap4.com.au/what-you-get/management/project-management-methodologies-compared/ Date of access: 12 Sep. 2021.

le Roux, A. 2022. *Urban South Africa is ill-prepared for the coming climate change storm - ISS Africa*. *2022*. https://issafrica.org/iss-today/urban-south-africa-is-ill-prepared-for-the-coming-climate-change-storm Date of access: 28 Jun. 2022

Levin, A.T., Hanage, W.P., Owusu-Boaitey, N., Cochran, K.B., Walsh, S.P. & Meyerowitz-Katz, G. 2020. Assessing the age specificity of infection fatality rates for COVID-19: systematic review, meta-analysis, and public policy implications. *European Journal of Epidemiology*. 35(12):1123–1138.

Levitt, R.E. 2011. Towards project management 2.0. *Engineering Project Organization Journal*. 1(3):197–210.

Levy, S.M. 2018. *Project management in construction*. McGraw-Hill Education.

Li, W., Xue, D. & Huang, X. 2018. The role of manufacturing in sustainable economic development: A case of Guangzhou, China. *Sustainability (Switzerland)*. 10(9).

Liberto, D. 2020. Small and Mid-size Enterprise (SME). https://www.investopedia.com/terms/s/smallandmidsizeenterprises.asp. Date of access: 24 Oct. 2020Maulik. P. 2019. Implementing agile project management (Scrum) in real estate projects. *Project Management Development – Practice and Perspectives.* 13(1): 143-155

Linthorst, J. & de Waal, A. 2020. Megatrends and Disruptors and Their Postulated Impact on Organizations. Sustainability, 12(20):1-25.

Lusiantoro, L., Purwanto, B.M. and Rostiani, R., 2022. The effect of small business leaders' organisational mindfulness and social learning on opportunistic behaviour

to survive the COVID-19 pandemic. *Journal of Small Business and Enterprise Development,* 29(4), pp.627-644.

Luy, M., di Giulio, P., di Lego, V., Lazarevič, P. & Sauerberg, M. 2020. Life Expectancy: Frequently Used, but Hardly Understood. *Gerontology*. 66(1):94–104.

Ma, C., Rogers, J.H. & Zhou, S. 2020. Global economic and financial effects of 21st century pandemics and epidemics. Covid Economics, 5:56-78

Maciulyte-Sniukiene, A. & Butkus, M. 2022. Does infrastructure development contribute to EU countries' economic growth?. *Sustainability*, 14(9), p.5610.

Madrid-Guijarro, A., Garcia, D. & van Auken, H. 2009. Barriers to innovation among spanish manufacturing SMEs. *Journal of Small Business Management*. 47(4):465–488.

Madubela, A. 2021. South Africa's growing social unrest proving as big a threat to growth - The Mail & Guardian. *Mail & Guardian* . 8 December. https://mg.co.za/business/2021-12-08-july-unrest-proves-sparks-of-social-unrest-pose-a-risk-to-economic-growth/ Date of access: 28 Jun. 2022.

Madzivhandila, T.S. & Musara, M. 2020. Taking responsibility for entrepreneurship development in South Africa: The role of local municipalities. *Local Economy*, 35(3), pp.257-268.

Majumder, S., Majumder, S. & Biswas, D. 2022. Impact of effective construction planning in project performance improvement. Quality & Quantity, 56(4):2253-2264

Makalesi, A., Orhan, M. & Yalçin, İ. 2022. Comparison of innovation capacities of manufacturing sectors of OECD member countries. *Academic Review of Economics and Administrative Sciences*. 15(1):208–226.

Makinde, G., Ajike, E. & Babatunde, A. 2021. Strategic Planning and Performance of Small and Medium. (June).

Makhathini, M.S., Mlambo, V.H. & Mpanza, S. 2020. Infrastructure provision as a catalyst for local economic development in South Africa. Strategic Review for Southern Africa, 42(1):99-122.

Manzoor, F., Wei, L. & Sahito, N. 2021. The role of SMEs in rural development: Access of SMEs to finance as a mediator. *PLoS ONE*. 16(3 March 2021).

Martinsuo, M., Teerikangas, S., Stensaker, I. & Meredith, J. 2020. Call for papers: Managing strategic projects and programs in and between organizations. *International Journal of Project Management*. 38(7):464–467.

Maome, I.J. and Zondo, R.W.D., 2022. Insights into corporate social responsibility in small and medium enterprises in South Africa. *International Journal of Special Education*.

Masocha, R. and Fatoki, O., 2018. The role of mimicry isomorphism in sustainable development operationalisation by SMEs in South Africa. *Sustainability,* 10(4), p.1264.

Matysiak, A., Sobotka, T. & Vignoli, D. 2021. The great recession and fertility in Eurpoe. *European Journal of Population*. 39:29–64.

Mavenlink, M. 2021. *Why is the Project Lifecycle Important?* https://www.mavenlink.com/blog/article/why-is-the-project-lifecycle-important Date of access: 21 Jun. 2022.

