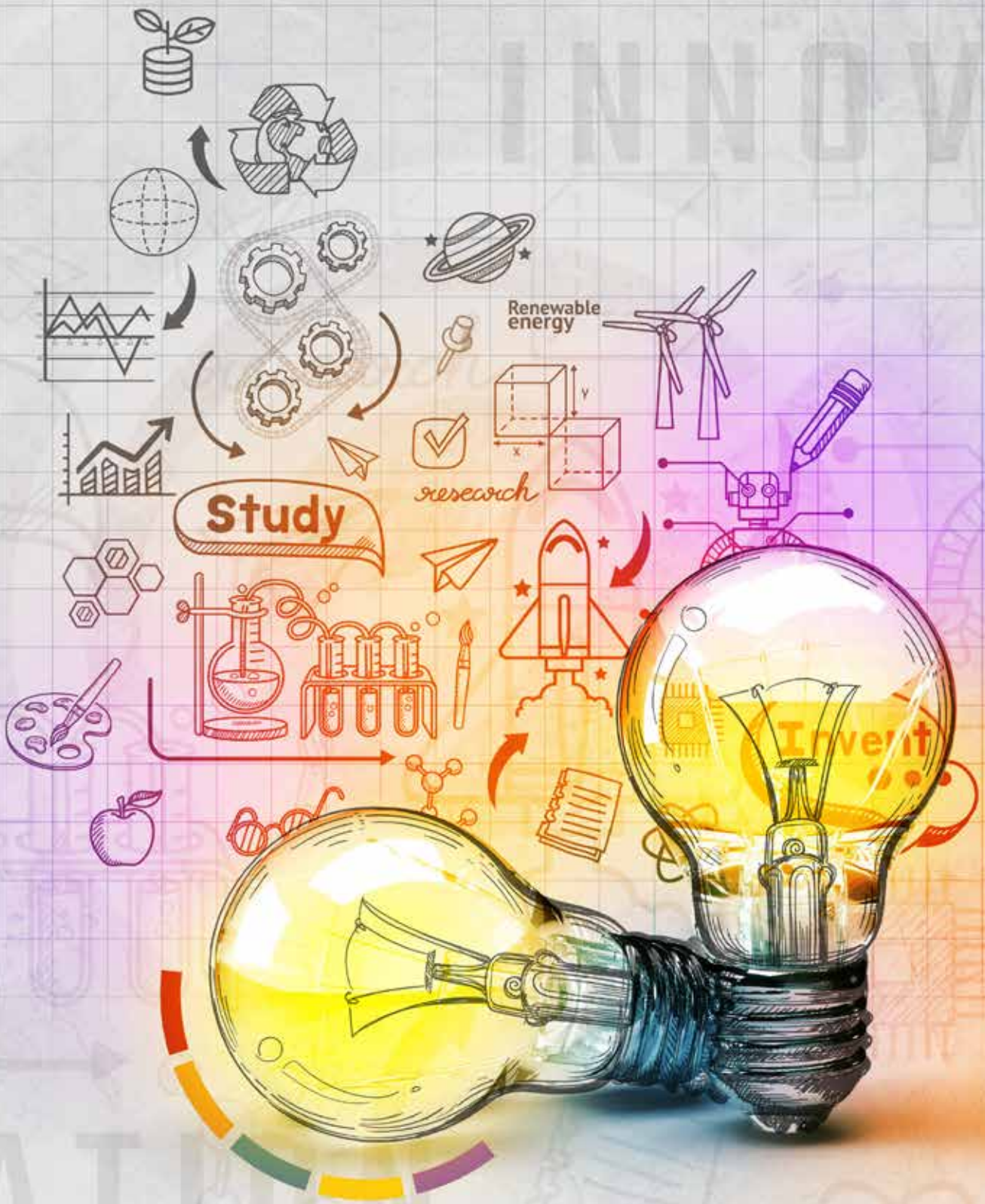

ecsecc
eastern cape socio economic consultative council

2023 INNOVATION REPORT

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LIST OF ACRONYMS

APAP	Agricultural Policy Action Plan
Co-Lab	Collaborative Laboratories
Covid-19	Corona Virus
CSIR	Council for Scientific and Industrial Research
DEDEAT	Department of Economic Development and Environmental Affairs
DSBD	Department of Small Business Development
DSI	Department of Science and Innovation
DTIC	Department of Trade, Industry and Competition
ECSECC	Eastern Cape Socio-Economic Consultative Council
FGD	Focus Group Discussion
ICT	Information Communications and Technology
IDC	Industrial Development Corporation
IPAP	Industrial Policy Action Plan
MNC	Multinational Corporations
NAAMSA	National Association of Automobile Manufacturers of South Africa
NACI	National Advisory Council on Innovation
NEDLAC	National Economic Development and Labour Council
NRF	National Research Foundation
NSI	National System on Innovation
OEM	Original Equipment Manufacturer
PEDS	Provincial Economic Development Strategy
PMTSF	Provincial Medium Term Strategic Framework
RAAVAC	Revitalisation of Agricultural and Agro-processing Value Chains
R&D	Research and Development
RIS	Regional Innovation Strategy
SMME	Small, Medium and Micro Enterprise
TVET	Technical and Vocational Education and Training
TNC	Transnational Companies
TIA	Technology Innovation Agency

EXECUTIVE SUMMARY

While the benefits of innovation have been highlighted, it is also important to emphasise the importance of including marginalised actors to achieve transformative outcomes. Harnessing innovation for inclusive and transformative outcomes calls for an in-depth understanding of the innovation potential of different actors at both local and regional levels. In developing the Eastern Cape Innovation Strategy, it is important to understand key determinants for economic growth and of particular importance in this study - the innovation potential of both small and big enterprises. To understand the innovation dynamics of the Eastern Cape, two phases of research were implemented.

Phase one of this study aimed to determine how skills development and jobs could be retained in this new and shifting world, especially in the context of rural and urban development. The study also pointed to opportunities to leverage 4IR for accelerated industrial development for job creation and inclusive economic growth. Phase one of the study addressed these questions from an industry perspective, that is, the demand-side of skills development. The study's current phase is to investigate the innovation activities and performance among enterprises operating in the Eastern Cape.

A mixed methods approach, qualitative and quantitative interviews, and surveys were conducted. Key informant participants were selected using purposive sampling, followed by snowballing sampling. 34 key informant interviews were conducted and 431 responses were received from the survey.

The qualitative data in this study was thematically analysed using the key research questions; (1) how is innovation understood in the Eastern Cape, (2) what are the key innovation activities among enterprises in the Eastern Cape and lastly, what are the leading potential investment innovation opportunities in the selected sectors?

The policy assessment conducted of the Eastern Cape economic development strategies revealed that there is a considerably high negative gap in support for Science, Technology and Innovation within enterprises. This view was also shared by the participants in the study. From local economic development strategies to provincial and sector-based policies, support and prioritisation are limited. There is also a gap in alignment between the national system of innovation and the regional innovation system in terms of its support for enterprise development. Enterprises have a higher likelihood of receiving innovation support in the NSI compared to the regional innovation system.

Innovation among participants was commonly understood in relation to ICT, Technology and Big Science. The notion and potential of social innovation in relation to its value for economic development were not associated with innovation. These innovations are commonly seen merely as daily use or practices of tradition or culture. The monetary or economic value and potential were recognised by respondents.

A summary of key findings are as follows:

1. **Adoption and adaption of other's innovations are the most prevalent types of innovation in the Eastern Cape.**
    - The interviewed enterprises showed little engagement with innovation activities. Only 10% were involved in product, 11% in process, 8% in organisational and 10% in marketing.
    - Most of these enterprises stated that the innovations they implemented were not new in their respective sectors/markets.
2. **Enterprises do not have the necessary skills and resources to innovate.**
    - Enterprises highlighted little to no access to adequate resources (electricity, ICT infrastructure, libraries).
    - 61% of innovative organisations noted that the resources they need are not available in the province. Enterprises in the agriculture sector sourced their resources in other provinces.
    - 84.5% of these businesses highlighted a lack of necessary skills that hindered their ability to innovate.
3. **An emphasis on a more organised/inclusive provincial innovation network.**
    - 85% of the enterprises indicated a need for innovation networks, most particularly for information-sharing purposes and incubation.
    - Only 8% of the respondents indicated having formal agreements with STI agencies and those agreement relationships being fruitful.
    - Enterprises indicated a great interest in an innovation network, particularly for the sharing of information.
4. **A lack of awareness of government support initiatives for innovation.**
    - 68% of enterprises showed little to no awareness of laws and regulations around innovation activities.
    - Enterprises that were engaged in innovative activities made use of their own funds. An exception was noted in agricultural enterprises that were actively involved in government support initiatives (funding or coaching).


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CHAPTER 1

Introduction

CHAPTER ONE. INTRODUCTION

1.1 STUDY BACKGROUND

Widespread agreement exists that innovation is a crucial enabler of economic and social development. Research has indicated that innovation activities have the potential to unlock economic growth opportunities, create new market value propositions, and facilitate new skills and occupations (Kahn et al., 2021; McKinsey, 2021). Many South African studies have reported a positive correlation between innovation and productivity, particularly in the manufacturing industry (Kahn et al, 2021; Kambela, 2018, Kasongo et al, 2016).

Other studies have shown that companies that invest in innovation generate more shareholder value, create more jobs, and contribute more towards economic growth compared to peer companies that do not (Mckinsey, 2021). Innovation investment in industries is sometimes regarded as a long-term investment, particularly taking into consideration its appreciation for sustainability, and at times, the environmental impact of the organisation. As industries and businesses become innovative, new market values are created which, in turn, translate into new value propositions, skills, occupations, and positive social impact within the industry.

The Fourth Industrial Revolution (4IR) technologies continue to change the way business is conducted and are said to threaten many traditional jobs. But there are also new opportunities for new services and jobs that emerge from this revolution, as seen in the 2019 NEDLAC Report on the Nature of Work. Creating an innovation culture ensures that local industries can exploit the benefits of the 4IR while reducing the potential negative impacts.

Socio-economic disruptors in South Africa, such as the Covid-19 pandemic, the KwaZulu-Natal flood and mudslides, and the socio-economic unrest, provide an apt opportunity for industries to rethink and re-strategise their value proposition. Especially considering the vast opportunities of digital technologies and innovative solutions that allow optimal business functions and solutions. The worldwide call for environmentally friendly and sustainable solutions is another opportunity for new market opportunities within the country, particularly in the Eastern Cape economy.

While the benefits of innovation have been highlighted, others have emphasised the importance of ensuring the inclusion of marginalised actors to achieve transformative outcomes (Edler and Fagerberg, 2017; Sinyolo et al., 2022; Schot & Steinmuelle 2018). Harnessing innovation for inclusive and transformative outcomes calls for an in-depth understanding of the innovation potential of different actors at the local and regional levels. In developing the Eastern Cape economic reconstruction and recovery plan, it is important to understand key determinants for economic growth and, specifically, the innovation potential of both small and big enterprises.

To understand the innovation dynamics of the Eastern Cape, two phases of research were implemented. Phase one of this study was aimed at determining how skills development and jobs could be retained in this new and shifting world, especially in the context of rural and urban development. The study also pointed to opportunities to leverage 4IR for accelerated industrial development for job creation and inclusive economic growth.

Phase one of the study addressed these questions from an industry perspective, specifically focusing on the demand side of skills development. The current phase of the study is aimed at investigating the innovation activities and performance among enterprises operating in the Eastern Cape.

1.2 STUDY OBJECTIVES

The EC Digital Skills research project (phase one) investigated the Digital Skills capacity in the Eastern Cape from an industry perspective.

The findings of that study provided a baseline for developing an evidence-based five-year Digital Skills Plan utilising the NEMISA DSM Framework. The Digital Skills Plan aims to guide the Eastern Cape provincial government and its social partners on economic investments for the development of an innovation-driven economy. The aim of the study (phase two; 2ND Generation Eastern Cape Business Innovation Study) is to provide evidence for strategic policy advice on the innovation activities of Eastern Cape enterprises and how these activities impact economic development and social change.

To achieve this aim, phase two seeks to understand the following:

1. How is innovation understood by the Eastern Cape business sector?
2. Understanding the innovation activities and innovation performance trends within enterprises in the selected sectors:
   - How these indicators are active and performing within the businesses in the Eastern Cape and what are the strengths and constraints within the innovation system?
3. What is (are) the leading potential investment innovation opportunities in the selected sectors?

1.3 SCOPE OF WORK AND PROJECT DELIVERABLES

Having achieved the above the study will provide:

1. A research report outlining (1) the innovation landscape of the Eastern Cape, (2) highlighting the innovation activities within Eastern Cape enterprises, (3) highlighting innovation-driven key potential catalytic investment opportunities for the province.
2. Set up regional innovation forums that will deliberate on strengthening regional and local innovation systems through Science, Technology, and Innovation.
3. Advocating for the showcasing of the innovation potential of local economies through hosting innovation fairs.
4. Facilitate the integration of innovation policy proposals in the planning process of the policy discourses in the regional and local innovation ecosystem.

1.4 SUMMATIVE REFLECTION FROM THE FIRST-GENERATION DIGITAL SKILLS STUDY

This subsection provides key insights from phase one of the study. Readers interested in in-depth details can consult the phase one report.

1.4.1 OVERVIEW AND SPECIFIC OBJECTIVES OF PHASE ONE

In 2018 the Eastern Cape Socio-Economic Consultative Council (ECSECC), formed a partnership with the National Electronic Media Institute of South Africa (NEMISA). NEMISA is a public entity of the Department of Communications and Digital Technologies whose primary responsibility is providing training on ICT and digital skills throughout South Africa. In the Eastern Cape, the Co-Lab is based at Walter Sisulu University. Each province has its own Co-Lab, with its own niche area of focus in delivering ICT and digital skills training. In the Eastern Cape, the area of focus is on ICT for rural development.

The partnership with NEMISA focused on digital skills in the Eastern Cape. Through a research project, a five-year Provincial Digital Skills Plan was developed. This plan is aligned with the NEMISA Framework - to enhance provincial participation in Industry 4.0, focusing on building the capabilities of individuals in selected priority industries and post-school education and training institutions. The Eastern Cape Digital Skills research study, phase one of this project, took place against the backdrop of the advances of the 4IR, a time in which new technologies were fusing with the physical, digital, and biological worlds, and impacting all disciplines, economies, and industries. Digital transformation is a key feature of this revolution. Entire systems of production, management, and governance are being affected, and as digitisation continues, it is intimately intertwined with addressing youth unemployment, manufacturing, and harnessing human innovation.

Digital transformation in industries demands new skills, and the absorption of these skills into the labour market will improve the growth prospects of the economy (Kahn et al. 2018). According to the NEMISA DSM Framework on Digital Skills, digital skills are the basic understanding of how to interact with a computer, how

to interact with applications on that computer, and how to make it do what you want in real-time. Digital skill can be defined as the ability to locate, organise, understand, evaluate, and create information using digital technology. According to Usoro and Calab (2014) digital learning encompasses many different facets, tools, and applications to support and empower teachers and students, including online courses, blended or hybrid learning, or digital content and resources. The question then becomes, from a skills development appraisal, how do we ensure innovation activities respond to skills development and economic growth?

With a sectorial priority focus, the digital skills research which informed the Digital Skills Plan prioritised the following sectors: Automotive and Non-Automotive Manufacturing; Agricultural Industry; and Renewable Energy.

1.4.2 SNAPSHOT KEY INSIGHTS FROM PHASE ONE OF STUDY

This section provides a summary of the findings from the Digital Skills Research study. The findings are presented as per the three selected sectors. The limitations of phase one of the study are further highlighted in this section.

1.4.2.1 AUTOMOTIVE AND MANUFACTURING SECTOR

One of the priority sectors in the Eastern Cape is the automotive and manufacturing sector. The automotive sector has been categorised as the leader in digital transformation and innovation in the province. This can be attributed to the presence of leading OEMs such as the Mercedes Benz plant in East London and Volkswagen, Isuzu and Ford in Uitenhage and Gqeberha. The sector associated the use of digital technologies as (1) providing entry and competitive edge in the global markets, although much of the innovations are developed in the global space. Investment for Research and Development in the South African automotive industry is very little. The Original Equipment Manufacturers' Investment for R&D is an investment more in the mother company i.e. VW's largest R&D investment is in Germany. This can be said about all the OEMs in South Africa. This leaves very little room for innovation in the South African plants. This results in the plants rather adopting existing digital technologies, rather than innovating independently.

Secondly, 4IR technologies improved product quality with fewer costs and (3) reduced production time. Furthermore, findings on skills development in the sector revealed that there is a skills mismatch where the post-schooling sector lags in producing a workforce with skills in demand and ready for work. Students, particularly those from the TVET colleges, lacked up-to-date practical training. As a result, companies must retrain them for current skills in the sector, which is timeous and costly.

Lastly, due to digital transformation in the automotive and manufacturing sector, many vacancies were falling away and new emerging task-based occupations were emerging. Some job descriptions and tasks are currently being combined and new emerging occupations that are task (skills) based are emerging. The study also found that these new emerging task-based occupations in the sector have a huge reliance on engineering, ICT, and data analysis. The industry is innovating and data is the new currency pushing the innovation state of the industry.

1.4.2.2 AGRICULTURAL SECTOR

The sample of agriculture and agro-processing was skewed towards the small-scale farmers, which was one of the limitations of phase one. The use of technology by small-scale farmers was minimal while in agro-processing, slow participation was observed. However, amongst those that were sampled, the study found occupational changes were also ICT, engineering and/or data-driven.

Similar trends in manufacturing and automotive were observed in agro-processing from the reflections from the skills development sector. Certain tasks were also deteriorating whilst others were joined with other tasks to form new occupations. Innovation in this sector is understood as good practice for competing in the commercial or global space. The respondents, small-scale emerging farmers, reflected a comfortable state of ease in their farming practices, with no aspirations for commercial or global competitiveness.