McCombes, S. 2019. *An Introduction to Sampling Methods*. https://www.scribbr.com/methodology/sampling-methods/. Date of access: 10 August 2020

Megginson, L.C., Mosley, D.C. & Pietri, P.H. 1997. *Management, concepts and applications*. New York: HarperCollins.

Meiklejohn, C., Westaway, L., Westaway, A.F.H. & Long, K.A. 2021. (No Title).

Melo, J.C.F. de, Salerno, M.S., Freitas, J.S., Bagno, R.B. & Brasil, V.C. 2021. Reprint of: From open innovation projects to open innovation project management capabilities: A process-based approach. *International Journal of Project Management*. 39(2):170–182.

Miković, R., Petrović, D., Mihić, M., Obradović, V. & Todorović, M. 2020. The integration of social capital and knowledge management – The key challenge for international development and cooperation projects of nonprofit organizations. *International Journal of Project Management*. 38(8):515–533.

Miramond, T. 2019. *Hybrid Project Management: What is it, Methodology & Software*. https://teamhood.com/project-management-resources/hybrid-project-management/ Date of access: 30 Jul. 2022.

Mishra, N. 2019. Knowledge management practice for effective operations in SMEs. Vol. 30. pp. 795-798: Taylor & Francis.

Mlaba, K. 2021. *Poverty, Inequality and Looting: Everything You Need to Know About South Africa's Protests*. *Global Citizen*. https://www.globalcitizen.org/en/content/everything-you-need-to-know-south-africa-protests/ Date of access: 28 Jun. 2022.

Mohamed, S. 2010. "The State of the South African Economy," R. Southall, D. Pillay, P. Naidoo and J. Daniel, New South African Review 1: Development or Decline, Wits University Press, Johannesburg.

Moodley, C., Seerane, T. & Gravett, S. 2022. Learning at home for Grade 1 learners in disadvantaged communities: Insights from the Sandbox@Home COVID-19-response intervention. *South African Journal of Childhood Education*. 12(1).

Moola, N. 2020. *South Africa must support SMEs to save jobs*. *Daily Maverick*. https://www.dailymaverick.co.za/article/2020-04-07-south-africa-must-support-smes-to-save-jobs/ Date of access: 14 Apr. 2022.

Morina, D. & Gashi, P. 2017. The Role of SMEs on the Economic Development: Kosova's Case. *SSRN Electronic Journal*. (June, 28).

Morris, P.W.G. 2000. Researching the unanswered questions of project management. In: *PMI® Research Conference 2000: Project Management Research at the Turn of the Millennium*. France: Project Management Institute. https://www.pmi.org/learning/library/researching-unanswered-questions-project-management-1113 Date of access: 23 Jun. 2022.

Morris, P.W.G. 2011. A Brief History of Project Management. *The Oxford Handbook of Project Management*. (1916):1–10.

Motta, V. & Sharma, A. 2020. Lending technologies and access to finance for SMEs in the hospitality industry. *International Journal of Hospitality Management*, *86*, p.102371

Moya, K. 2016. What Causes Small Businesses to Fail. http://www.worldscientific.com/doi/abs/10.1142/S0218495894000355. Date of access: 30 Dec. 2019.

Mphomela, M. 2020. SONA: Construction industry needs less talk, more action. https://www.iol.co.za/business-report/economy/sona-construction-industry-needs-less-talk-more-action-42706787. Date of access: 28 Oct 2020

Muneeswaran, G., Manoharan, P., Awoyera, P.O. & Adesina, A. 2020. A statistical approach to assess the schedule delays and risks in Indian construction industry. *International Journal of Construction Management*. 20(5):450–461.

Murray-Webster, R. ed. 2019. *Association for Project Management*. 7th ed. United Kingdom: APM.

Musarat, M.A., Khadim, N., Taseer, S., Jaffar, A. & Ilyas, U. 2021. Effects of Corruption on Infrastructure Projects in Developing Countries Special Issue “Sustainable Construction of Future: Opportunities and Challenges for Green and Buildings” View project Life Cycle Cost Analysis (LCCA) of construction projects View project Effects of Corruption on Infrastructure Projects in Developing Countries. *International Journal on Emerging Technologies*. 12(1):284–295. https://www.researchgate.net/publication/351528989.

al Mutair, A., Al, A., Id, M., Alhumaid, S., Abdullah, S.M., Al-Omari, A. 2021. Examining and investigating the impact of demographic characteristics and chronic diseases on mortality of COVID-19: Retrospective study.

Naidu, S. & Chand, A. 2012. A comparative study of the financial problems faced by micro, small and medium enterprises in the manufacturing sector of Fiji and Tonga. *International Journal of Emerging Markets*. 7(3):245–262.

Naicker, Y. & Rajaram, R. 2019. Factors that influence tax compliance of SMEs in South Africa. Acta *Universitatis Danubius. Administratio*, 10(2).

Nisha, J.S. 2020. Implementation of agile management in construction of different infrastructure projects. (02):79–89.

Nisula, A.M., Blomqvist, K., Bergman, J.P. & Yrjölä, S. 2022. Organizing for knowledge creation in a strategic interorganizational innovation project. *International Journal of Project Management*. 40(4):398–410.

Nizaeva, M. & Coşkun, A. 2018. Determinants of the financing obstacles faced by SMEs: An empirical study of emerging economies. *Journal of Economic and Social Studies,* 7(2), p.81.

Nuh, O. 2021. *As HIV incidence declines in South Africa, new infections are concentrating in those over 25 | aidsmap*. https://www.aidsmap.com/news/sep-2021/hiv-incidence-declines-south-africa-new-infections-are-concentrating-those-over-25 Date of access: 08 Jan. 2022.

OCHA. 2022. *South Africa: Floods and landslides - Emergency Appeal No. MDRZA012 - South Africa | ReliefWeb*. *United Nations*. https://reliefweb.int/report/south-africa/south-africa-floods-and-landslides-emergency-appeal-no-mdrza012 Date of access: 28 Jun. 2022.

OECD. 2002. *OECD Glossary of Statistical Terms - Economically active population Definition*. https://stats.oecd.org/glossary/detail.asp?ID=730 Date of access: 10 Jan. 2022.

OECD. 2019. OECD Labour Force Statistics 2019. (September, 18).

OECD. 2020. *Small businesses, job creation and growth: facts, obstacles and best practices*. https://www.oecd.org/cfe/smes/2090740.pdf Date of access: 25 Jan. 2022.

Oladinrin, T., Ogunsemi, D. & Aje, I. 2012. Role of Construction Sector in Economic Growth: Empirical Evidence from Nigeria. *FUTY Journal of the Environment*. 7(1).

Olatunji, A. & Houghton, A.J. 2017. The role of Small and Medium Scale Enterprise in local economic development (LED). *www.jbrmr.com A Journal of the Academy of Business and Retail Management*. 11(2). www.jbrmr.com Date of access: 12 Jan. 2022.

Omezzine, F.A. 2019. *Project Success and the Concept of Success Factors*. https://www.stakeholdermap.com/project-management/project-success-factors.html Date of access: 17 Apr. 2022.

Onaran, O. 2009. Wage share, globalization and crisis: The case of the manufacturing industry in Korea, Mexico and Turkey. *International Review of Applied Economics*. 23(2):113–134.

Oni, O., Agbobli, E.K. & Iwu, C.G. 2019. Entrepreneurial orientation and performance of small business in Vryburg region North West province South Africa. *Journal of Reviews on Global Economics.*

Orumie Ukamaka, C. 2020a. Implementation of Project Evaluation and Review Technique (PERT) and Critical Path Method (CPM): A Comparative Study. *International Journal of Industrial and Operations Research*. 3(1).

Orumie Ukamaka, C. 2020b. Implementation of Project Evaluation and Review Technique (PERT) and Critical Path Method (CPM): A Comparative Study. *International Journal of Industrial and Operations Research*. 3(1).

Osuizugbo, I.C. 2019. Project Failure Factors Affecting Building Project Success in Nigeria: Design and Construction Phase. *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN*. 16(1):1–11.

Packer, M.J. & Goicoechea, J. 2000. Sociocultural and constructivist theories of learning: Ontology, not just epistemology. *Educational Psychologist*. 35(4):227–241.

Panda, A.K., Nanda, S. & Panda, P. 2021. Working capital management, macroeconomic impacts, and firm profitability: evidence from Indian SMEs. *Business Perspectives and Research*, 9(1), pp.144-158

Pandey, K. 2019. 11 Best Project Management Methodologies to Skyrocket Your Business. https://www.softwaresuggest.com/blog/project-management-methodologies/. Date of access: 28 Oct. 2020.

Pathak, T. & Tewari, R. 2014. Sustainable CSR for Micro, Small and Medium Enterprises. *Journal of Management & Public Policy.* 6(1): 34-44

Pawley, M. 2017. *Why does South Africa have a mixed economy? - Quora*. https://www.quora.com/Why-does-South-Africa-have-a-mixed-economy Date of access: 17 Dec. 2021.

Picciotto, R. 2020. Towards a 'New Project Management' movement? An international development perspective. *International Journal of Project Management*. 38(8):474–485.

Pillay-Van Wyk, V. 2020. COVID deaths in South Africa: 99 days since South Africa's first death. 110(11):1093–1099.

Pinto, J., Davis, K., Ika, L., Jugdev, K. & Zwikael, O. 2021. Call for Papers: Special Issue on Project Success. *International Journal of Project Management*. 39(2):213–215.

PMI. 2017. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. 6th ed. Newtown Square: Project Management Institute.

Pohekar, S.D. & Ramachandran, M. 2004. Application of multi-criteria decision making to sustainable energy planning - A review. *Renewable and Sustainable Energy Reviews*. 8(4):365–381.

Popov, D. 2018. Application of Altman Z-score for viability of small and medium enterprises. *Бизнес посоки,* 24(02 EN), pp.5-17.

Pradesyah, R. & Ardianti, R.A. 2021. The Influence of The Amount of Third Party Funds and Inflation on The Placement of SME Financing in the BMT Sharia Cooperative of The Civil Society of North Sumatra. *International Journal of Educational Research and Social Sciences* (IJERSC), 2(6), pp.1515-1520.