In other words, when respondents were probed further on this finding, the respondents had no additional training or aspiration to taking up training to encourage them or their produce for commercial or global participation. Interestingly, these were attributed to issues of awareness and advocacy on digital technologies and transformation in the agri-sector, particularly in the sector measures to upskill.

The financial difficulties experienced by black emerging farmers was one of the strongest reasonings for the discouraged innovative state. Farmers experience difficulties in getting investment or financial assistance from the government, private sector, and banks. The historical background of black people can also be attributed to this impermeable state.

The investment and financial muscle needed for black emerging farmers investing in digital innovations is a deterrent to these farmers to participate in the 4IR space. The agricultural sector in the Eastern Cape can be characterised as highly mechanised. 4IR and digital technologies are only evident in game farms and arguably amongst commercial farmers. Phase two of this study will further probe the innovation in the agricultural sector but with a particular focus on commercial farmers and big agro-processing plants.

1.4.2.3 RENEWABLE ENERGY SECTOR

The identified research informants for sustainable energy declined the invitation to participate in the study. As a result, no fieldwork findings were made on the sector. The findings made from the literature review of government documents, such as the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), indicate minimal digital transformation in the sustainable energy sector in the Eastern Cape. This is attributed to the global integrated value chains in the sector, with major original equipment manufacturers of the technologies based in overseas markets. There is little value addition in emerging markets such as South Africa.

In addressing this limitation of phase one, a new sample has been created to include this sector's participation in the study i.e. SMMEs. This has been done with the assistance of the Department of Energy and Minerals, Energy Seta and the three Business Chambers in the province.

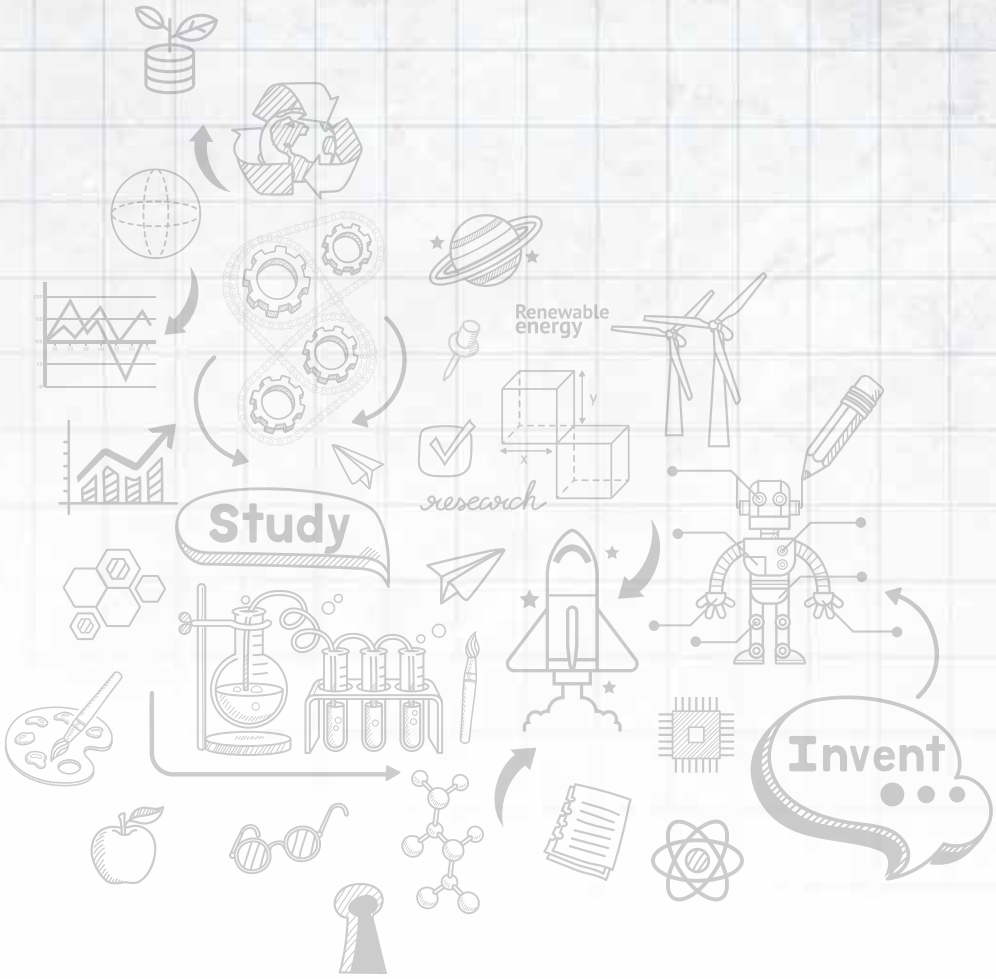
1.4.2.4 POST SCHOOLING SECTOR; THE TVET SECTOR

This is the sector in response to the skills supply of industry needs. A focus group discussion (FGD) was conducted will TVET colleges in the province. The TVET sector acknowledged the skills supply and demand mismatch citing gross infrastructural and human resource difficulties. The rate at which the industry is evolving and the rate at which the educational system is moving are not at par, consequently, education and training of its students are negatively impacted.

The key insights from phase one of the Digital Skills Research Project provided the following strategic themes that further informed the Eastern Cape Digital Skills Plan:

- Awareness of the importance of the ICT sector and digital skills must be inculcated during the basic schooling level.
- Post-schooling institutions, especially the TVET College sector is central to developing critical technical skills required for digital transformation in the economy and society as a whole.
- Responsiveness of the education and training institutions to the labour market needs of the industry requires collaboration between the training institutions, government, and industry.
- Companies are better placed to re-skill their employees on the changing nature of work driven by the rapid adoption of digital technologies at the workplace.
- Resource mobilisation must be undertaken to fund the digital skills needs of the economy.

Phase two of this project will re-evaluate these sectors' response to the digital transformation of the industry.



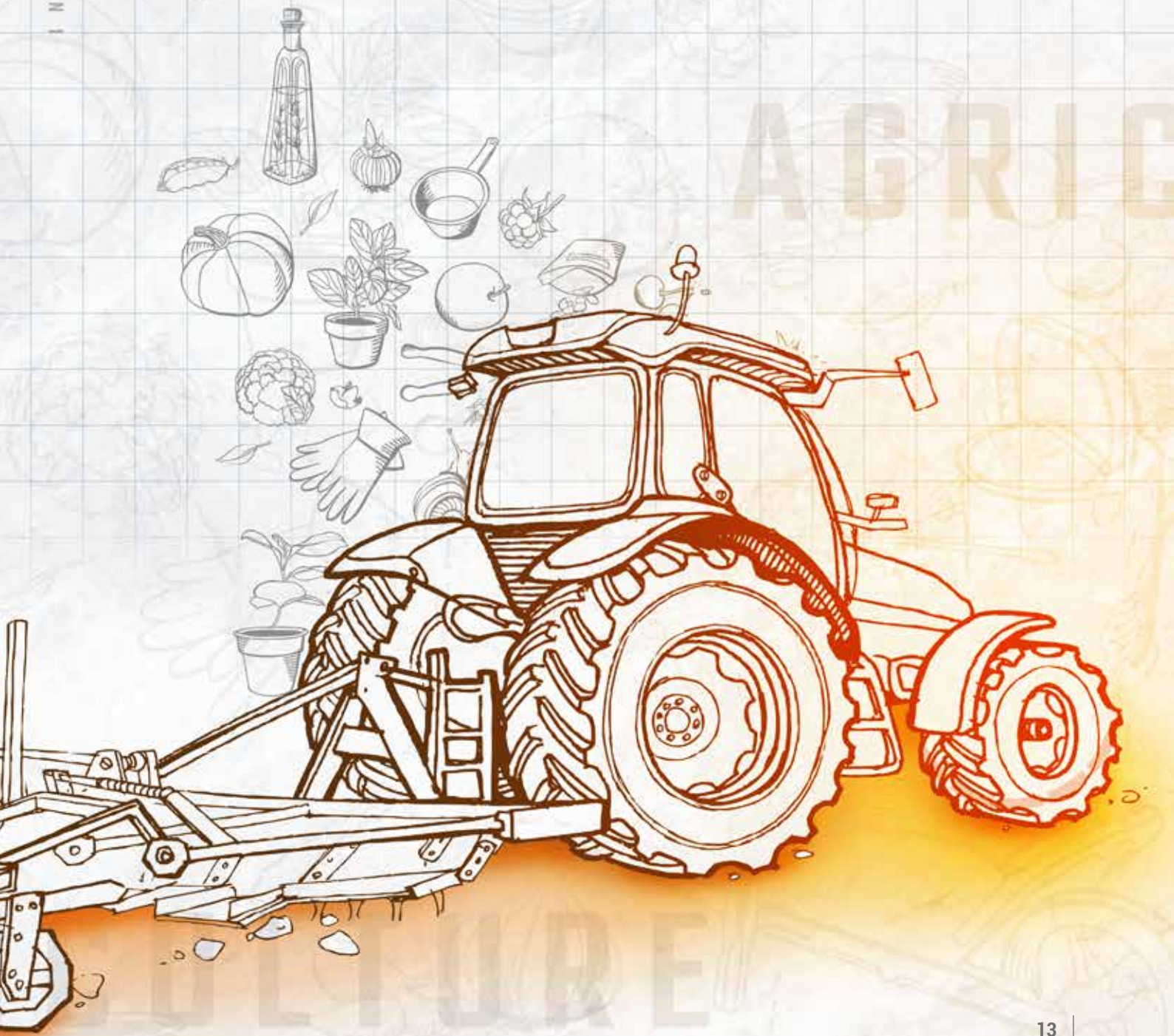
1.5 SUMMARY AND STRUCTURE OF THE REPORT

In summary, this chapter provides an outline of the research rationale, project scope and deliverables, and research objectives. The chapter provides a detailed summary of the premise of the discussion and how the Eastern Cape Socio-Economic Consultative Council started to participate in the innovation ecosystem. What the organisation's niche area is in the innovation ecosystem and how ECSECC will participate in this space.

The remainder of the report consists of six chapters. The following chapter presents the literature review, discussing the definition of innovation and key theories that explain innovation processes. Chapter Three of the report provides the SA policy landscape, discussing how the country relies on the national systems of innovation to promote innovation. Chapter Four presents the research methodology and discusses how the study relies on a mixed methods approach, which combines both qualitative and quantitative techniques, to meet the study's objectives. Chapter Five presents the key study findings on the key innovation actors and their understanding of innovation. Chapter Six presents innovation activities among enterprises in the Eastern Cape. The last chapter presents the conclusions and recommendations.

CHAPTER 2

Literature Overview



CHAPTER TWO. LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this chapter is to unpack current discussions around innovation and some prominent theories of innovation that underpin our understanding of how firms innovate.

2.2. DEFINITION OF INNOVATION

The prominent economist Joseph Schumpeter, probably the father of the ideas that gave rise to what we now refer to as "innovation", made an important difference in 1939. According to Schumpeter, while invention involves making something new, innovation is rooted in the commercialisation of that something new (Lema, Kraemer-Mbula & Rakas, 2021). As such, Schumpeter (1983) defines innovation as the "commercial or industrial application of something new - a new product, process or method of production; a new market or sources of supply; a new form of commercial business or financial organisation". In his book Capitalism, Socialism and Democracy in 1942, he refers to this as Creative Destruction. From Schumpeter's explanation, innovation is then a process that starts with the creation of a new idea(s), developing and transforming ideas into commercial products/services, and lastly the diffusion of said products and other activities. From this understanding, to tap into the economic value of innovation, it must be commercialised. From Schumpeter's description of innovation, it can be divided into five types:

1. Production Innovation - the introduction of a new service, product, or programme.
2. Process Innovation - changing skills and technologies used in the process of production and the delivery of goods and services.
3. Marketing Innovation - links consumers through using new promotional strategies to help enhance brand awareness and product differentiation.
4. Supply Chain Innovation - change in the supply chain process or introduction of a supply chain technology to create more value for stakeholders.
5. Organisational Innovation - internal changes in an organisation's structure and work environment in trying to foster more efficient workspaces.

Process innovation places importance on efficiency and cutting costs while product innovation places importance on the creation of new products and services (Mamphiswana & Sinha, 2019). As such, a strict focus on process innovation may limit an organisation's potential to introduce new offerings in a market. It is important to note that for organisations that occupy the lower ends of a value chain, process and product innovation allow for the integration into better chain nodes. Marketing and supply chain innovation are typically more applicable to organisations that are lead players within a value chain.

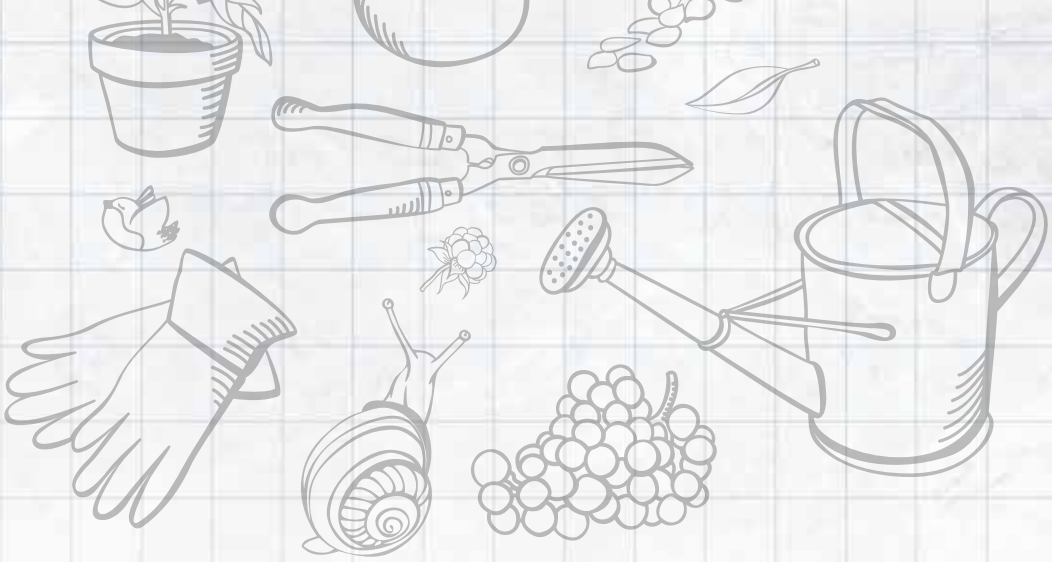
Schumpeter argued that innovation is important in the efforts of increasing profits and overall economic growth. However, one of the consequences of innovation is what the author explains as "a process of industrial mutation, that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (Clemence, 2009). The introduction of new technologies, improved services and products threaten the existence of products and technologies already in the market. As a result, innovation results in the ending of certain markets but similarly creates new ones that require new skills (Maier, Maftei, Sven and Golowko, 2016).

2.3. THEORETICAL APPROACHES TO UNDERSTANDING HOW FIRMS INNOVATE

2.3.1 LINEAR MODEL

The linear model of innovation, which is also known as the traditional or sequential model, describes innovation as a linear process that involves a series of sequential stages that lead to the development and commercialisation of a new product or service (Godin, 2006). It postulates that innovation begins with basic scientific research, which generates new knowledge and ideas.

This knowledge is then applied to the development of new technologies or processes through a process of applied research and development (Godin, 2006). Once a new technology or process is developed, it is transferred to the market through a process of commercialisation, which involves manufacturing, marketing,



and sales. The linear model has shortcomings in explaining innovation and has been criticised for its simplicity and limitations in capturing the complex and dynamic nature of innovation (Godin, 2006). The model neglects the role of networking, user feedback and external factors such as institutions, culture and politics that shape innovation processes (Lundvall, 1992; von Hippel, 1986; Godin, 2006).

2.3.2 RESOURCE BASED VIEW

This approach emphasises the importance of a firm's resources in shaping its ability to innovate. According to this view, a firm's resources, including its tangible and intangible assets, capabilities, and knowledge, are key determinants of its ability to develop and commercialise new products and services (Barney, 1991). This theory suggests that firms with valuable, rare, and inimitable resources are better positioned to innovate and gain a competitive advantage over their rivals (Barney, 1991).

2.3.3 DIFFUSION THEORY

Diffusion of Innovation (DOI) was first introduced by a sociologist named Everett Rogers, who wanted to know how, why and the rate at which a new service, product or process spreads through a population or a social system (Dearing & Jeffrey, 2018). The diffusion theory attempts to understand how new ideas and technological advancements are adopted in society. The adoption of a new product or idea is something that occurs at different stages for people within a social system. According to this theory, some people are more apt to the adoption of innovation than others. When promoting the adoption of an innovation to a population, this theory advocates for understanding the characteristics of the population that might help or hinder adoption. Diffusion theory identifies five adopter categories, and these are namely;

1. Innovators - typically the first to try out innovation.
2. Early Adopters - comfortable with adopting new ideas.
3. Early Majority - adopts innovative ideas before the average person, however, they need to see evidence of success before adopting.
4. Late Majority - sceptical to change and will only adopt innovation once it has been accepted by the majority.
5. Laggards - traditional in their approach and takes time to convince them about an innovative idea/product.

The diffusion theory helps identify the rate at which an idea/product gains momentum and diffuses through a population. Also, considering, four elements to an innovation; the invention, channels of communication, time, and the social system to an innovation. Five aspects have been the focus of innovation research in this theoretical approach, (1) the characteristics of an innovation which may influence its adoption, (2) the decision-making process that occurs when individuals consider adopting a new idea, product or practice, (3) the characteristics of individuals that make them likely to adopt and innovate, (4) the consequences for individuals and society of adopting an innovation, (5) the communication channels used in the adoption process.