Project Management Institute. 2020. *What is Project Management?* https://www.pmi.org/about/learn-about-pmi/what-is-project-management Date of access: 10 Jul. 2021.

Ptak-Chmielewska, A. & Matuszyk, A. 2019. Macroeconomic factors in modelling the SMEs bankruptcy risk. The case of the Polish market. *Econometrics. Ekonometria. Advances in Applied Data Analytics*, 23(3), pp.40-49.

Puentes, R. Why infrastructure matter: rotten roads, bum economy. https://www.brookings.edu/opinions/why-infrastructure-matters-rotten-roads-bum-economy/. Date of access: 1 Nov. 2020.

Tsai, K., Tseng, H. & Chou, H. 2019. The influences of sales ability of taiwan publicly-listed construction companies upon financial performance: interference variable of macro-environment. *Journal of Research in Environmental and Earth Sciences.* 2(2):10-19

Rajapathirana, R.P.J. & Hui, Y. 2018. Relationship between innovation capability, innovation type, and firm performance. *Journal of Innovation and Knowledge*. 3(1):44–55.

Rani, P., Mishra, A.R., Krishankumar, R., Ravichandran, K.S. & Kar, S. 2021. Multi-criteria food waste treatment method selection using single-valued neutrosophic-CRITIC-MULTIMOORA framework. *Applied Soft Computing*. 111.

Rane, S.B., Narvel, Y.A.M. & Bhandarkar, B.M. 2019. Developing strategies to improve agility in the project procurement management (PPM) process: Perspective of business intelligence (BI). Business Process Management Journal:257-286.

Rassier, D.G. & Earnhart, D. 2015. Effects of environmental regulation on actual and expected profitability. *Ecological Economics*. 112:129–140.

Rastogi. 2020. *A Brief Introduction To Lean, Six Sigma And Lean Six Sigma*.

Razak, D.A., Abdullah, M.A. & Ersoy, A. 2018. Small medium enterprises (SMEs) in Turkey and Malaysia a comparative discussion on issues and challenges. *International Journal of Business, Economics and Law*, 10(49), pp.2-591.

Reynolds, E.B. & Uygun, Y. 2018. Strengthening advanced manufacturing innovation ecosystems: The case of Massachusetts. *Technological Forecasting and Social Change*. 136:178–191.

Ribeiro, F.L. & Fernandes, M.T. 2010. Exploring agile methods in construction small and medium enterprises: A case study. *Journal of Enterprise Information Management*. 23(2):161–180.

Richardson, G.L. & Jackson, B.M. 2018. *Project Management Theory and Practice*. 3rd ed. *Project Management Theory and Practice*. Boca Raton: Auerbach Publications.

Rodríguez-López, Á. & Souto, J.E. 2016. The status of entrepreneurship education in Jordanian universities. *Education + Training*. 61(2):169–186.

Rodríguez-Rivero, R., Ortiz-Marcos, I., Díaz-Barcos, V. & Lozano, S.A. 2020. Applying the strategic prospective approach to project management in a development project in Colombia. *International Journal of Project Management*. 38(8):534–547.

Rogerson, C.M. 2014. The impact of the South African government's SMME programmes: a ten-year review (1994–2003). *Development Southern Africa* 21(5): 765-784.

Rogerson, C.M. 2016. The Market Development Approach to SMME Development. *Urban Forum* 17(1): 54-78

Roy Maulik, S. 2019. Supply chain management in handloom sectors–a review.

Rubashkina, Y., Galeotti, M. & Verdolini, E. 2015. Environmental regulation and competitiveness: Empirical evidence on the Porter Hypothesis from European manufacturing sectors. *Energy Policy*. 83:288–300.

Ruijter, H., van Marrewijk, A., Veenswijk, M. & Merkus, S. 2021. 'Filling the mattress': Trust development in the governance of infrastructure megaprojects. *International Journal of Project Management*. 39(4):351–364.

Saini, M., Arif, M. & Kulonda, D.J. 2017. Critical factors for transferring and sharing tacit knowledge within lean and agile construction processes. *Construction Innovation*. 18(1):64–89.

Salifu, A.T., Tofik-Abu, Z., Rahman, M.A. & Sualihu, M.A. 2018. Determinants of loan repayment performance of small and medium enterprises (SMEs) in Ghana: The case of Asante Akyem Rural Bank. *Journal of African Business,* 19(2), pp.279-296.

Sambasivan, M., Deepak, T.J., Salim, A.N. & Ponniah, V. 2017. Analysis of delays in Tanzanian construction industry Transaction cost economics (TCE) and structural equation modeling (SEM) approach. *Engineering, Construction and Architectural Management*. 24(2):308–325.

SAMRC. 2021. *Report on Weekly Deaths in South Africa | South African Medical Research Council*. https://www.samrc.ac.za/reports/report-weekly-deaths-south-africa Date of access: 09 Jan. 2022.

Sanni-Anibire, M.O., Mohamad Zin, R. & Olatunji, S.O. 2022. Causes of delay in the global construction industry: a meta analytical review. *International Journal of Construction Management*. 22(8):1395–1407.

Santos, J. M. D. 2020. 3 Best Tools for Waterfall Project Management. https://project-management.com/3-best-tools-for-waterfall-project-management/. Date of access: 27 Oct. 2020.

Schäffler, A. & Abrahams, C. 2021. *Hungry city-region | GCRO*. *Gauteng City Region Observetory*. https://www.gcro.ac.za/research/project/detail/hungry-city-region/ Date of access: 01 Apr. 2022.

Scheers, L.V., 2018. Marketing challenges small and medium enterprises (SME) are facing in South Africa. In *Marketing challenges small and medium enterprises (SME) are facing in South Africa: Scheers, Louise van*

Scheuer, C., Boot, E., Carse, N., Clardy, A., Gallagher, J., Vecchione, H. 2021. Disentangling inclusion in physical education lessons: Developing a resource toolkit for teachers. *Physical Education and Sport for Children and Youth with Special Needs Researches – Best Practices – Situation*. 343–354.

Schroeder, R.G., Scudder, G.D. & Elm, D.R. 1989. Innovation in manufacturing. *Journal of Operations Management*. 8(1):1–15.

SEDA. 2016. The Small, Medium and Micro Enterprise sector in South Africa. *Research Note 2016 No 1*. Center for Development Enterprise.

SEDA. 2021. *The Small Enterprise Development Agency*. http://www.seda.org.za/Publications/Publications/SMME Quarterly 2021 Q1 September.pdf Date of access: 21 Jan. 2021.

Segebart, E. 2019. *Change Management: Agile vs. Waterfall Methods*. *https://medium.com/@elysesegebart/change-management-agile-vs-waterfall-methods-8ca992cfedae*.

Sethy, K. 2018. *Definition of Management: As Propounded by Authors, Scholars, Thinkers*. https://www.economicsdiscussion.net/management/definition-of-management/31854 Date of access: 29 Sep. 2021.

Seymour, T. & Hussein, S. 2014b. View of The History Of Project Management. *International Journal of Management & Information Systems*. 18(4):233–240. https://www.clutejournals.com/index.php/IJMIS/article/view/8820/8811 Date of access: 11 Sep. 2021.

Shane, S. 2013. Why Small Business Have Trouble Getting Credit. https://smallbiztrends.com/2013/05/why-small-businesses-have-trouble-getting-credit.html. Date of access: 7 Dec. 2019.

Sharma, N.K., Govindan, K., Lai, K.K., Chen, W.K. & Kumar, V. 2021. The transition from linear economy to circular economy for sustainability among SMEs: A study on prospects, impediments, and prerequisites. *Business Strategy and the Environment,* 30(4), pp.1803-1822.

Shava, H. & Rungani, E.C. 2016, 'Influence of gender on SME performance in emerging economies', *Acta Commercii.* 16(1), a408. http://dx.doi.org/10.4102

Shrivas, A. & Singla, H.K. 2022. Analysis of interaction among the factors affecting delay in construction projects using interpretive structural modelling approach. *International Journal of Construction Management*. 22(8):1455–1463.

Sifumba, C.M., Mothibi, K.B., Ezeonwuka, A., Qeke, S. & Matsoso, M.L. 2017. The risk management practices in the manufacturing SMEs in Cape Town. *Problems and Perspectives in Management*. 15(2):386–403.

Singh, R., Deep Singh, C. & Deepak, D. 2021. Analyzing performance indicators of advanced manufacturing technology implementation using MCDM. *Materials Today: Proceedings*. 47:3750–3753.

Sitharam, S. & Hoque, M. 2016. Factors affecting the performance of small and medium enterprises in KwaZulu-Natal, South Africa. *Problems and Perspectives in Management*. 14(2).

Smit S. 2021. *The Effects Of Looting On The South African Health Care System At A Time When It Is Most Needed — Helen Suzman Foundation*. *Helen Suzman Foundation*. https://hsf.org.za/publications/hsf-briefs/the-effects-of-looting-on-the-south-african-health-care-system-at-a-time-when-it-is-most-needed Date of access: 28 Jun. 2022.

Sohi, A.J., Hertogh, M., Bosch-Rekveldt, M. & Blom, R. 2016. Does lean & agile project management help coping with project complexity? Procedia-social and behavioral sciences, 226:252-259.

South African Market Insights. 2020. *Education Statistics - South African Market Insights*. http://www.southafricanmi.com/education-statistics.html Date of access: 16 Mar. 2022

Standard Development Indicator Group. 1996. Construction Industry. https://www.hq.nasa.gov/iwgsdi/Construction.html. Date of access: 26 October 2020

Statistics SA. 2019. *Five facts about poverty in South Africa | Statistics South Africa*. http://www.statssa.gov.za/?p=12075 Date of access: 09 Mar. 2022.

Statistics South Africa. 2001. Census in brief. www.statssa.gov.za Date of access: 04 Jan. 2022.

Statistics South Africa. 2011. *Census 2011 Census in brief*.