2.3.4 NETWORK THEORY

Network theory focuses on the importance of social networks and relationships in driving innovation. According to this approach, innovation often occurs through the exchange and combination of knowledge and resources among actors in a network (Latour, 2005). It acknowledges that innovators rarely innovate in isolation, but in collaboration or interactions with others (i.e., systemic nature of innovation processes) (Lundvall, 2016). Network theory highlights the importance of the structure and characteristics of a firm's network in facilitating or hindering innovation.

2.3.5 ABSORPTIVE CAPACITY

According to this theory, innovation is driven by a firm's ability to absorb external knowledge (Cohen and Levinthal, 1990). Firms with higher absorptive capacity are better able to recognise, assimilate, and apply external knowledge to their innovation activities.

2.3.6 DYNAMIC CAPABILITIES

This approach emphasises the importance of a firm's ability to adapt and respond to changing environments in driving innovation. According to Teece et al. (1997), dynamic capabilities is the "ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments." These capabilities enable firms to identify and pursue new opportunities for innovation.

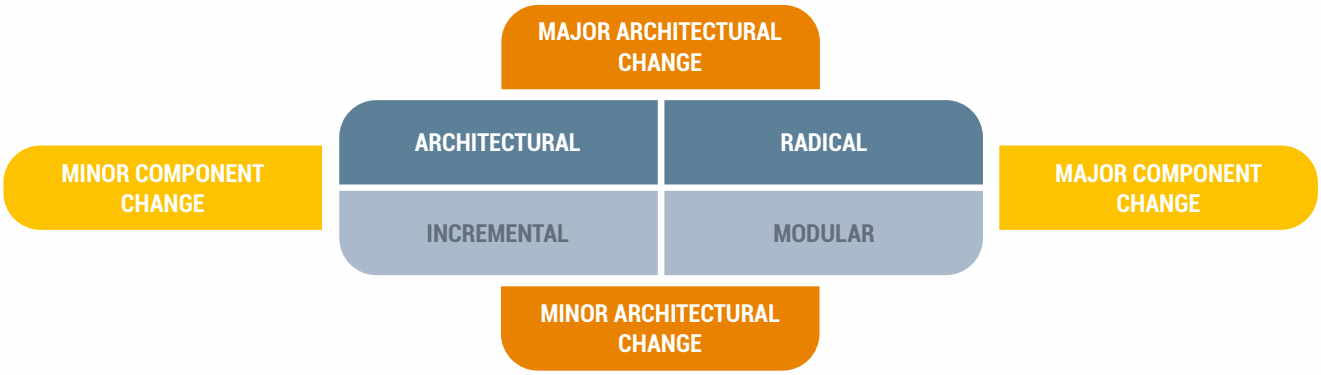
2.3.7 INCREMENTAL AND RADICAL INNOVATION

Radical Innovation - the technological knowledge required for the innovation is different from existing technology and the current technological knowledge may become obsolete.

Incremental Innovation - describes products being created as a result of a build-up of knowledge and resources i.e., competence enhancing innovation. This theory is anchored on leveraging existing knowledge and products.

2.3.8 HENDERSON CLARK MODEL

According to the model, the categorisation of innovation as either radical or incremental is incomplete and potentially misleading. This bilineal categorisation, according to the model, does not take into consideration the circumstances around innovation. Henderson and Clark, therefore, introduced a framework to address this gap. According to their framework, the knowledge required to develop successful new products is divided into two types; knowledge of the components and knowledge of the linkages between the components. This model places great importance on the distinction between knowledge on linkages and links between them. According to Henderson and Clark, this is what helps to explain the differences between innovations and competencies and strategies to ensure optimal returns within enterprises. Innovations in this model can be categorised as incremental, modular, architectural or radical. Distinctions are in the knowledge of the components and linkages between components to innovate.



2.3.9 OPEN INNOVATION MODEL- HENRY CHESBROUGH

Firms should use external and internal ideas - external and internal paths to market as firms advance their technology. This theory defines open innovation as the use of purposive inflow and outflow of knowledge to accelerate internal innovation and expand the markets for external use of the innovation.

Research and development investment - changes over time (impacted by the number of knowledge workers and the growing availability of private venture capital)

Closed Innovation - specialists would be involved in the innovation. An open process of innovation embedded in joint venture appreciation of research and development, multiple IP benefits and use.

Appreciation of outbound innovation flow of knowledge or technology exploitation.

2.3.10 DISRUPTIVE INNOVATION- CLAYTON CHRISTENSEN 1997

According to the Disruptive Innovation Theory, disruptive innovations are innovations that help create new markets and value networks and eventually disrupt existing markets and value networks over a period of time, leading to the displacement of earlier technologies. These innovations, according to this theory, improve products and services in ways the market did not expect.

2.4 SYSTEMS THEORY APPROACH TO INNOVATION

Systems Theory is the result of work done in various disciplines like sociology and organisational management (Chih-Hui & Sapphire, 2017). At the foundation of this theoretical approach, is the belief that the whole is greater than the sum of its parts. Systems view on innovation recognises the interdependence of different kinds of interactions between different elements for innovation to fully occur (Ritala & Almpanopoulou, 2017). From the literature, Systems Theory is rooted in the following core characteristics:

1. Innovation and learning processes at the centre of innovation rest on the ability to produce new knowledge and combine existing elements of knowledge in new methods. Innovation is then seen as a learning process.
2. Interdependence - organisations do not innovate in isolation, but rather interact closely with other organisations. Innovation is seen as the result of the relations between various elements or actors.

For this theory, innovation is then a result of a complex set of relationships, among actors in a system. Such factors include enterprises, universities, and research institutions. As such, the ability of an organisation to innovate is dependent on various interconnected factors, namely leadership, resources, culture and structures.

Since companies depend on their innovative capabilities to maintain competitive advantage and stay in business, they tend to act as the engines of innovation within an economy. However, the interconnectedness of the global market means that businesses alone cannot sustain a culture of innovation (Lundval, 1992; Manzini, 2012). While one business may have the technologies needed, they may need to source information about client needs, supplier specifications and labour standards outside of their organisation. As such, the innovation process of one business requires external stakeholders to occur effectively. This process in its simplest explains national systems of innovation.

Freeman (1987) defines a national system of innovation as "the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies." Lundvall (1992) added that these institutions "are either located within or rooted inside the borders of a nation-state". From the provided explanation, the national system of innovation is bringing together key actors who have the compentencies to increase the innovation performance of businesses of a country thereby improving the overall innovation performance in a country. According to Lundvall, Muchie and Gammeltoft (2003) the three factors that determine an innovation system are investment, learning and linkages.

However, the mere presence of these factors does not automatically result in an innovation system but rather the coordinated flow of information and intentional actions of actors make up an innovation system. Casadella and Tahi (2022) expand on these three factors and state that a national innovation system should include the following factors: a) Technological capacities, b) Innovation processes in low and medium technologies, c) Innovation and social entrepreneurship, d) Position of social capital, e) Position of informality and indigenous knowledge, f) Global technological environment and g) Complex financing of innovations.

Fromhold-Eisebith (2007), however, highlights the need to create regional/local systems of innovations within nations from the understanding that there are different types of assets that favour different contexts. For example, locally bound assets (tangible or intangible) create advantages for local innovations or innovativeness. For Fromhold-Eisebith (2007), the Regional Innovation System is the most suitable scale in which policy interventions can be tested and this is because the regional level takes explicit account of the roles played by all role players as important elements of the system. At the regional level, interactive-enterprise support is easier, this is caused by the issues of proximity, which are also discussed below through the prism of "intensity of collaboration" as espoused by Broekel (2012).

Innovation as a backbone of economic growth requires aligned efforts and this is true for different levels and geographies. In Iammarinno (2005) for example, it is stated that it is almost impossible to talk about the National Systems of Innovation (NIS) without recognising the importance of regional innovation systems and that what the study refers to as "national bias" limits the identification of players on the ground. In earlier studies such as that of Cooke (2002), operationalising RIS in the multi-level governance structure is critical because the existence of regional structures and national structures provide the potential for shared knowledge among the regional actors for a vibrant innovation ecosystem at the regional level. It becomes clear that a country cannot talk about unlocking the economic benefits of innovation without a clear innovation system in place, both at national and regional levels.

Crevoisier (1997) points to some benefits of regional systems, that through the establishment of the regional innovation networks, it becomes easier to even access funding opportunities, for instance, from "local entrepreneurs" or "angel investment" through networks. Different forms of capital can also be sourced through regional systems of innovation, for example, Martin, Aslesen, Grillitsch and Herstad (2018:1) argue that there are several ways in which local businesses and innovators can gain access to global knowledge sources (another form of capital). The authors point to identified knowledge-sourcing channels that include "international R&D collaborations, foreign direct investments, personally embedded relationships, international mobility of skilled labour, virtual communities and online platforms, and the participation in temporary clusters such as fairs, exhibitions, and conferences" Martin, et al (2018:1). This shows that regional innovation networks have an important role to play in ensuring vibrancy at a local level, the sharing of various forms of opportunities and information for successful innovation projects.

Research and Development expertise specifically are at the centre of successful innovation projects. This is evident in Cooke (2002), arguing that the existence of innovation infrastructure makes it easier for innovators and businesses to access or test knowledge relating to their innovations. This was also extended by Broekel (2012) who makes the point that regional innovation systems, or put differently, businesses that are located within or closer to regional innovation systems have better chances of having access to information spillovers, which is beneficial in terms of minimising risks - this is what he refers to as the 'intensity of collaboration'.
Zhou and Xin (2003) argue that multinational corporations (MNCs) are essential for positively affecting the technological dynamics of developing countries. In their view, MNCs carry with them an advantage of capital and vast expertise in such areas, and that the presence of multinational corporations greatly improves the learning capacity of local firms. Interestingly, and in support of this view, Vang and Asheim (2006) also point to Transnational Companies (TNCs) as a critical part of developing systems of innovations in developing countries. Vang and Asheim (2006) argue that RISs in developing countries have more to offer rather than only local linkages inside the geographies of the different RISs. In this view, these regional systems can exploit the opportunities presented by the existence of the TNCs to their advantage, which has the potential of building capacity for innovation and diffusion, and learn from external activities beyond national borders (Vang and Asheim, 2006).

It is also important to show that RISs should also motivate and support the use and importance of indigenous knowledge systems in which rural residents create innovative solutions for social problems. For Padilla, Vang and Chaminade (2008), RIS research in developing nations should focus more on indigenous innovations that emerge outside of traditional knowledge-creating industrial settings such as corporations and universities. Padilla, et al. (2008) state that no RIS studies have been conducted on innovations occurring in the informal economy or rural areas.

These inventions may not become conventionally institutionalised innovations, but they may play key roles in reducing poverty among the poor. Netshiluvhi and Galada (2012) have also raised concerns that a gap exists between the use and incorporation of indigenous knowledge systems into scientific knowledge, further to this, the study shows that indigenous practices have a role to play in mainstream business models and the authors conceptualise this in the context of building regional innovation systems.

As per the concern of this chapter regarding the importance of innovation for propelling regional and national economic development, Fromhold-Eisebith (2007) conducted a study that investigated the importance of and how to link the international, national, and regional innovation systems. The study argues for a way of thinking that cuts spatial bias, but recognises the importance of regional initiatives although critiquing a regional fix. For Fromhold-Eisebith (2007), there is no one size fits all practices that can be deemed as the correct practices, however, taking from scholars such as Nelson (1993), Edquist (1997), and Hotz-Hart (2000), who suggest that innovation systems should be contextualised on the factors of the geographies.

According to Fromhold-Eisebith (2007), the are some questions that are critical when seeking to build effective Regional Systems of Innovation (RIS) that can serve and become interrelated to NSIs and one of these questions is: to which extent and in which way do well-functioning RSI make up a successful NSI?

However, scholars such as Chung (2002) earlier emphasised that the concept of regional innovation systems are correct means by which effective national innovation systems could be generated. Chung (2002) emphasised that the are three important actors in innovation activities at all levels.

These three actors are universities, the public research sector and the private sector. Chung (2002), emphasises that, having evaluated the regional innovation systems of South Korea, he found that there were three categories of regional systems:
- Advanced RIS
- Developing RIS
- Less developed RIS

Chung (2002) precisely discusses what characterises a region with an advanced RIS - a region with an appropriate numbers of innovation actors. This is in line with the findings by Broekel (2012), who found that the intensity of collaboration by actors is a critical element of a successful RIS. In other words, what is important in building successful RISs is to ensure that there are sufficient role players in the ecosystem that can collaborate in the most efficient way to motivate and support innovations using relevant approaches and methods.

For Doloreux and Parto (2005), the region is a locus of innovations. This is because innovation is to some extent a territorial concept that demands some context to respond to contextual issues. He further states for innovations to be successful they are dependent on the agglomeration of industries or networks. Doloreux and Parto (2005) show that literature has demonstrated that local learning processes and spillover effects, cooperative and entrepreneurial mindsets, supporting agencies and organisations, and the existence of consumers and users are all factors to consider when evaluating the innovation activities relating to regional systems of innovation (Asheim, Coenen and Svensson-Henning, 2003; Cooke, 2002; Tödtling and Kaufmann, 2001). Considering the above, it can be stated that building regional innovation systems requires the existence of key role players who should be collaborative, as the degree of their collaboration determines the success or failure of the innovations.

The above discussion has argued that the literature on innovation suggests that for a nation to successfully take advantage of new innovations, the implementation of innovation systems at national and regional levels are a crucial component of this. As stated in the first chapter, this research is interested in understanding the possible economic and developmental benefits innovation may have for the Eastern Cape. As such, the following section of this chapter will discuss the South African national innovation system and its influence at a provincial level.

2.5 SUMMARY

This chapter has presented an overview of the definition of innovation and discussed some theories that inform our understanding of how firms innovate. The chapter has indicated that innovation is understood from a multidisciplinary perspective and that the understanding has progressed throughout the years. Several theories explain innovation processes, ranging from simple and linear models to more complex, interactive models.

The latest theories emphasise the importance of production systems, networking, learning capabilities and institutional set-up in innovation processes. The Innovation Systems Approach, which is the framework that informs South Africa's innovation policies, has several strengths, which include that it is holistic, interdisciplinary, and emphasises learning processes and the role of institutions.

CHAPTER 3

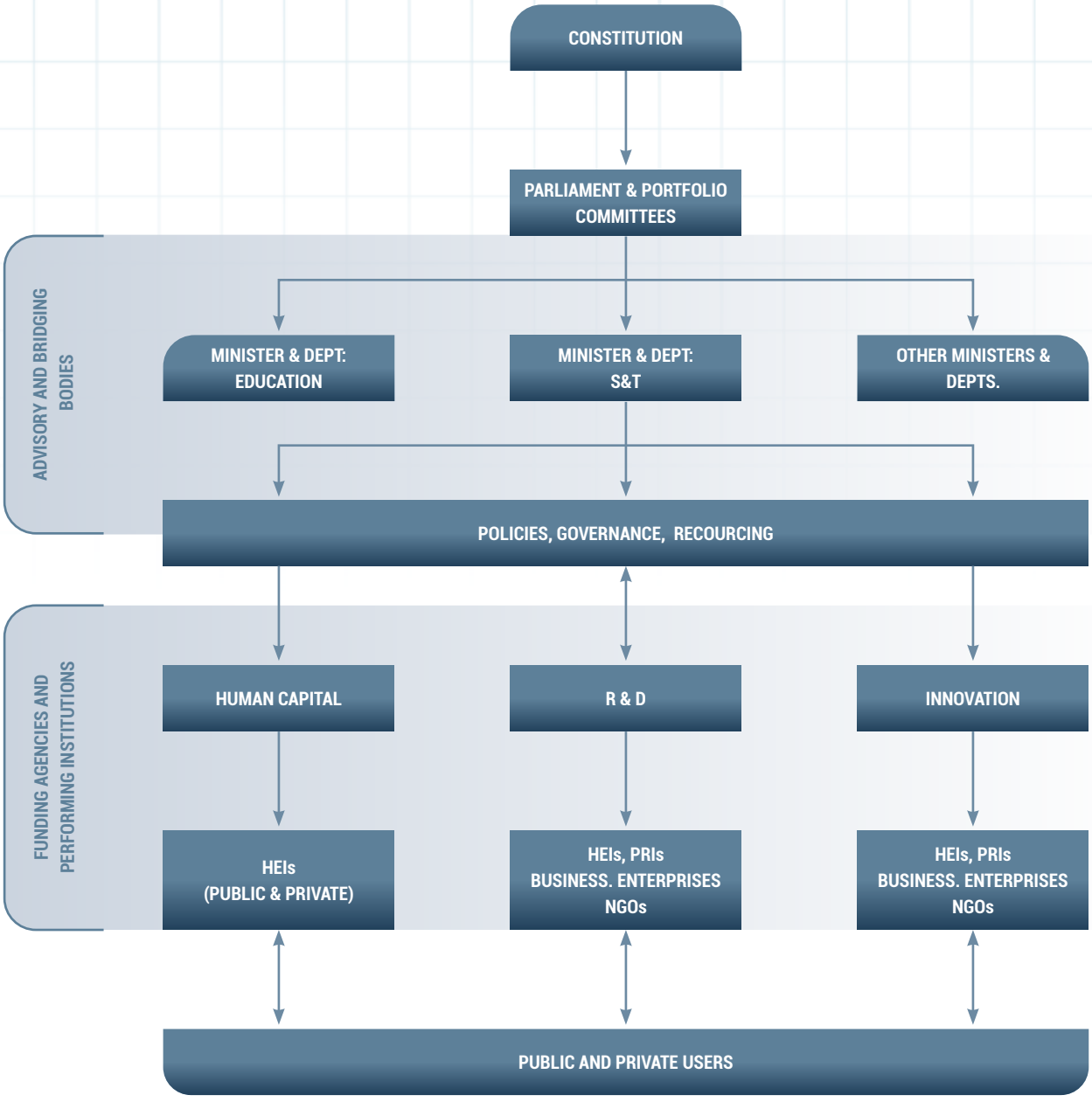
Overview of Innovation Policy

CHAPTER THREE. OVERVIEW OF INNOVATION POLICY LANDSCAPE IN SOUTH AFRICA

3.1 INTRODUCTION

The white paper states that the National System of Innovation is "means by which a country seeks to create, acquire, diffuse, and put into practice new knowledge that will help that country and its people achieve their individual and collective goals". This definition of the NSI established the foundation for a structure that would concentrate on producing and using knowledge for the improvement of the country's social and economic systems by stating the development aim of the nation's science and technology programs.

Since the 1996 White Paper, the South African government has introduced funding agencies, policy frameworks and institutions to help support the innovation agenda at a national level. Furthermore, the increase in the number of higher education institutions and research institutions is a further investment in strengthening the innovation systems of the country. The following image from Naci (2006) provides an overview of the NSI of South Africa.



Source: Naci, 2006

The above image indicates that at a national level, South Africa meets the conventional indicators for an effective NSI system. However, the core focus of this research is understanding innovation within the Eastern Cape province. As such, the following section unpacks the innovation environment at a provincial level.

3.2 NATIONAL LEVEL POLICY LANDSCAPE

White Paper on Science, Technology and Innovation

To analyse relevant national policy initiatives regarding innovation, we must look at the White Paper of Science, Technology and Innovation by DSI in 2019. The White Paper seeks to maximise the considerable potential of STI to help South Africa thrive. The White Paper advocates for policy coherence regarding innovation nationally, the development of human capacity, knowledge expansion, innovation performance, and increasing investments.

Gaps

The White Paper notes that even though significant progress has been made, it makes note that NSI remains too small, and not yet fully transformed and that new governance approaches are required to address aspects such as the fragmentation of STI efforts across the NSI and, lastly, the alignment of the mandate of public research institutions to national priorities.

It additionally notes that the level of collaboration between all NSI actors need to increase. Further, it points to the inclusion of civil society into formal NSI structures and networks.

The White Paper also points to the need to incorporate the STIs in the strategies of lead departments.

Industrial Policy Action Plan

The Plan is aimed at creating and strengthening new entities to serve as innovation, technology transfer and commercialisation support structures.

The Decadal Plan 2021-2031

The Plan was developed to respond to the vision as set out in the White Paper on STI of 2019. The STI priorities as set out in the Decadal Plan are climate change, the circular economy, education for the future, the future of Society, ICTs and smart systems, high-technology industrialisation, nutrition security, water security, health innovation, and sustainable energy.

National Advisory Council on Innovation-Science, Technology and Innovation Annual Report

The report outlines the state of STIs in South Africa in the context of deepening global economic, ecological and social crises. Commissioned by the National Advisory Council on Innovation (NACI), the report looks at investments in Research, Development and Innovation (RDI), STI human resources, innovation in manufacturing, digital competitiveness, and the distribution of Research and Development (R&D) in provinces, among other indicators.

The report compares South Africa's performance with various countries, identifying the relative strengths and weaknesses of the national system of innovation. It also indicates progress in creating conditions conducive to the translation of innovative R&D into useful technologies with a positive impact on the economy, society and the environment.

NACI-Exploration of Community Innovation System: Bridging the Innovation Divide between Formal and Informal Sectors

As an advisory body to the Minister about national matters concerning innovation, including science and technology, NACI conducted a research project which found that even though social innovations do exist in the communities, they were, however, ineffective in uplifting the lives of communities.

This was attributed to a variety of issues such as lack of resources, lack of coordination, and poor understanding of innovation by stakeholders. Secondly, the study found that regional innovation systems do not seem functional. The document emphasises strong coordination to facilitate access to social innovations by poor communities on a provincial level.

3.3 PROVINCIAL LEVEL POLICY LANDSCAPE

The Provincial Development Plan Vision 2030

This vision will be realised through education and training, innovation, and human development. In terms of the PDP, the higher education sector shall be playing a leading role in innovation.

Some key areas which the higher education sector shall focus on include:

- Growing a more relevant and applicable body of knowledge, with collaboration across institutions and other public organisations, instead of fragmented work and research that has limited impact on transformation.
- Producing a new kind of graduate who can better understand, relate to and address the challenges of underdevelopment.
- Developing relevant curricula that infuse, transfer and extend knowledge and innovations into development. Incorporating indigenous knowledge and non-formally accredited experience and expertise into new research and innovation.

Provincial Economic Development Strategy

The strategic framework of the Eastern Cape Provincial Economic Development Strategy (PEDS), illustrated on the next page, is intended to deepen and enhance the economic development component of the Eastern Cape Provincial Development Plan - which is the overarching provincial integrative framework.

The Eastern Cape has six high-growth potential sectors; Agri-Industry, Sustainable Energy, Ocean Economy, Automotive, Light Manufacturing and Tourism. A key element of the PEDS is the strategy's strategic goal which is a "growing, inclusive and equitable economy, which is larger and more efficient, and optimally exploits the competitive advantages of the province, increase employment and reduces inequalities of income and wealth".

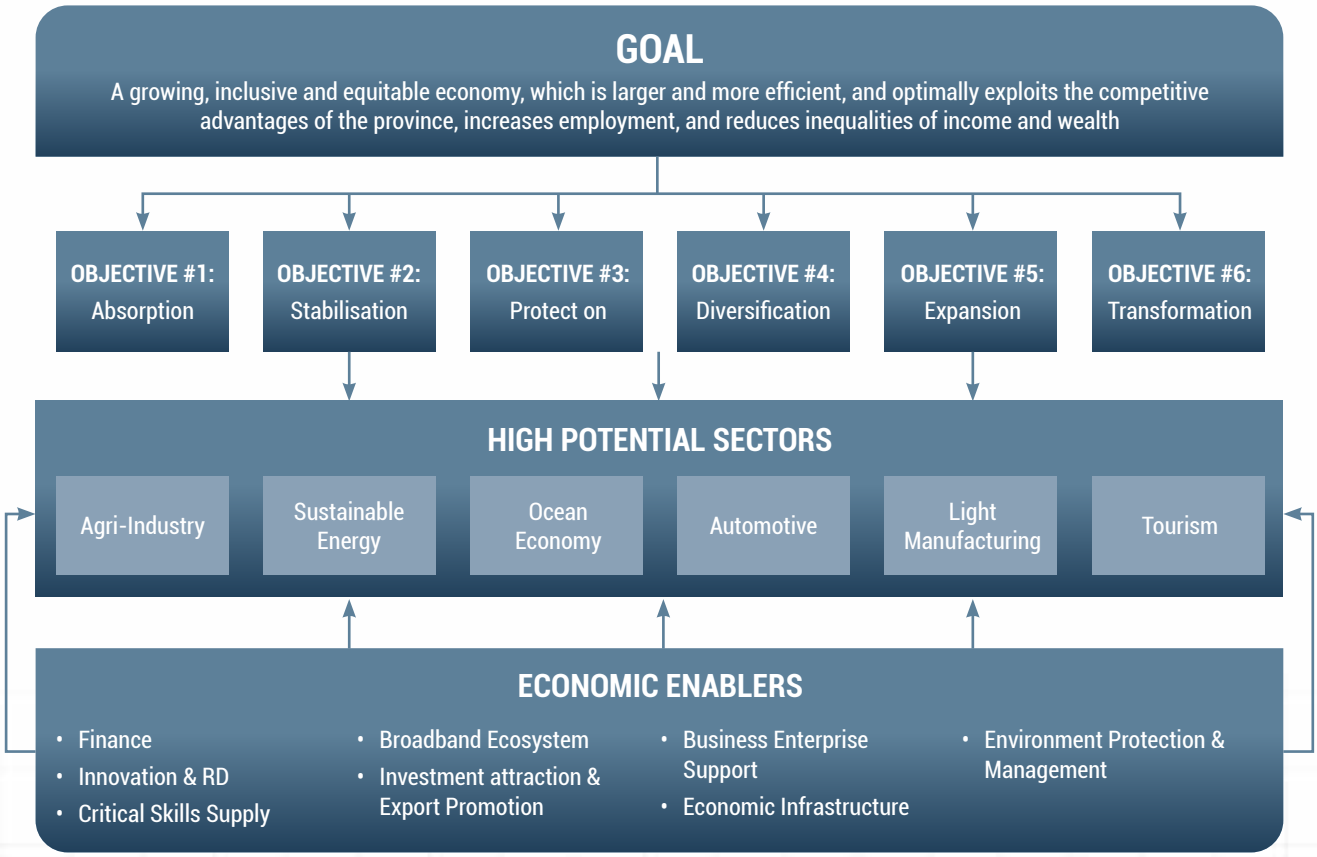


Figure 1: Provincial Economic Development Strategy

This strategic goal is in accordance with the original problem statement set out for PEDS, namely that of poverty, inequality and unemployment, as both a cause and effect of low economic development. The PEDS further contains key principles that are of focus in the economic development of the Eastern Cape: growing, inclusive and equitable economy; competitive advantage; and increase employment.

Eastern Cape Sustainable Energy Strategy

Sustainable Energy is both an economic opportunity and an economic enabler. Sustainable Energy represents a sector with significant opportunities for growth in the Eastern Cape. It forms one of the pillars of the Provincial Sustainable Energy Strategy. The key focus areas of the Department of Economic Development and Environmental Affairs and Tourism (DEDEAT) with respect to the sustainable energy sector are:

- Utility Scale Renewable Energy (wind and solar farms)
- Small Scale Embedded Generation (rooftop solar & small wind)
- High-quality rural electrification through mini-grids
- Liquid Natural Gas to Power
- Shale Gas
- Offshore oil and gas
- Offshore (ship to ship) Bunkering

All the above activities link to industry development, localisation of the value chain and local supplier development (including SMMEs and black industrialists). Below represents a process flow of key interventions that the Eastern Cape can undertake to unlock the opportunities of the Wind Energy Sector.

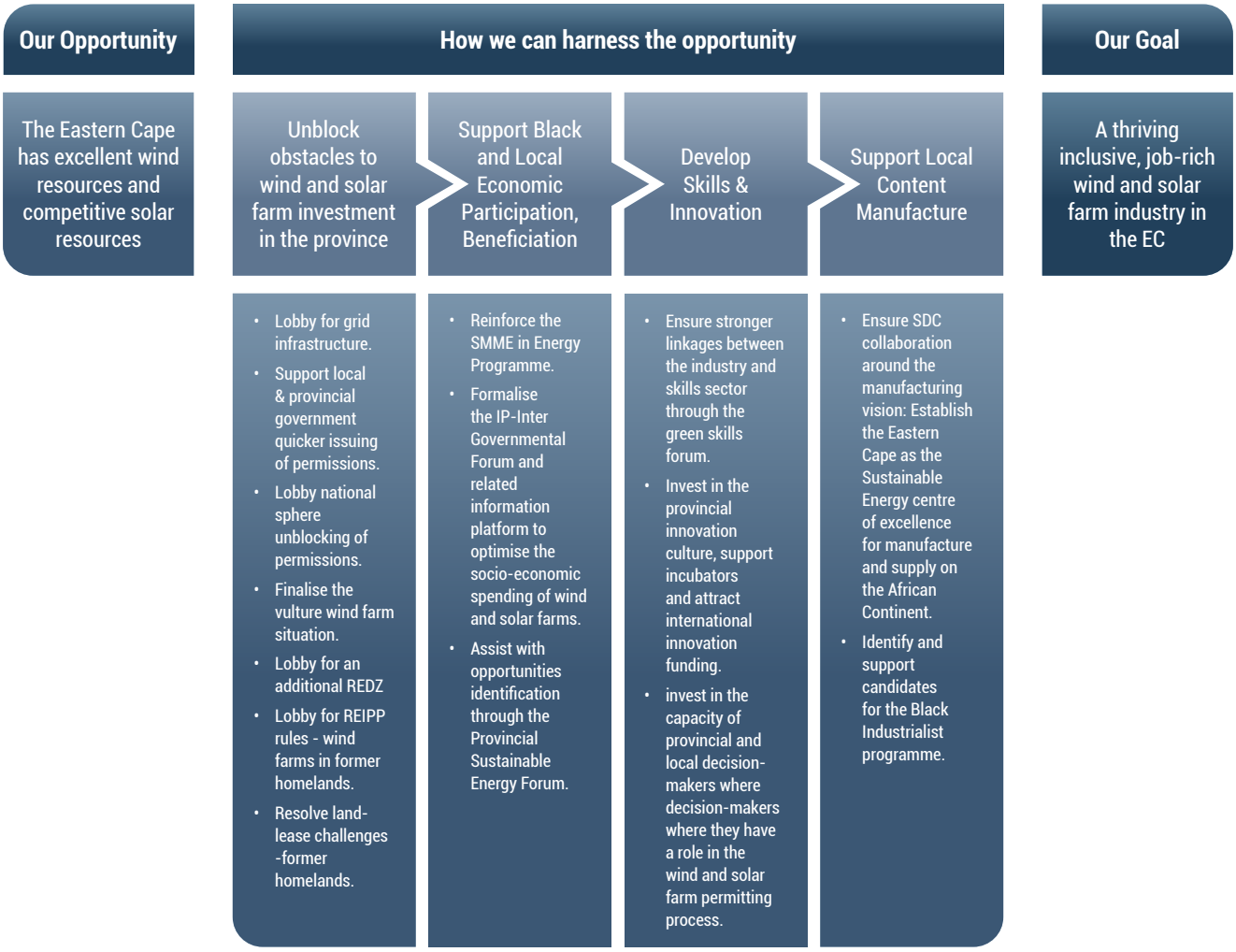


Figure 2: Processing Opportunities in Renewable Sector

Eastern Cape Agriculture Economic Transformation Plan

The Eastern Cape Agricultural Economic Transformation Strategy seeks to enable rural communities, i.e., targeted smallholder/subsistence and communal farmers, to derive optimal economic value out of their agricultural activity through customised government-supported partnerships with organised commercial partners.

These smallholder/communal and commercial partnerships will provide investment to expand agriculturally economic activities, technology capabilities, training, employment opportunities and general growth in the sector.

The strategy advocates for the unlocking of private sector investment through the facilitation of partnerships between smallholder/communal farmers and private partners. It also promotes the public procurement of agricultural produce from primary producers and thereby, stimulating the growth and employment in the sector. This strategy is informed by the following over-arching policy directives.

Outcome 7: Vibrant, equitable, sustainable rural communities contributing towards food security for all.

- Sustainable agrarian reform with a thriving farming sector
- 9–point plan and establishment of Agri-Parks
- Agricultural Policy Action Plan (APAP)
- Industrial policy Action Plan (IPAP)
- Revitalisation of Agricultural and Agro-processing Value Chains (RAAVC)
- The Provincial Medium-Term Strategic Framework (PMTSF)
- Improved food security
- Small producer development and support
- Broad-based black economic empowerment

A crucial element of this strategy is that it is grounded within the context of the provincial economic performance of the sector, which also speaks to the PEDS as one of the key performance high growth sectors.

Provincial ICT Strategy Document 2019 – 2024
Provincial Broadband Master Plan

The provincial broadband master plan, therefore, seeks to provide a framework and guidance to the local Eastern Cape Government in implementing their own broadband plans, provide coherence and coordination across the local governments and also opportunities to leverage provincial efforts to meet their service delivery objectives.

3.4 STRATEGIC REGIONAL INNOVATION INITIATIVES IN THE EASTERN CAPE PROVINCE

Regional Innovation Platform:
The National Department of Science and Technology (DSI) has contracted the Nelson Mandela Metropolitan University to develop a regional innovation forum in the province. According to DSI, the aim is to create provincial and regional innovation systems that will strengthen economic growth through innovation. While the Eastern Cape has four universities and eight TVET colleges, the lack of collaboration between these HEIs further supports the need for a provincial innovation system. The lack of a provincial and regional innovation system in the Eastern Cape is perhaps the reason for the unclear role innovation is said to play in helping recover the provincial economy. Similarly, the various innovation activities that occur in silos without a clear guiding provincial innovation mandate.

OR Tambo Innovation Champions working group ICD4LED:
The OR Tambo Innovation Champions working group, ICD4LED is a Department of Science and Innovation initiative, that is driven by the new National Framework for Local Economic Development: Creating Innovation-Driven Local Economies (CoGTA). The IC4LED is a strategic initiative that seeks to revitalise key aspects of the new National Framework for Local Economic Development (2018-2028), which guides the country towards developing innovation-driven local economies. The new Framework highlights the importance of building and strengthening local systems of innovation to support local economies in order to drive inclusive social and economic development.

Entrepreneurship and Incubation Centres:
The Centre for Entrepreneurship Rapid Incubators (CFERI) is a new phenomenon in scholarship and student development in South African colleges and universities. The CFERI was founded through a partnership between the Department of Small Business Development (DSBD) and the Small Enterprise Development Agency (SEDA). The programme seeks to accelerate the growth and success of entrepreneurial enterprises and allow for a culture of entrepreneurship among graduates.

This is done through several business and technology supports, such as physical space, business infrastructure, coaching, common services, and market access. The CFERI accelerate economic growth, job creation and poverty eradication. Secondly, the CFERI promotes research and development within the business incubation ecosystem. SEDA plays a key role in monitoring the CFERI. In the Eastern Cape, the CFERI are based in Lovedale TVET College, Ikhala TVET College, and Walter Sissulu University. Other SEDA funded incubation programmes are; Chemin Chemicals - which is a chemical industry incubation programme found in both Nelson Mandela Bay Metropolitan and Amatole District Municipality; Furntech Furniture - which is a manufacturing incubator found in Mthatha-OR Tambo District; Seda Construction Incubator (SCI) in Mthatha, East London and Nelson Mandela Bay Metropolitan; iHub ICT incubator in Nelson Mandela Bay Metropolitan; Propella in Nelson Mandela Bay Metropolitan, Seda Alfred Nzo Agro Manufacturing Incubator (SANAMI) found in Mount Ayliff in the Alfred Nzo District; and lastly, Kaya's Culinary Food Incubation Centre in Nelson Mandela Bay Metropolitan.