Statistics South Africa. 2016. Community Survey 2016 In Brief. www.statssa.gov.za Date of access: 04 Jan. 2022.

Statistics South Africa. 2019. *Five facts about poverty in South Africa*. *Statistics South Africa*. http://www.statssa.gov.za/?p=12075 Date of access: 17 Dec. 2021.

Statistics South Africa. 2020. *Three facts about small business turnover in South Africa*. http://www.statssa.gov.za/?p=13900 Date of access: 19 Jan. 2021.

Statistics South Africa. 2021a. Quarterly Labour Force Survey. www.statssa.gov.za,info@statssa.gov.za,Tel+27123108911 Date of access: 10 Jan. 2022.

Statistics South Africa. 2021b. *STATISTICAL RELEASE P0302*. www.statssa.gov.za,info@statssa.gov.za,Tel+27123108911.

Statistics South Africa. 2021c. STATISTICAL RELEASE P0302. www.statssa.gov.za,info@statssa.gov.za,Tel+27123108911 Date of access: 04 Jan. 2022.

Streefkerk, R. (2019). Qualitative vs Quantitative Research. https://www.scribbr.com/methodology/qualitative-quantitative-research/ Date of access: 15 Aug. 2020.

Stefan, I., Hurmelinna-Laukkanen, P. & Vanhaverbeke, W. 2021a. Trajectories towards balancing value creation and capture: Resolution paths and tension loops in open innovation projects. *International Journal of Project Management*. 39(2):139–153.

Stević, Ž., Pamučar, D., Puška, A. & Chatterjee, P. 2020. Sustainable supplier selection in healthcare industries using a new MCDM method: Measurement of alternatives

and ranking according to COmpromise solution (MARCOS). *Computers and Industrial Engineering*. 140.

Stewart, S.W. & Willy, D.M. 2020. The Collegiate Wind Competition–Undergraduate Education through Student Competition. *In Journal of Physics: Conference Series* (Vol. 1452, No. 1, p. 012022). IOP Publishing.

Stratton, S.J., 2021. Population research: convenience sampling strategies. *Prehospital and disaster Medicine,* 36(4), pp.373-374.

Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H. & Idris, M. 2021. Economic growth, increasing productivity of SMEs, and open innovation. Journal of Open Innovation: Technology, Market, and Complexity, 7(1):1-37.

Szirmai, A. & Verspagen, B. 2015. Manufacturing and economic growth in developing countries, 1950-2005. *Structural Change and Economic Dynamics*. 34:46–59.

Tabernik, T.J. 2002. The birthday syndrome the impact of a goal with no plan. In: *Project Management Institute Annual Seminars & Symposium*. San Antonio: Project Management Institute.

Tahir, H.M., Razak, N.A. & Rentah, F. 2018. The contributions of small and medium enterprises (SME's) On Malaysian economic growth: A sectoral analysis*. In Proceedings of the 7th International Conference on Kansei Engineering and Emotion Research 2018: KEER 2018, 19-22 March 2018, Kuching, Sarawak, Malaysia* (pp. 704-711). Springer Singapore.

Tandon, A. 2022. *Climate change made extreme rains in 2022 South Africa floods 'twice as likely' - Carbon Brief*. *Bloomberg*. https://www.carbonbrief.org/climate-change-made-extreme-rains-in-2022-south-africa-floods-twice-as-likely/ Date of access: 28 Jun. 2022.

Tariq, J. & Shujaa Safdar Gardezi, S. 2022. Study the delays and conflicts for construction projects and their mutual relationship: A review. *Ain Shams Engineering Journal*. (May, 12):101815.

Teresiene, D., Keliuotyte-Staniuleniene, G., Liao, Y., Kanapickiene, R., Pu, R. & Yue, X.G. 2021. The Impact of the COVID-19 Pandemic on Consumer and Business Confidence Indicators. *Journal of Risk and Financial Management*. 14(4):159.

Terry, J. 2020. How Lean Project Management Helps Organizations Optimize for Value Delivery. https://www.planview.com/resources/articles/lean-project-management/. Date of access: 26 Oct. 2020

Terry, K. 2018. What is DMAIC? https://www.isixsigma.com/new-to-six-sigma/dmaic/what-dmaic/ Date of access: 26 Oct. 2020

TeSai. 2014. SMME Strategy: Economic Development Department Nelson Mandela Metropolitan Council. http://www.nelsonmandelabay.gov.za.FeJZz_smme. Date of access: 24 Dec. 2019

The World Bank. 2017. *World Bank SME Finance: Development news, research, data* | *World Bank*. https://www.worldbank.org/en/topic/smefinance Date of access: 12 Jan. 2022.

The World Bank Group. 2021. *South Africa - Vulnerability* | *Climate Change Knowledge Portal*. https://climateknowledgeportal.worldbank.org/country/south-africa/vulnerability Date of access: 28 Jun. 2022.

Thompson Agyapong, G., Mmieh, F. & Mordi, C. 2018. Factors influencing the growth of SMEs: The case of Ghana. *Thunderbird International Business Review,* 60(4), pp.549-563.

TISO Skills Fund. s.a. *The Importance of Education in South Africa - TISO Skills Fund*. *2019*. http://tisoskillsfund.co.za/importance-education-south-africa/ Date of access: 15 Mar. 2022.

Toumi, M. & Smida, A. 2018. entrepreneurship education: understanding the failure of entrepreneurial act for learners. *International Journal of Technology Management & Sustainable Development*. 17(3):275–294.

Tran, N. & Pham, B.J.M.S.L. 2020. The influence of CEO characteristics on corporate environmental performance of SMEs: Evidence from Vietnamese SMEs. *Management Science Letters*, 10(8), pp.1671-1682.

Turner, R., & Ledwith, A. (2018). Project management in small to medium-sized enterprises: fitting the practices to the needs of the firm to deliver benefit. *Journal of Small Business Management*, *56*(3), 475-493.

Turner, R., Ledwith, A., & Kelly, J. (2010). Project management in small to medium-sized enterprises: Matching processes to the nature of the firm. *International journal of project management*, *28*(8), 744-755.

Turner, R., Ledwith, A., & Kelly, J. (2012). Project management in small to medium-sized enterprises: Tailoring the practices to the size of company. *Management Decision*, *50*(5), 942-957.

United Nations. 2021. — *SDG Indicators*. https://unstats.un.org/sdgs/report/2021/goal-08/ Date of access: 12 Jan. 2022.

Unnikrishnan, N. & Kattookaran, T.P., 2020. Impact of public and private infrastructure investment on economic growth: Evidence from India. *Journal of Infrastructure Development*, 12(2), pp.119-138.

Vanclay, F. 2020. Reflections on Social Impact Assessment in the 21st century. Impact Assessment and Project Appraisal, 38(2):126-131.

Van der Westhuizen, M.A. & Swart, I., 2015, 'The struggle against poverty, unemployment and social injustice in present-day South Africa: Exploring the involvement of the Dutch Reformed Church at congregational level', *Stellenbosch Theology Journal (STJ)* 1(2), 731-759. https://doi.org/10.17570/stj.2015.v1n2.a35

Vargas R. V. 2000. A new approach to PMBOK guide 2000. In: *Project Management Institute Annual Seminars & Symposium*. Nashville, Newtown Square: Project Management Institute.

Viviers, S., Van Eeden, S. & Venter, D. 2012. Identifying small business problems in the South African Content for proactive entrepreneurial education. http://www.idasa.org.za. Date of access: 17 Jan. 2020.

Wang, G., Locatelli, G., Wan, J., Li, Y. & Le, Y. 2021. Governing behavioral integration of top management team in megaprojects: A social capital perspective. *International Journal of Project Management*. 39(4):365–376.

Warburton, R.D.H. & Cioffi, D.F. 2014. Project management theory: deriving a project's cost and schedule for its network structure. In: *Project Management Institute*. Phoenix, AZ. https://www.pmi.org/learning/library/updating-project-management-theory-1917 Date of access: 11 Sep. 2021.

Warner, M.H. 2020. *The Four Phases of a Project — The Project Management Blueprint.com*. https://www.theprojectmanagementblueprint.com/blog/project-overview/the-four-phases-of-a-project Date of access: 23 Jun. 2022.

Welman, C., Kruger, F & Mitchell, B. 2012. Research Methodology. Oxford South Africa: Cape Town.

Wesland, J. 2018. Six Sigma: A Simple Guide for Project Managers. https://www.projectmanager.com/six-sigma-a-simple-guide-for-project-managers. Date of access: 26 Oct. 2020

Wickham, P.A. 2011. Strategic entrepreneurship: a decision-making approach to new venture creation and management, 4th edition. Prentice Hall: Harlow

What is Project Management: Definition and Terms | Project Management Guide. s.a. https://www.teamgantt.com/project-management-guide/what-is-project-management Date of access: 02 Aug. 2021.

Williams, T. 2018. *From Academia: Summaries of Research for the Reflective Practitioner The Nature of Risk in Complex Projects*.

Willumsen, P., Oehmen, J., Stingl, V. & Geraldi, J. 2019. Value creation through project risk management. International Journal of Project Management, 37(5):731-749.

Wójtowicz I. 2021. *Hybrid Project Management – Should You Use It In Your Project? INVO*.

World Bank. 2019. Small and Medium Enterprises (SMEs) Finance: Improving SMEs Access to Finance and Finding Innovative Solutions to Unlocking Capital. Washington. The World Bank

World Bank. 2021. *Poverty Overview: Development news, research, data | World Bank*. https://www.worldbank.org/en/topic/poverty/overview#1 Date of access: 09 Mar. 2022.

World Bank Group. 2018. Overcoming Poverty and Inequality in South Africa. *Overcoming Poverty and Inequality in South Africa*. (March).

World Health Organization. 2019. *Coronavirus*. https://www.who.int/health-topics/coronavirus#tab=tab_1 Date of access: 04 Jan. 2022.