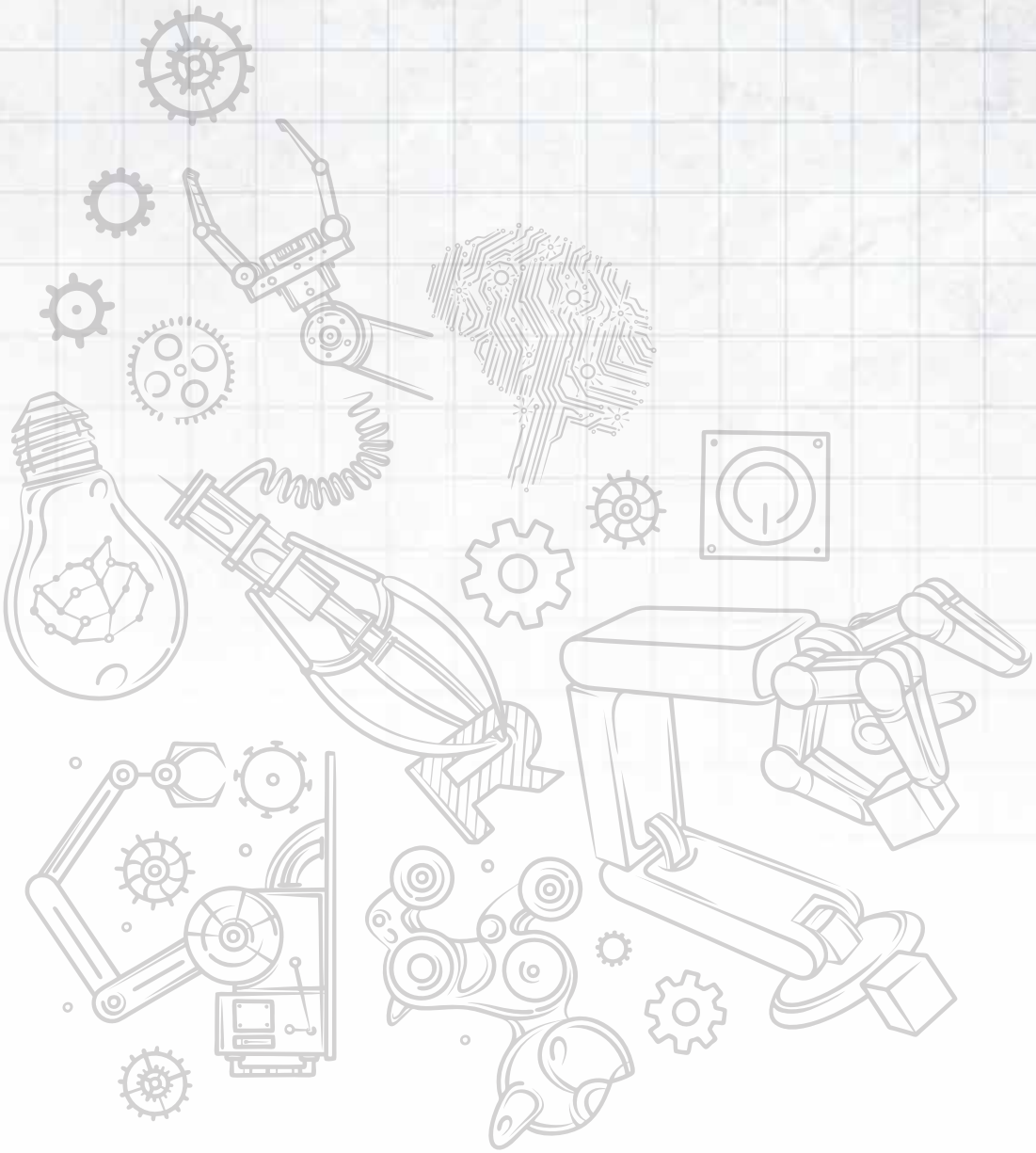
EAST LONDON INDUSTRIAL DEVELOPMENT ZONE SCIENCE AND TECHNOLOGY PARK

Science Centre at Cofimvaba:
There is a Science Centre in Cofimvaba which is part of the Technology for Rural Education and Development (Tech4RED) project. The Tech4RED initiative supports rural learners and teachers to integrate tablets to teach mathematics and science in schools in Cofimvaba in the Nciba district of the Eastern Cape. This is to ensure familiarity with technology and to teach technology skills to young learners. Tech4RED is a partnership between the Department of Science and Innovation (DSI), the Department of Basic Education (DBE), the Eastern Cape Department of Education (ECDoE) and the Department of Rural Development and Land Reform.

Digital Skills Virtual Innovation Hub:
The Hub is meant to develop critical digital skills and build the ICT capability of individuals and small, medium, and micro enterprises (SMMEs).

Liquid SA: established an innovation and digital skills centre in Mthatha. The centre has high-tech classroom learning facilities with high-speed connectivity and will serve as a technology hub where learners and entrepreneurs can equip themselves with the latest and most relevant digital skills.

Development Incentives:
The Support Programme for Industrial Innovation (SPII) is designed to promote technology development in South Africa's industry, through the provision of financial assistance for the development of innovative products and/or processes. SPII is specifically on the development phase, which begins at the conclusion of basic research and ends at the point when a pre-production prototype has been produced.



The DTI initiated the **Incubation Support Programme (ISP)** as a grant to develop incubators into successful enterprises with the potential to revitalise communities and strengthen local and national economies. The ISP encourages partnerships whereby big businesses assist SMMEs with skills transfer, enterprise development, supplier development and marketing opportunities.

3.5 SUMMARY

The chapter provides the policy innovation landscape in South Africa and within the Eastern Cape. In addition, this chapter has provided key strategic initiatives that drive and support innovation in the Eastern Cape Province and various incubation programmes supported by the government.

CHAPTER 4

Research Methodology

CHAPTER FOUR. RESEARCH METHODOLOGY

4.1 INTRODUCTION

The study used a mixed methods approach, applying both qualitative and quantitative methods to collect and analyse the data. The study triangulates three research methods: Key Informant interviews, Focus Group Discussions and a Survey. The study adapted the Local Innovation Advancement Tools (LIAT) - an innovation tool kit developed by the Human Science Research Council to help measure innovation activities in marginalised contexts in South Africa.

To measure the innovation activities of Eastern Cape Businesses, the LIAT tools were amended to fit the research scope of this research study, based on the pilot results. The LIAT approach combines national and internationally comparative innovative indicators, such as those outlined in the Oslo Manual, together with indicators generated by innovators and actors active at the local level, to ensure that locally developed innovations are not ignored and that their relevance to local people as part of their own attempts to improve their socio-economic circumstances are acknowledged and given value.

4.2 STAKEHOLDER ANALYSIS

A stakeholder analysis was done to identify, assess, and prioritise key actors in the Eastern Cape. The initial list of stakeholders was based on the database that exists at ECSECC. The Eastern Cape Socio-Economic Consultative Council (ECSECC) is a multi-stakeholder council that is made up of the provincial government, local government, organised labour, organised business, civil society, and higher education.

Stakeholder engagement is one of the key components of the success of a project. It serves to connect the organisation to its strategy as well as to measure the responsiveness to the needs and concerns of stakeholders. A stakeholder is a person, group or organisation that has an interest in an organisation or its activities; is involved with the work of an organisation or has something to either gain or lose because of its activities and projects.

For a research-based project, the benefits of stakeholder engagements include:

- putting more ideas on the table;
- varied perspectives from all sectors and elements of the affected community;
- gaining buy-in and support for the effort from all stakeholders;
- ensuring fairness to all parties;
- reducing the risk of the project from being blindsided by unforeseen issues;
- identifying opposing views and positions and helping identify common ground or the basis for overcoming such positions;
- creating connections among diverse stakeholder groups that might not otherwise interact;
- increasing the credibility of an organisation; and
- increasing the chances for the success of the effort.

The stakeholder analysis was conducted using the following method:

Step 1: Stakeholder Identification

1. Who stands to benefit from the project?

Step 2: Stakeholder Mapping (Interest and Power Matrix)

1. How will they benefit?
2. Who has an interest in the project?
3. What influence do they have over project activities?

Detailed stakeholder analysis:

Who stands to benefit from the project?

4.3 KEY INFORMANT INTERVIEWS

Interviews were done with purposefully selected 11 key actors, who had knowledge of the general economic and innovation landscape of the Eastern Cape. Purposive sampling was used to select the KII and thereafter, snowballing sampling. The sampling sequence used in this study contributed to the expansion of the sample database from 11 key informants to 34 Key Informant Interviews. This methodology further gave the research team a sense of what is out there in the three sectors of the study, particularly in the two metros of the province.

The introductory meetings were conducted at Nelson Mandela Bay Metro, Buffalo City Metro and King Sabata Dalindyebo Municipality. The purpose of these meetings was to introduce ECSECC, and the research project, and garner participant buy-in from the stakeholders before the piloting phase of the study. The key informant interview participants included Sector Specialists, State-Owned Entity CEOs, University of Research Centre Directors in Technology Transfer Centres and Innovation related faculties, Company CEOs, Directors and/or Managers. Overall, the research team completed 34 Key Informant Interviews and 4 Focus Group Discussion Interviews for all targeted sectors (Renewable Energy, Automotive and Manufacturing, and Agricultural Sector).

Key Informant Interviews were conducted until the saturation point had been reached. The analysis from the KII is what informed the development of the Enterprise Survey that will be presented in Chapter Five of this study. The data was recorded using cell phones and fieldwork notes were gathered.

4.4 FOCUS GROUP DISCUSSIONS

Four Focus Group Discussions (FGD) were conducted by the research team. The FGD participants were grouped according to the selected sectors of the study; Agriculture, Automotive and Manufacturing and Renewable Energy. The first FGD conducted was with the Agricultural Sector, followed by the Renewable Energy Sector and the Automotive and Manufacturing Sector.

The fourth FDG was with the post-schooling sector with included participant in the skills development sector and post-schooling sector, the TVET sector. In the agricultural sector, due to the availability of respondents, two separate FGDs were conducted. The first was with the agri-industry officials and extension officers and the other was with farmers and private sector actors.

4.5 SURVEY

In determining the sample for the survey, the researcher curated a database from the research key informant participants that took part in the study. The master list consisted of all registered companies that work or pay levies to any or are part of the organised business sector or forums in the Eastern Cape.

The list included companies in the scoped sector of the study, Manufacturing and Automotive, Agri-industry and Renewable Energy. A total of 451 enterprises completed the survey.

4.6 DATA ANALYSIS

Thematic analysis was used to analyse qualitative data. The quantitative data from the survey was captured on SPSS and Excel and summarised using descriptive statistics (frequencies and means).

4.7 ETHICAL CONSIDERATIONS

An ethical consent letter was designed and presented to the participant in every interview. Participants were asked to sign to acknowledge approval in participating in the study.
In compliance with the Covid-19 restrictions:

- Face-to-face interviews (where possible)
- Zoom, Teams and Google interviews (Individual and FGD)
- Telephonic interviews
- Site visits (where possible)
- Tape recorders, cameras and notepads

4.8 SUMMARY

The chapter provides the methodology used in this study. The study provides an outline of the research approach used, how the sample was sampled and how data was collected and analysed.

CHAPTER 5

Key factors & their understanding of innovation

CHAPTER FIVE: KEY ACTORS AND THEIR UNDERSTANDING OF INNOVATION

5.1 INTRODUCTION

This chapter presents key findings on the identification of key innovation actors in the Eastern Cape and their understanding of innovation.

5.2 KEY INNOVATION ACTORS IN THE EASTERN CAPE

This sub-section presents results from the stakeholder analysis that was done. The stakeholders that stand to benefit from the project have been divided into primary and secondary stakeholders:

Primary Stakeholders

a. National Government and public entities with a research and innovation mandate and skills development.
b. Eastern Cape Government and its entities (e.g. Coega, ECDC, ECRDA, ECSECC, ECTPA)
c. Education and Training Institutions (both public and private)
d. Industry (companies, start-ups, entrepreneurs, clusters)
e. Eastern Cape Multi-stakeholder grouping or Communities of Practice (HRD Council, HRD research and skills working group, ICT Working Group)
f. Consultancies and Think Tanks
g. Local Government

Secondary Stakeholders

a. Eastern Cape Communities (the unemployed, students, farmers, workers, etc.)
b. Mid-career workers on the factory floor
c. Students choosing careers, parents, teachers, and school governing bodies
d. State-owned Enterprises (SoEs)

Stakeholder Mapping Matrix

CATEGORY	NAME OF STAKEHOLDER	INTEREST IN THE PROJECT	EXTENT OF INFLUENCE	METHOD OF ENGAGEMENT
Government and its Public Entities	National Government departments • DCDT • Dtic • DSI • DHETI	National Gov- provides leadership, an enabling environment and resources. Policy formulation and regulations. Policy custodians.	They are core to the project	Direct Engagement
	Provincial Government Departments • OTP • DRDAR • Dedeat • DoL • Provincial Treasury • CoGTA	Drive and oversee policy, implementation and M&E. The lack of innovative skills and technological skills in the working population of the province affect service delivery, growth and efficiencies.		
SETA'S	• MICT • Agri-SETA • ETDP SETA • merSETA • Chieta SETA • Energy SETA	Facilitates development of industry skills through skills-development levy.	They provide critical funding for training	Direct Engagement
National departments and their entities	DTPS • NEMISA • Usassa • SITA	Custodians and champions of ICT policy and regulatory framework.	As custodians of policy, they provide critical policy leadership	Direct Engagement
	Department of Science and Technology and its entities CSIR, HSRC, TIA, NACI, CeSTIi, MERAKA Institute, SKA	Lead innovation research and other initiatives. Custodians of industry research and development.	High influence	Direct Engagement
	Land, Agriculture and Rural Development Departments and Public Entities • DAFF • DRDAR	Custodians of rural development and land reform policy and regulatory framework.	High Influence	Direct Engagement
	Economic Development Departments • DTI	Drive initiatives on economic development and provide incentives.	High Influence	

CATEGORY	NAME OF STAKEHOLDER	INTEREST IN THE PROJECT	EXTENT OF INFLUENCE	METHOD OF ENGAGEMENT
Education and Training Institutions (both public and private)	TVET Colleges Universities	Ensure skills supply meet skills demand (curriculum and skills alignment) Funding of initiatives.	High influence	Invitation to participate in project workshops. TVET focus groups. HEI Direct engagement
Industry (companies, start-ups, entrepreneurs, clusters)	Industry clusters: - EC automotive cluster - EC Non-Automotive Cluster - EC Tooling Cluster - Agro-industry forum - Renewable Energy Associations - Industry key informants - Automotive and Non-Automotive Manufacturing Industry key informants in Agro-Industry - Industry key informants - in Renewable Energy	Demand for innovative and digital skills come from this sector. Interest in influencing skills supply side alignment.	They are core to the project	Cluster focus groups Key informant Interviews Individual in-depth interviews
Eastern Cape Multi-stakeholder grouping or Communities of Practice (HRD)	- Provincial Skills Forum - Provincial Human Resource Development Council (Skills for Economy Working Group) - Provincial Human Resource Development Council	Drive skills and HRD strategy and planning for the EC. Ensure demand and supply alignment.	High influence	Presentation to forum
Eastern Cape Multi-stakeholder grouping or Communities of Practice (ICT)	- Provincial ICT Steering Committee	Drive ICT strategy, policy and planning for the EC.	Medium influence	Presentation to forum
Consultancies and Think Tanks	- HSRC-CeSTli - CSIR - NACI - TIA	Conduct research and provide policy advice. Well networked stakeholders.	Low influence	
Local Government			Low influence. Not focused of this project	

5.3 UNDERSTANDING OF INNOVATION AMONG INNOVATION ACTORS

The first thematic area addressed in this study is: How is innovation understood by the Eastern Cape business sector? This objective is addressed using mainly Key Informant Interviews and Focus Group Discussions.

The following questions were asked:

1. What is your understanding of innovation?
2. What are the major innovation developments in the sector?
3. What is the impact of the innovation on the sector or your company?
4. What are the enablers of innovation in your sector or company?
5. What are the challenges of innovation in your sector or company?
6. What are the policies and grant schemes available to drive innovation in your sector or company? Do you know of any?

The thematic analysis of the discussions with key informants and participants in focus groups discussions indicated the following sub-themes:

1. Innovation is understood as related to ICT, Science, Engineering and Technology.

The analysis indicates that innovation is generally associated with and understood to be related to ICT, Science, Engineering and Technology. According to one respondent:

"The output indicator of measurement for an innovation is the end product and the research attached to that end product. All of our innovations are grounded on research and development and tech-solutions as the end results".

Another respondent:

"For us as a company, the outcome of the convergence of various technologies is highly beneficial. Some available innovations that were considered previously separate have now converged, thanks to the Fourth Industrial Revolution. Technologies such as Artificial Intelligence, the Internet of Things, 3D printing and cloud computing are key for us."

In the Eastern Cape, policy landscape strategies that are considered to drive innovation are embedded ICT, Science, Engineering, and Technology assumptions to innovation, i.e., Provincial ICT strategy, Broadband strategy, and the Green Economy strategy, to name a few. Social and Indigenous knowledge systems on innovation are not considered key indicators of innovation activities in the Eastern Cape Business Sector, particularly the neglect in considering the potential economic value in naturing these innovations. Funding schemes and grant applications are also silent on innovations outside of the assumed ICT, Science, Engineering and Technology related innovations. Sector priority in the Eastern Cape also considers innovation as embedded in ICT, Science, Engineering and Technology. This narrow understanding of innovation possibly limits investments on non-technological innovations, which are just as important in improving firm performance.

This is also in line with the assumptions of the South African National Systems of Innovation. A review of innovation in Local Economic Development strategies within some local municipalities in the Eastern Cape indicated minimal to no reflection or priority towards innovation in their strategic plans (HSRC 2020). At a national level, innovation funding opportunities are predominantly also ranked within ICT, Science, Engineering and Technology.

In appreciation of the work done by the HSRC in understanding the innovation orientation of local municipalities in the Karoo, the study runs an evaluation of various LED strategies, an Integrated Development Plan and a Spatial Development Framework. The objective of the content analysis was to understand the extent to which municipalities, as key local innovation brokers, prioritise innovation in LED interventions. The findings indicated that most of local municipalities' LED strategies are at level 0, indicating that these have little to no mention of innovation or related concepts in the municipal documents.

Table: Innovation Orientation

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3
Little or No Innovation Awareness	***Innovation Awareness***	***Innovation Prioritisation***	***Innovation Entrenchment***
Little or no mention of innovation or related concepts in municipal documents. Importance of innovation in LED not acknowledged in the municipal documents.	Mention and evidence of awareness of innovation in the municipal documents. Importance of innovation in LED acknowledged. However, there is little or no prioritisation of innovation when resources are allocated for LED.	Innovation is clearly defined, mentioned frequently, and its importance in LED emphasised. Documents show understanding and prioritisation of innovation driven LED in resource allocation.	Innovation's importance in LED emphasised, and innovation principles are entrenched in the municipal's LED interventions. Resource allocation for LED is informed by innovation and there are incentives for innovation.

Source: Sinyolo et al (2020)

Most of the municipalities that were sampled in the HSRC study scored between 0 to 1 on the scale. In the post Covid-19 realities, the study saw numerous social innovations. In most cases, these innovations were driven by the very definition of social innovation - innovative activities and services that are motivated by the goal of meeting a social need. An example of this is the organic oil extraction projects to produce cosmetic products that the research team interviewed in Mthatha. The need to participate in this industry, according to the respondent, was to promote the use of indigenous plants for health and beauty products.

The business started off by promoting and selling locally within the community. But, over time the respondent has further invested in product research and business development to expand the business. She is unemployed, but, through the business is able to make a living for herself and her children. Another example of social innovation in the Eastern Cape is in food waste management. Where organic fertiliser and biomass (methane gas) are made using everyday food waste material found at home.

Barriers to innovation for enterprises in the Eastern Cape

Three sub-themes emerged when the qualitative data was analysed from both KII and FDG on the barriers to innovation amongst enterprises in the selected sectors. The first insight was on the financial and non-financial cost to innovation, the second was knowledge and skills factors affecting an enterprise's ability to innovation and third was unemployment rate in the province as a barrier to innovation.

One emerging theme that was consistent throughout the sectors, involved business innovation costs and the cost of labour. One of the major factors that encourage businesses to innovate is the hike in labour costs. New technologies such as automation are a viable option when their cost is less than the labour required.

Furthermore, while the 4IR brings with it new occupations, the South African economy, according to the initial data, is too small for businesses in these sectors to adopt or introduce big innovations and fully automate. Currently, businesses have adopted blended production floors, in other words, certain production functions have been automated while others remain the same. The study saw this in the automotive sector of Gqeberha.

According to one respondent ***"new technology, specialised skills, and shifts in the business' identity can be an extremely expensive process and time-consuming. The amount of time taken to invest in innovation processes can sometimes be better spent on other business operations. Sometimes the financial risk to innovation is extremely costly, especially considering it is not a guaranteed venture."***

"For me as an SMME that risk is too high. Yes, I acknowledge the "said value" of technology and its possible benefit but the risk to too high. Without government support, at SMME level, this risk is too high. This is our bread and butter."

Another respondent indicated that:

"Investing in innovative ideas can be extremely exciting and expensive. In the renewable energy space, our focus is going green as much as possible. That solution on its own is expensive and highly research and technology dependent. That then means for me to be relevant and sustainable my employee profile needs to be highly specialised. The cost of that labour is expensive. We receive bear minimum support from the government. Let alone government support for innovation support. Our solution for business growth is bank loans."

This view was common in the automotive, manufacturing and renewable energy sector. In the agricultural sector, the opposite was found. Farmers invested in innovation because the cost of innovation versus the cost of labour is less. A respondent in the agricultural sector indicated that:

"The government increase in labour wages by 16% has motivated me to innovate. I bought a machine, the Oxbo 3220, that has helped cut the harvesting labour costs. I employ seasonal workers of between 250-300 on my farm and right now with the wage increases that machine has helped me stay afloat in my business. Less wastage, double the job done in less time."

However, the lack of skills in the agricultural sector remains an issue. The technical, engineering and operational skills for farming are still lacking in the sector, and mostly in emerging farmers. According to the 2021 NEDLAC report, occupations such as pesticide handlers and applicators, payroll and timekeeping clerks, purchasing agents, product representatives, and drying and cooling equipment operators are occupations that are at a decrease in need due to innovation and digital transformation - both nationally and globally. Occupations that are becoming increasingly in demand are IoT managers, agronomists, horticulturist, drone operators, vertical framing specialists, nutrigenetics advisors, animal biosciencetists, hydrologists and precisions agriculture technologies.

According to one respondent in the agricultural sector:

"The world is changing each and every day. Consumer needs are becoming increasingly driven by health and knowledge needs. We are in a world that is knowledge and data-driven. Consumers want to know how their food is processed from organic and non-organic products and how much chemical derivatives are in their food. The old ways of ploughing and quality assurance methods are done for. People want transparency in farming and food production. Today we have identification stickers on our food that inform consumers where all food processing and production of that specific product was done. The changing needs of consumers and the knowledge and skills requirements in the sector are changing the occupational look in our sectors."

In some instances, participants also referred to lack of credit and private equity as barriers to adopting and adapting to innovative solutions in their enterprises. This was most common in the agricultural and manufacturing sector. Historical factors were cited timeously by participants as barriers to financial assistance from banks through loans. Innovation constraints can lead to decisions not to innovate, which may have long-term impacts on the competitiveness of businesses. Moving forward, understanding the business sector's perceptions of the barriers to innovation provides essential evidence to promote innovation and identify policy gaps in economic development.

The business mortality rate was cited as being high amongst enterprises in rural and marginalised areas. According to sector specialists, businesses in their first three years of registration have a higher likelihood of being unsuccessful and closing. This can be attributed to financial and non-financial lack of support. Businesses close to the economic hub are likely to survive and innovate. The lack of business service support such as business hubs and innovation hubs are a barrier to innovation. Non-financial business development, strengthening and financial access improvement is an ongoing support structure needed for businesses and innovators to survive their first three years. The innovative capabilities of an enterprise also depend on the survival of the enterprise.

2. People-centered approach to business innovation

Lastly, another emerging sub-theme has been the people-centred approach to business innovation where new technologies, such as automation and digital technologies, are introduced to assist the workers and not replace them. One business argued that:

"In South Africa, there is no shortage of labour both in the immediate and medium-long term, unlike Europe. Therefore, it is counter-productive to replace humans with machines."

However, the extent to which this is true for most players in the sector remains to be confirmed by the study. Entry-level skills occupations are in abundance in the South African labour market. What has been proven to be of shortage in the country and in the Eastern Cape is the skilled labour market.

Unemployment and skills shortages in the Eastern Cape remains rife. Enterprise growth and competitiveness are embedded in innovation, sustainability and filling the market gap. In the Eastern Cape business sector, it could be assumed based on this data, that the business sector is cognisant of the high unemployment rate of the province and that this awareness influences an enterprise's ability to innovate.

5.4 HOW ARE ENTERPRISES INNOVATING IN THE EASTERN CAPE?

5.4.1 RENEWABLE ENERGY

The renewable energy sector in the Eastern Cape is fast becoming one to be reckoned with. The provincial government continues to commit investment in this sector as it has promising potential in wind, solar energy, and Nitrogen gas. During the data collection, three wind farms were approached, however, only two were successfully interviewed. The interviews were held at one farm and an office located in the community. The scope of the research study falls onto the Socio-Economic Development (SED) desk of these wind farms.

According to formal engagements with a government key informant, there are fourteen wind farms currently in Eastern Cape and one solar farm. In addition, there is a small grid project that uses solar energy currently being piloted successfully in the province.

The research team engaged with several role players and stakeholders in the sector - both from the private and public sectors. A preliminary insight this study found was that the wind farms are owned by parent companies who may have more than one wind farm in the province.

Furthermore, the parent companies outsource the function of running the technical aspects of the wind farms to specialist engineering companies that are in charge of the day-to-day maintenance of the farms, but are based outside of the province. Further indicating that the Eastern Cape business sector has a gap within this market.

Research team at Humansdorp Wind Farm SED Office.

Kouga Wind Farm, opened in 2015 in Kouga.

Data Collection Challenges

The main challenge with data collection in this sector is access to the farms because the mother companies are not based in the province. In cases where there is no on-site SED office, it is difficult to successfully locate the relevant person to speak to. Time is another challenge because emails may only be answered after a long time, after which certain protocols need to be followed. Lastly, the farms are located on the outskirts and travel can be challenging given the conditions of the roads. Low-ground clearance vehicles tend to struggle, which impacts travel time and the number of farms that can be visited in one day.

Opportunities

The introductory meetings showed that the sector is willing and looking for opportunities for collaboration. The Coastal Six, which refers to six wind farms around Tsitsikamma-Hankey, is a platform open to ECSECC for further engagements and exploration of possibilities. Another promising opportunity is located at the DEDEAT, which has expressed interest for ECSECC to spearhead the Green Skills Forum for the province.

Automotive and Manufacturing

The automotive and manufacturing sector is mainly concentrated in the two largest cities in the province - East London and Gqeberha. Phase one of the data collection started in Gqeberha targeting the Coega IDZ and the Nelson Mandela Bay in general. The first qualitative interview was with Automotive Industry Development Centre (AIDC).

Automotive Industry Development Centre (AIDC) falls under the skills development of our master sample. It is a state-owned entity that provides skills training to employees in the industry, also working with several TVET colleges in the province through support in developing their curriculum and equipping employees with skills, as well as a bridging point for students from school to industry.

The second interview was with Mahle Behr, a German automotive component manufacturer based in Stuttgart - Germany, with offices in Gqeberha and Durban, and is one of the largest automotive suppliers worldwide. Their Research and Development (R&D) office is situated in Germany, as they argue that in South Africa it is more costly to innovate. Therefore, they are people-centred, meaning they hire people to do the work rather than automate. Secondly, they do not promote big innovation in South Africa because according to them, economies of scale are thin here.

The third interview was with Coega-IDZ, which has automotive and manufacturing tenants on its premises and is willing to link us to their tenants to assist with our survey. They have also recommended other stakeholders that can contribute to our study, such as Jendamark Automation. The last interview was with Jendamark, who took us through their turnkey production solutions as well as their core manufacturing focus areas of powertrain and catalytic converter assembly systems. In addition, they run various programmes such as the apprenticeship, which focuses on training and developing young artisans in partnership with MerSETA's and Higher Institutions. They further stated that the Covid-19 pandemic forced them to develop ODIN Health applications, which is meant for screening, and they had to change their systems design to best fit the present situation.

a) **Challenges**

   A major barrier that we encountered was the issue of accessibility, whereby we were not able to get hold of most of the stakeholders. Some did not pick up our calls and never responded to our emails. We, therefore, ended up opting for door-to-door visits and we were able to develop our database as we went through snowball sampling.

b) **Opportunities**

   AIDC proposed a partnership with ECSECC whereby they want to launch and implement a policy framework that advocates for TVET colleges so that their students are employable right after they graduate. AIDC is of the view that TVET colleges are not taken seriously as they are looked down upon compared to other institutions of higher learning. Lastly, Jendamark is interested in working with ECSECC and linkages with relevant stakeholders for business partnerships.

5.4.2 AGRICULTURE

The Eastern Cape is the second largest province (after the Northern Cape) and accounts for 9.7% of South Africa's agricultural production (Sihlobo, 2019). It has the third largest share of the country's commercial agricultural land (37,1%) (Stats SA, 2020). The Agricultural industry is scattered throughout the whole of Eastern Cape. The first area that was visited to achieve the objectives of the study was Gqeberha.

The first focus group discussion was with Agri-EC. Agri-EC is seen as the voice of the farmers as it represents more than 3000 farmers/members within the whole of the Eastern Cape. Their vision is to develop and grow the agricultural Industry as a sustainable economic sector by promoting agricultural business interests and providing value-added services to its members. Every year they hold a road show where they visit farmers all over the province. However, during 2020, due to the Covid-19 pandemic, the roadshow was done virtually where a maximum of 100 farmers attended.

Given the fact that farmers are said to be unskilled when it comes to technology, the total number of farmers that attended the roadshow was seen as a success for a first-time virtual roadshow. The farmers that attended were both commercial and smallholder farmers. The officials at Agri-EC offered to assist in circulating the letter, requesting farmers (smallholder/emerging farmers and commercial farmers) to form part of the respondents.

AgriSETA creates and promotes opportunities for social, economic and employment growth for agri-enterprises through relevant, quality and accessible education, training and development in both primary and secondary agriculture, in conjunction with other stakeholders in agriculture. Due to technical issues from ECSECC, Agri-Seta could not share their information with the research team. Through referrals from the Hankey Municipality Administrator/ Clerk. The second face-to-face interview was with the Hankey Citrus Packers - a citrus farm and citrus packing company that is competing commercially within the agricultural industry. The Hankey Citrus Packers sell their produce locally, however, much of their produce is exported.

They give back to the community by employing seasonal citrus pickers every year. The Hankey Citrus Packers shared a very interesting point as they stated that in the agricultural sector, digital transformation is seen as a way of replacing labour. Most commercial farmers opt for digitalisation not because of innovation but because of expensive labour costs.

The third interview was with Coega-IDZ, that leases out space for agro-processing tenants. They were more than willing to assist us with the contact details of their tenants who participate in agro-processing.

Meeting with Inxuba Yethemba local municipality farmers association.

a) Challenges

During the study, several challenges were encountered. First, at a desk-top level where stakeholders did not pick up our calls and when they did, they would complain about the "private number" that we used to call them. Securing meetings was also an issue, as most companies were preparing for the new financial year. Some stakeholders did not honour the virtual meetings after agreeing to partake in the study.

At Agri-EC, while the focus group discussion was happening with Agri-EC and Agri-Seta, there were connectivity issues. Agri-Seta, as well as the team from ECSECC that was connecting virtually, had to log off the interview without participating. The ECSECC team planned to interview Agri-Seta separately, however, they have not managed to secure a meeting after the network issue at the first virtual meeting.

b) Opportunities

The ARC proposed a partnership with the ECSECC for this project with the possibility of article publications, sharing of the farmers' database, assisting ECSECC with the development of the data collection tools and giving ECSECC access to the training facilities under ARC.

Phase one of the data collection has provided insights to further strengthen the qualitative instrument and further develop the survey instrument. The emerging themes have enabled the research team to approach subsequent themes with better precision and analytic foresight. The challenges presented in this report are lessons for the following phases of data collection to ensure scientific rigour and successful data collection.

This report has displayed initial evidence and ideas on the study and serves to account for the time and resources used in and around the two weeks of this phase of data collection. The imminent collaboration with the said industry players in this study will not only enrich it but deepen this body of work.

5.4.3 MANUFACTURING

Automotive company in Gqeberha.

5.5 SUMMARY

Butterworth, eNgcobo & Eliot

In all three of these towns, there is a presence of both formal and informal automotive markets. The formal automotive markets are local petrol filling stations and automotive component distributors. However, the informal sector was more dominant and occupied with what was considered the "industrial area". The formal automotive businesses were survivalist in nature and had between 5-8 employees at most. Furthermore, the formal automotive market in these towns were characterised by three/four fuel stations.

These firms were a part of larger organisations, so any changes or innovations came from the top. Interestingly, new ideas like the introduction of an app, were difficult to implement in the towns because of issues around network connectivity and electricity. Furthermore, a dominant theme amongst some employers was the educational level of their employees provided little to no room for them to introduce complicated systems/methods of production.

Mthatha

The sectors present here are predominantly manufacturing, automotive and agriculture. The automotive industry follows similar trends as those in smaller towns. Companies are part of larger groups, as such, they have little to no room to innovate and/or divert from the specified manner of doing things. The manufacturing industry in this town is growing with the presence of a few innovators.

The key trend amongst the identified manufacturing innovators was the combination of skills (training), and using local assets to create/improve products and services offered. While the identified innovators have not penetrated markets outside of their district, they do have the potential to do so.

The agriculture sector is characterised by the presence of both commercial and small-scale farming. The goal of government institutions like Ntinga and Kei Fresh have been to support small-scale farmers to move up the value chain and occupy higher nodes of the value chain. Introducing farmers to new seedlings and providing them with farming technologies have allowed some farmers to increase their productivity.