Yap, J., Wang. & Abdul-Rahman. 2016. A conceptual framework for managing design changes in building construction. Proceedings of the 66th MATEC Web of Conferences. IBCC pp. 1-10

Yang, L., van Dam, K.H., Majumdar, A., Anvari, B., Ochieng, W.Y. & Zhang, L. 2019. Integrated design of transport infrastructure and public spaces considering human behavior: A review of state-of-the-art methods and tools. *Frontiers of Architectural Research*, *8*(4), pp.429-453

Yoshino, N. & Taghizadeh-Hesary, F. 2020. Unlocking SME Finance in Asia: Roles of Credit Rating and Credit Guarantee ... - Google Books. New York: Routledge. https://books.google.co.za/books?hl=en&lr=&id=VzuhDwAAQBAJ&oi=fnd&pg=PA23&dq=%22oecd+member+countries%22++and+SMEs&ots=4FK7ZZJDAj&sig=IOPjWZ-lTufc9tKPu-xc-dJTwsI&redir_esc=y#v=onepage&q=%22oecd%20member%20countries%22%20%20and%20SMEs&f=false Date of access: 13 Apr. 2022.

Zakaria, I., Rahman, B.Ab., Othman, A.K., Yunus, N.A.M., Dzulkipli, M.R. & Osman., M.A.F. 2014. The Relationship between Loyalty Program, Customer Satisfaction and Customer Loyalty in Retail Industry: A Case Study. Procedia - Social and Behavioral Sciences. 129:23–30.

Zeitoun, A. 2000. Raising the bar in project management awareness and application. In: Project Management Institute Annual Seminars & Symposium. Houston.

Zhang, Z., Ramanathan, M.K., Raj, P., Parwal, A., Sherwood, T. and Chabbi, M., 2022. {CRISP}: Critical Path Analysis of {Large-Scale} Microservice Architectures. In *2022 USENIX Annual Technical Conference (USENIX ATC 22)* (pp. 655-672).

Zingoni, T. 2020. Deconstructing South Africa's construction industry performance. https://mg.co.za/opinion/2020-10-19-deconstructing-south-africas-construction-industry-performance/. Date of access: 27 Oct. 2020.

Ziervogel, G. 2019. Unpacking the Cape Town drought: lessons learned. *Cities support programme*| *Climate resilience paper. African Centre for Cities, Febraury.*

Žižovic, M., Miljkovic, B. & Marinkovic, D. 2020. Objective methods for determining criteria weight coefficients: a modification of the critic method. Decision Making: Applications in Management and Engineering. 3(2):149–161.

Zwikael, O., & Meredith, J. (2021). Evaluating the success of a project and the performance of its leaders. *IEEE transactions on engineering management*, 68(6), 1745-1757.

Zuo, J., Zhao, X., Nguyen, Q.B.M., Ma, T. & Gao, S. 2018. Soft skills of construction project management professionals and project success factors: A structural equation model. Engineering, Construction and Architectural Management. 25(3):425–442.

APPENDIX A

ETHICAL CLEARANCE

NORTH-WEST UNIVERSITY
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Economic and Management Sciences Research
Ethics Committee (EMS-REC)

2 November 2021

Dr JJ Jordaan
Per e-mail
Dear Dr Jordaan,

EMS-REC FEEDBACK: 29102021
Student: Sibiya, A (25336339)(NWU-00994-21-A4)
Study leader: Dr JJ Jordaan – PhD in Business Administration

Your ethics application on, ***Exploring the use of an agile project management approach in infrastructure development within Gauteng,*** which served on the EMSREC meeting of 29 October 2021, refers.

Outcome:

Approved as a minimal risk study. A number **NWU-00994-21-A4** is given for one year of ethics clearance.

Please note that the ethics approval of this application is subject to the Covid-19 protocols.

Kind regards,

Mark Rathbone

Digitally signed by Mark Rathbone
DN: cn=Mark Rathbone, o=North-West University, ou=Business management, email=mark.rathbone@nwu.ac.za, c=ZA
Date: 2021.11.03 10:27:14 +02'00'

Prof Mark Rathbone
Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)

APPENDIX B

LANGUAGE EDITOR'S LETTER

Dynamic Language &
Translation Specialists

Antoinette Bisschoff
71 Esselen Street,
Potchefstroom
Tel: 018 293 3046
Cell: 082 878 5183
Language@dlts.co.za
CC No: 1995/017794/23

Tuesday, 30 August 2022

To whom it may concern

Re: Confirmation of language edit, typography and technical precision

The PhD thesis "**Exploring the use of an agile project management approach in infrastructure development within Gauteng"** by **A Sibiya** (25336339) was edited for language and technical precision.

Direct quotations, as transcribed from the interviews, were only checked for punctuation and spelling errors. Correcting the grammar or sentence structures might change the meaning of the transcription. These errors were not corrected in the name of scientific correctness.

Citations and sources were checked to comply with the Harvard guidelines specified by the 2020 NWU Reference guide.

Final, last-minute corrections remain the responsibility of the author.

Antoinette Bisschoff

BA Languages (UPE – now NMU); MBA (PU for CHE – now NWU); Translation and Linguistic Studies (NWU)

Officially approved language editor of the NWU since 1998
Member of SA Translators Institute (no. 100181)