Food waster project: Vermiculture

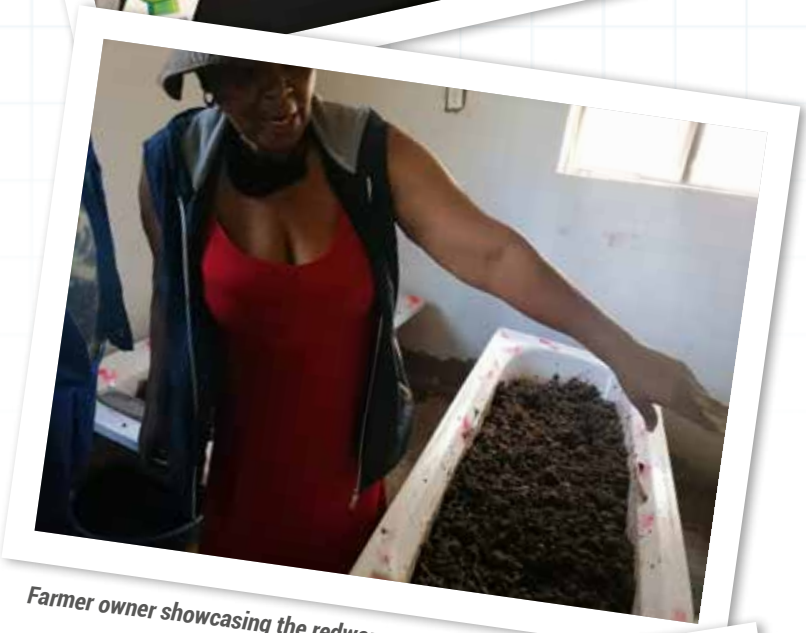
The research team attended a Circular Economy Conference in Mthatha, where several food waste management projects were presented. One of the projects that stood out was the Vermiculture project.

The idea behind warm farming is to turn organic waste (kitchen scraps), into organic fertiliser farming. This business is twofold, one with the Bokashi bucket, where kitchen food waste is deposited and allowed to ferment creating a highly concentrated methane liquid.

The fertiliser industry uses natural gas, of which about 95% is methane. It is used as both a fuel and as a main ingredient for ammonia and urea products, which farmers buy for their fields. The second stream of this business is worm farming, which also produces liquid fertiliser, vermicompost and worm harvest.

Innovations:

- Organic liquid fertilizer
- Vermicompost
- Worm Harvesting



Farmer owner showcasing the redworms.

Methane Liquid Fertiliser produced in Mthatha.

Ludada and Associates

The idea behind the company comes from the need to serve rural areas where people with a disability live - a clear example of social innovation. According to the company owner, ***"The underlying problem was that technologies that were created to help were general in application. Currently, South Africa has one uniform technological approach to helping people with disability."***

The owner saw the need to contextualise technology to fit the situational context of an individual. In other words, prosthetics products that are able to serve to help individuals living in rural areas to function optimally. Innovations: using 3D printing to produce more affordable products; manufacturing green products (using local resources like clay to replace imported materials).

Ludada and Associates in Mthatha Main Branch.

Mthatha, Maclear, Ugie

These towns can largely be categorised within an agrarian economic context. There was a lot of engagement by emerging farmers in the market and there are significant insights that emerged from the ground which are working towards ensuring that emerging farmers can sell their goods straight to the retail outlets. Emerging farmers are also learning about advancements in seedling technology, which gives them a competitive advantage in the market.

Process and product innovation is occurring in places where emerging farmers are striving to access the market, as well as in other locations where other innovators are engaging in the informal manufacture of organic items, such as cosmetics and the production of chem-care cleaning material. Additionally, in Maclear and Ugie, there was also a deep emphasis on incubation to assist other emerging farmers to enter the agricultural industry. Crop diversity practices, which include intercropping and complex multi-year crop rotations were also evident in most farms.

SIGNIFICANT PROJECTS:

1. Rocky Park Farm

Rocky Park Farm is an agricultural farm that has managed to enter higher modes of the value chain by using modern technologies, as well as investing in skills development. The farm has over 1500 hectares of land, where a section is dedicated to testing out new seeds and testing which fertilisers work best in terms of produce. Beyond producing, the farm also processes and stores its products, in so doing, allowing them to store produce and only sell when demand is high.

2. Bulelwa Bam

Bulelwa Bam is a manufacturer of organic cosmetic products.

She started the project in October 2021 and produces these products at her home. Due to the growing knowledge and consciousness towards organic products, she investigated what she could extract from medicinal plants and create organic cosmetic products. She uses a Glasschem to extract the oils from the plants, instead of what is done in the commercial industry that uses certain chemicals, her process is purely organic.

During the research field trip, the participant showcased how she was able to extract oil from spinach as an illustration to the research team, as seen in the picture on the left. This process took less than 20 minutes and she was able to extract 3ml of oil from three spinach leaves. At the time of the fieldwork, she was offering organic products from Tea Tree, Lemongrass, Cannabis Oil, and a few blended natural products. Her main value proposition is 100% organic cosmetic products, locally produced and sold. At the time of the fieldwork, her only market was the local market and she had not yet moved into the big market stores, such as Clicks, Spar, Pick 'n Pay, Just On and Dischem. However, collaborations were on the way and her hope is to get Unilever as a partner.

3. Amina Chem

Amina Chem was established in 2012 and its market is largely government entities. They develop, manufacture and distribute cleaning products. The company creates cleaning chemicals to the specification of the client. The company is situated in Mthatha and employs 31 individuals and has additionally employed interns from the YES (Youth Empowerment Services) Presidential Initiative.

4. Mount Elton

This is a farming company in the Elundini Municipality. They have four portions of land in the municipality, which is more than 500 hectares of land. The company currently produces maize, A-Grade potatoes, and other vegetables, and they also conduct livestock farming. They assist emerging farmers as well as perform a process of incubation and development in the area. They employ over 15 employees and have additional workers during harvest seasons.

Mount Fletcher, Matatiele, Maclear

Mount Fletcher had an informal automotive company which concentrated on rebuilding obsolete model vehicles. There were also activities of an established and formal timber industry at Maclear. Matatiele had a thriving market for farming and retail. There are also a lot of commercial linkages between Lesotho and Matatiele, which have not been formalised.

There are significant scale exchanges between Lesotho and Matatiele for livestock. The renewable energy sector was still in the basic stages and there were policy issues that were being attended to in consultation with communities and traditional leaders. The automotive industry in Matatiele was mostly informal and appeared to be retail and auto parts outlets, which were also in the lowest section of the value chain.

SIGNIFICANT PROJECTS:

1.Lereku Trading

Lereku Trading is a small company in Elundini Municipality that purchases old model cars, revamps them and rents them out to weddings and other prestigious ceremonies. Lereku Trading has also been a site for tourist attractions and has received a positive reaction from the municipality, however, they need financial assistance. The company is a labour-intensive company that has the potential to create employment. They have been approached by some TVET colleges for placement of engineering students, but they are unable to do this since they have no workshop.

2. Grain.co

Matatiele Grainco offers agricultural services to farmers in the district to help them keep up with global standards. The following services are offered by the organisation:

1. Agricultural Mechanisation Services: Ripping, Ploughing, Discing, Planting, Spraying and Lime/Fertiliser spreading.
2. Transporting Agricultural Products throughout South Africa as per customer needs.

Matatiele Multi Sectorial Secondary Co-op

- Manufacturing - textile and furniture
- Agriculture - Maize (yellow and white)
- Skills rehabilitation centre
- Innovations - irrigation systems
- Extraction of oil from maize
- Revive railways

Challenges:

1. Tunnels are necessary to store produce.
2. Processing equipment to ensure local raw materials are processed locally.

Gqeberha

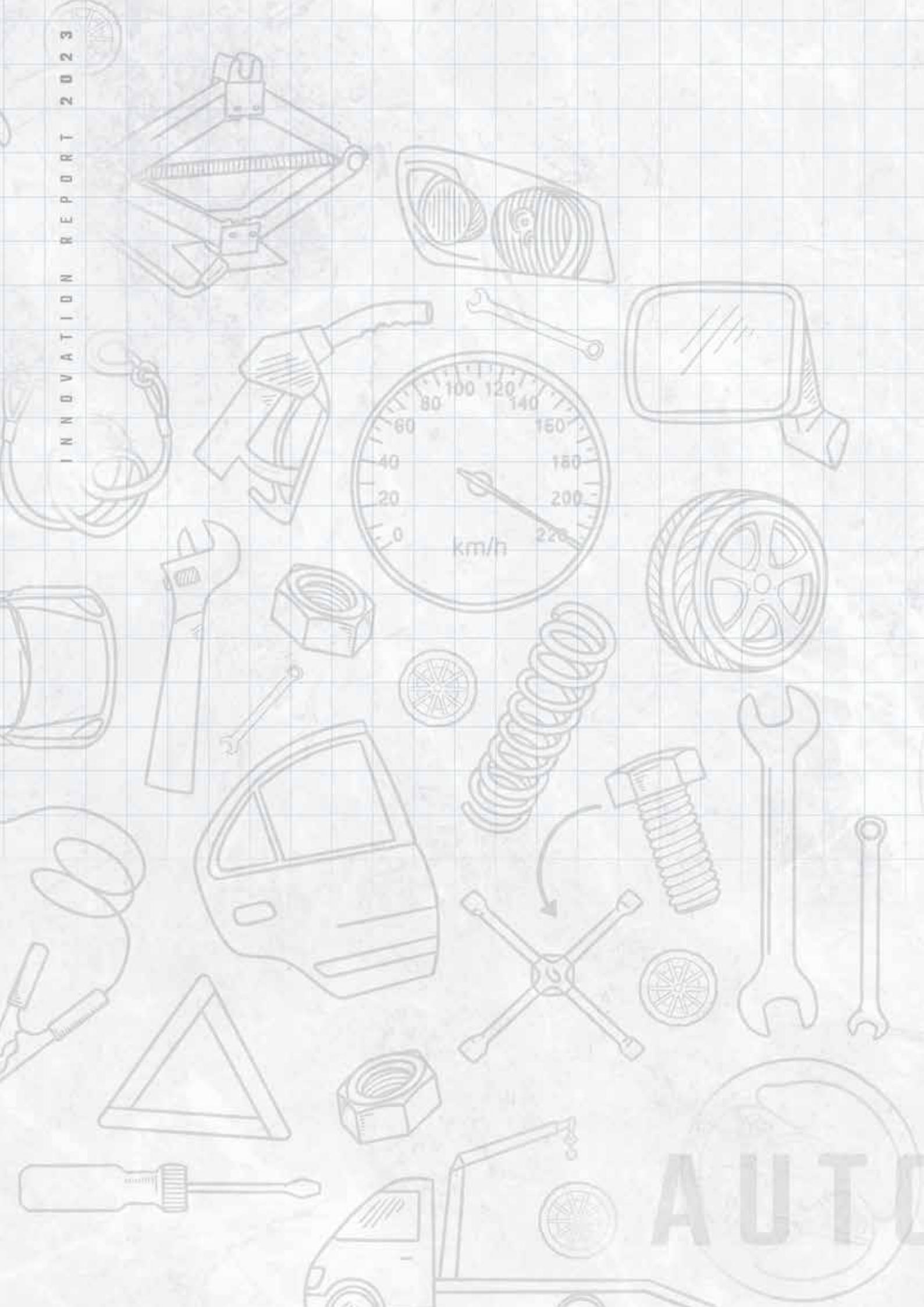
In Gqeberha, there was a thriving tech-innovation ecosystem. Additionally, there was a collaboration between many businesses within the innovation space, including the university. Gqeberha's innovation space was high-tech and more automotive-oriented. There was a centre for engineering and an innovation hub (where most of the innovators were housed and incubated).

Nelson Mandela University also housed an initiative called eNtsha, which served as a prototype, design, and material testing centre. Additionally, the NMU had an entity called InnoVenton that focused on technology development, cosmetic formulation, and industrial research.

At NMU, there was also a transfer office that focused on intellectual property and commercialisation; it also collaborated with other players in the ecosystem, such as Propela and the iHub. Several major automobile industry players with whom meetings had been scheduled were unavailable.

Innovations

- JR Prodigy (Data logger and tracker for water consumption controlled through your mobile device)
- Uyazi Mobile Application (App provides SMMEs with information on regulations, funding and directs SMMEs on the correct path for assistance).
- uYilo e-mobility Programme at Entsa
- Low smoke fuel:
  - o A research project on the use of coal and biomass for household cooking and heating, due to its major threat to people's lives across the world. A process has been developed that can transform ultrafine waste coal into valuable low-smoke fuel which could be supplied to the domestic market at a price similar to that of coal. This fuel could help reduce the amount of localised air pollution in households and particularly in black townships.
- Microalgae to energy project:
  - o This innovation comprises of several main components:
    - Microalgae cultivation and recovery in photo-bioreactors
    - Beneficiation and upgrading of discarded coal and coal fines using the microalgae biomass
    - Conversion of the coal-microalgae comprises into energy products such as bio-crude oil, synthetic gas and clean coal.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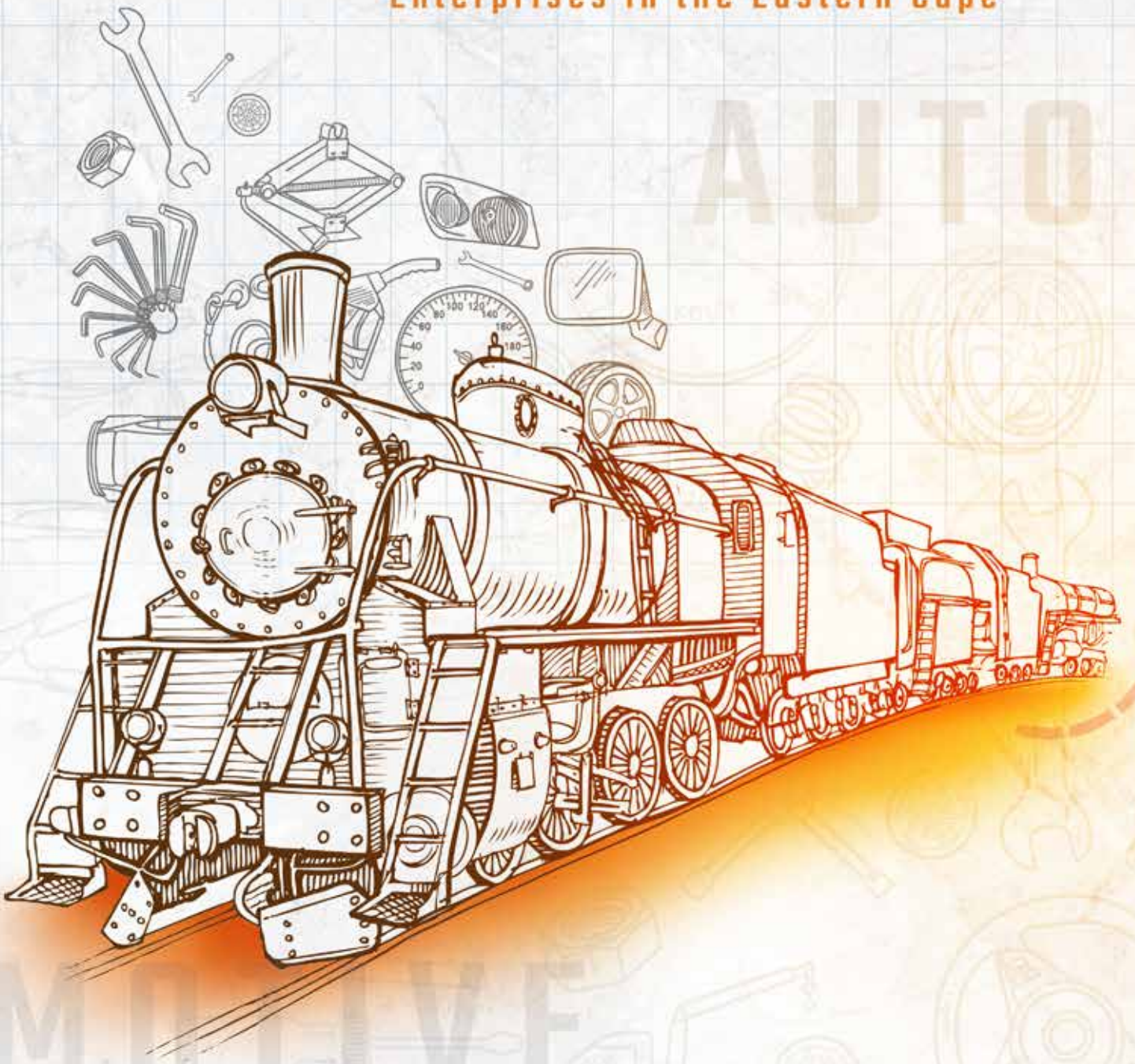
CHAPTER 6

Innovation activities among Enterprises in the Eastern Cape

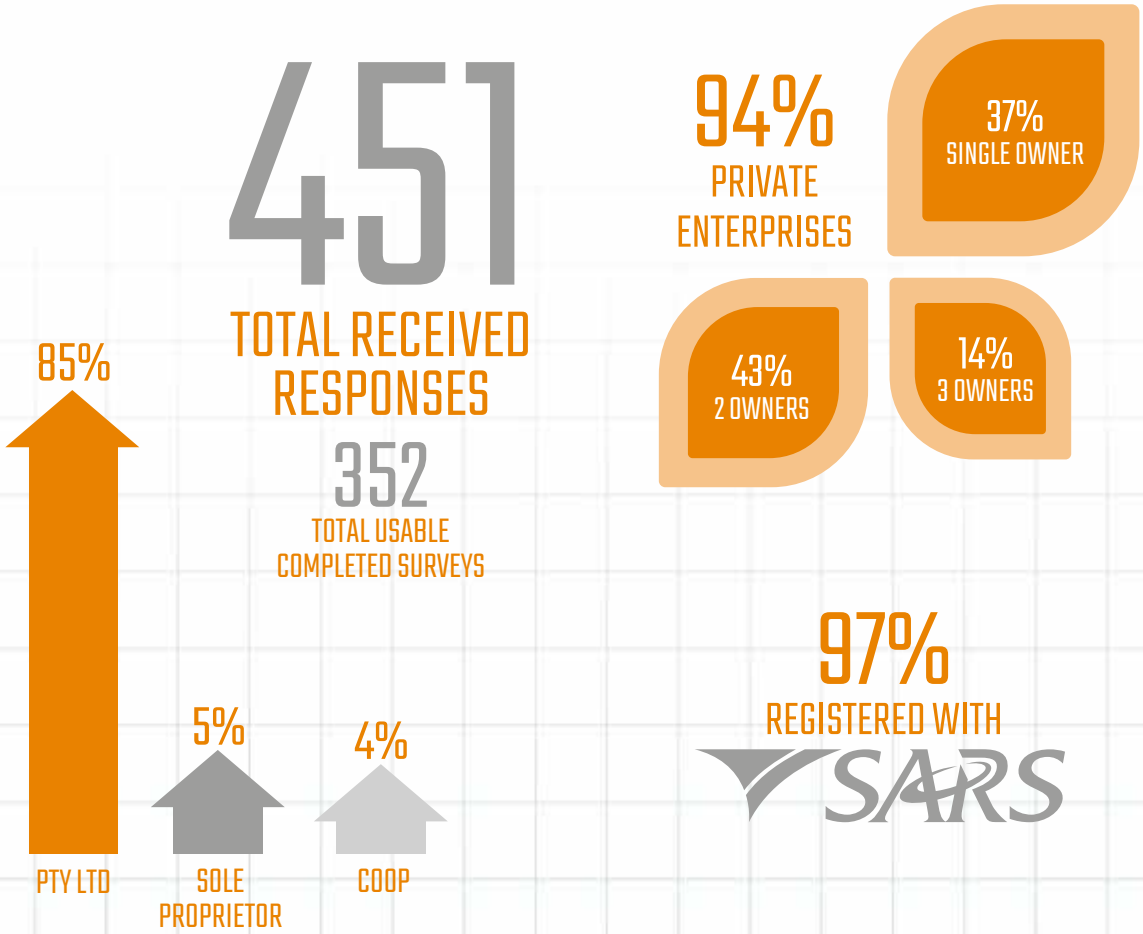


CHAPTER SIX. INNOVATION ACTIVITIES AMONG ENTERPRISES IN THE EASTERN CAPE

6.1 INTRODUCTION

This chapter presents findings from the survey of enterprises on their innovation activities.

The profile of companies in the Eastern Cape Innovation Survey



6.2 PROFILE OF ENTERPRISES

Of the total number of participants in the study, 94% of the interviewed enterprises were private enterprises, 2% were cooperatives, 1.4% were public enterprises and 1.4% were parastatal enterprises. Of the private enterprises, 37% with single ownership, 43% with 2 owners and 14% with 97% of these enterprises stated they were registered with SARS.

87% of these enterprises stated they were part of a larger organisation. The findings show that most of these enterprises were micro and medium enterprises with very few large enterprises participating in the survey.

These findings further show that most large enterprises were prevalent in the automotive industry, where the bigger branches were in Cape Town or Johannesburg. The following illustration shows the dominance of private enterprises:

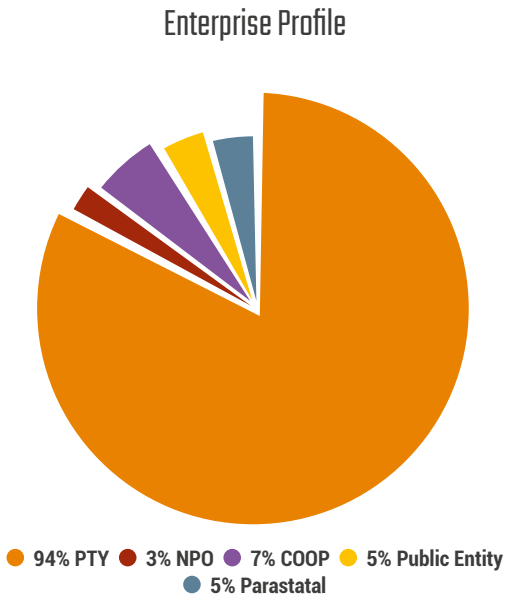


Figure 1: Enterprise Profile

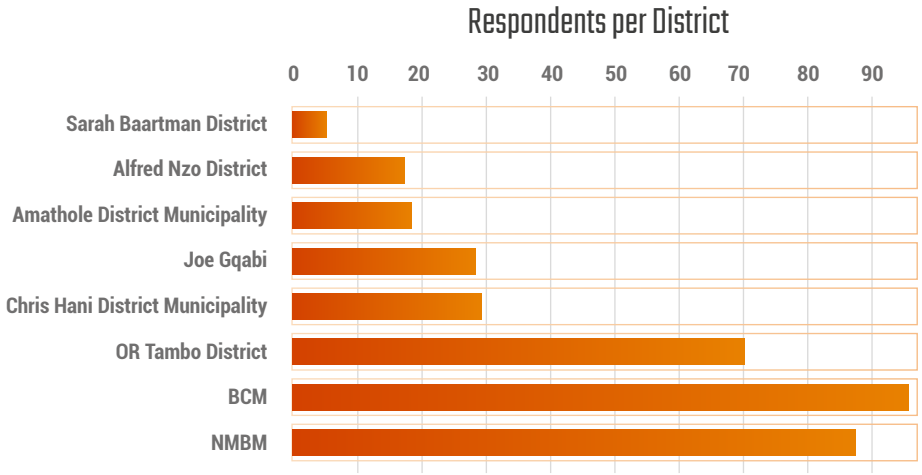


Figure 2: Location of participants as per the district in the Eastern Cape

The vast majority of respondents in the study were located in the Buffalo City Metro with 28%, followed by 24% in the Nelson Mandela Bay Metro and 19% in the OR Tambo District Municipality.

Table: Respondents Per District

District	Private Enterprise	Coop	Public Enterprise	Non-Profit Organisation (NPO)	Parastatal Enterprise	Grand Total
BCM	93		2		4	99
NMBM	86		1			87
OR Tambo District	54	6	4	6		70
Chris Hani District Municipality	29					29
Joe Gqabi	27		1			28
Amathole District Municipality	16				2	18
Alfred Nzo District	10	6				16
Sarah Baartman District	4	1				5
Grand Total	**319**	**13**	**8**	**6**	**6**	**352**

Almost all the survey participants were registered as private enterprises. Findings also indicate that of those 94% registered as private enterprises 37% were registered as with single ownership and 43% with 2 ownerships. Almost all the survey participants, 85%, were registered as close corporations/private limited companies, while only 6% were not registered with any authority. Sole proprietorship contributed 5% and 4% contributed to cooperatives. The results also indicate that a 97% of the enterprises were registered with SARS for tax purposes, assuming that the remaining 3% were either unregistered or non-compliant with SARS.

Employment status of enterprises

Of the 352 enterprises, only 10 enterprises stated to have more than 50 permanent employees; 146 enterprises stated they had between 10-50 permanent employees; 135 enterprises had between 5-10 permanent employees and 60 enterprises had less than 5 permanent employees.

Of these enterprises, 19 stated to have less than 5 temporary employees; 15 stated to have 5-10 temporary employees and 7 stated they have more than 10 temporary employees. The graph on the right shows the employment status of the enterprises.

It is interesting to note that permanent employment is the most dominant form of employment within the interviewed enterprises. This was especially the case in the automotive and manufacturing sector, where some of these jobs are done on a continuous basis.

For the agriculture sector, however, the use of temporary workers was prevalent because of seasons where labour demand is low and required fewer workers.

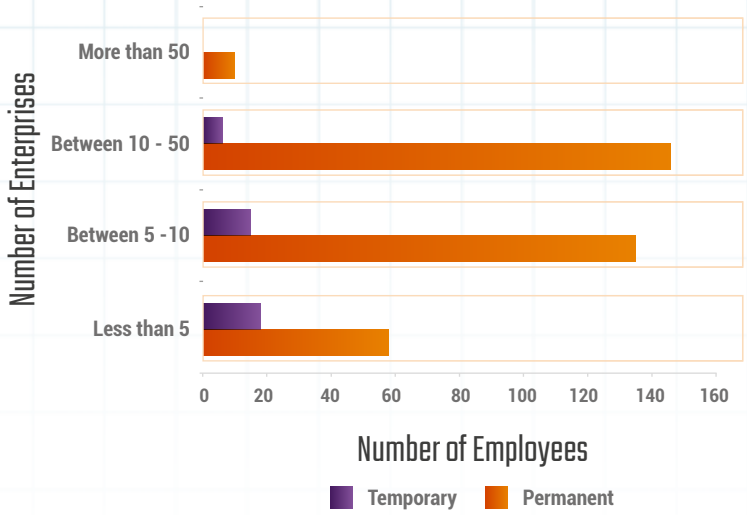


Figure 3: Employment Numbers of participants

6.3 INNOVATION ACTIVITIES OF THE ENTERPRISES

TYPES OF INNOVATION ENTERPRISES HAVE INTRODUCED IN THE LAST 3 YEARS (2019-2021)

The illustration on the right shows that the interviewed enterprises had little innovation introduced across all four types of innovation during the period of 2019-2021. This, therefore, indicates that 39% of the enterprises that took part in the survey are innovative active and the remaining 61% are non-innovative. Only 11% of the enterprises had introduced product innovation, 10% process, 8% organisational and 10% marketing innovation. Both technological and non-technological innovation levels throughout this time were evenly distributed.

The illustration shows that throughout the board, enterprises do not have a high uptake of any of the innovation types. Notably, agricultural enterprises were the ones that had introduced product and process innovation. The introduction of new seedlings and fertilisers were the most prevalent forms of product innovation. Similarly, the introduction of new farming techniques and equipment (for example, irrigation systems and mechanisation) were rated high as process innovation for the agriculture enterprises. However, these innovations were not new to the market, but rather adopted and adapted. For the manufacturing and automotive enterprises, innovation was mostly organisational and marketing. Since most of the manufacturing and automotive enterprises we interviewed were part of larger organisations, this made sense. For example, petrol stations had to regularly implement new organisational and marketing arrangements as set out by their respective head office.

Who developed these innovations?
In trying to understand the level of innovation, enterprises were asked who developed their innovations. 52.6% of the innovative enterprises stated that it was mainly their organisation; 24.6% stated that they developed their innovation together with others, while only 22.8% stated other enterprises developed their innovations. (A company adapting or modifying goods and/or services originally developed by another company, innovation diffusion, is the most prevalent innovation framework).

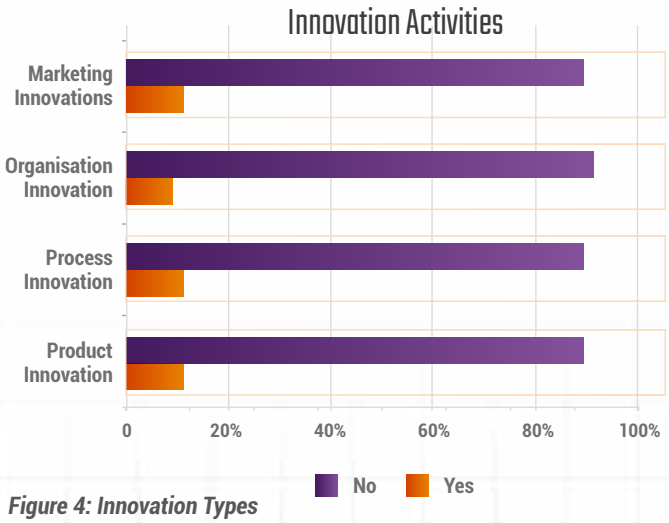


Figure 4: Innovation Types

The high rate of enterprises who innovate independently, highlights a key gap in collaboration between enterprises at a provincial level. Additionally, literature suggests that there is a strong link between ground-breaking innovations and collaboration, so the low levels of collaboration could thus be a contributing factor to the low levels of innovation provincially.

Global innovation trends indicate that accelerated globalisation, coupled with advances in technologies, has resulted in increased competition for scarce scientific resources (Selander et al., 2010). As a result, organisations are faced with structural and organisational shortcomings. Internal models of innovations may be unable to supply the skills and resources needed to adopt and use new innovations. Due to this, traditional innovation methods are less likely to be feasible in the long run.

Research from the 1960s and 1970s placed emphasis on the value of external resources in a firm's innovation process (Gibbons & Johnston, 1974; Almodovar and Aurora, 2009). To provide their knowledge and technological expertise and to lower the risk connected with the invention process, innovative enterprises use external resources. The importance placed on external resources has made innovation networks take on some of the roles and responsibilities that were exclusively performed by firms.

The emergence and development of innovation networks are closely linked to the concept of open innovation, wherein innovation is the direct result of collaboration between network actors on production, policy, skills, and other key factors. Innovation networks are viewed as a group of actors connected by a complex relationship that are eventually geared toward the development of an innovation.

Furthermore, these groups of actors are only defined as innovation networks when their collaborative activities advance the competitive advantage of a given organisation/sector. As such, the key functions of an innovation network are to use "real and virtual infrastructures and technologies that serve to nurture creativity, trigger invention, and catalyse innovation in a public and/or private domain context" (Desmarchelier, Djellal, & Gallouj, 2019:28).

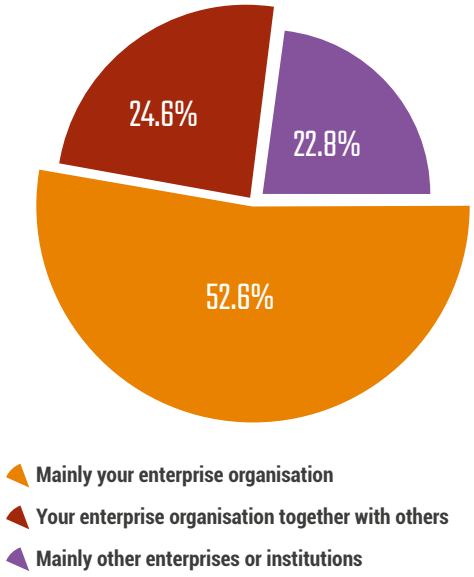
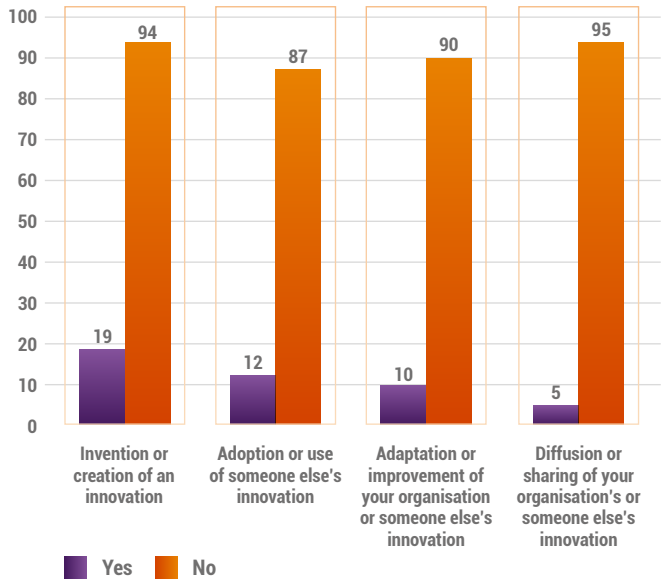


Figure 5: Where Innovations Take Place

This low level of collaboration links to the low engagement in innovation activities as demonstrated below.

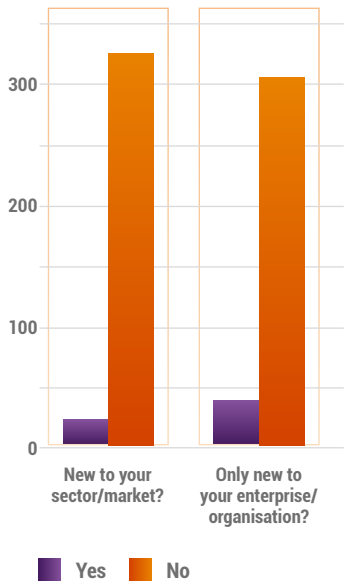
Figure 6: Enterprise Engagement with Innovation Activities in the Past 3 Years



The above figure shows that overall, the enterprises had a low intake of innovation during the period of 2019-2021, whether their own invention or using someone else's innovation.

As seen above, only 19% of enterprises stated they had invented an innovation, 12% had adopted someone else's innovation, 10% adapted or improved someone else's innovation, while only 5% diffused/shared an innovation.

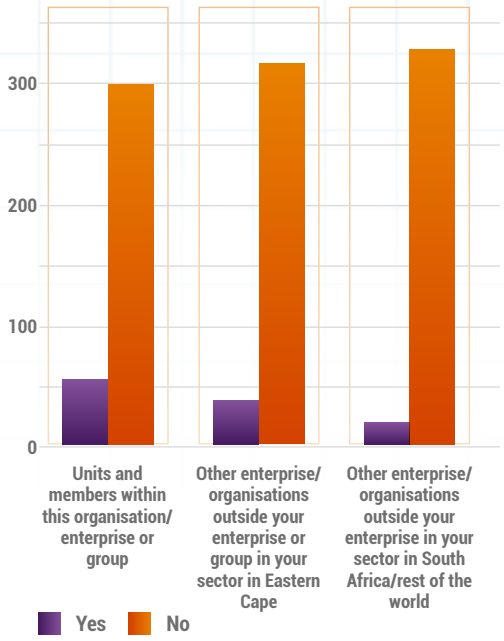
Figure 7: Innovations New to the Sector or Market



The above illustration shows that of the innovative enterprises, 93% stated that these innovations were not new to their respective sectors and only 7% were new to their sector/market. Similarly, 12% of innovative enterprises stated that their innovations were new to their organisations.

These results imply that enterprises in the Eastern Cape are more adapters and adopters of already existing innovations as opposed to creating something new. Given the barriers facing enterprises, becoming an adopter/adapter of an already existing innovation may allow it to improve its competitiveness, thereby gaining access to more markets.

Figure 8: Recipients of Innovations



Literature on innovation suggests that for an enterprise to fully engage in innovative activities, it needs to have certain skills that will match the required innovation activities. This means that an enterprise must have employees that have the required skills for it to carry out any innovation activities.

The image below shows that for the interviewed enterprises, 84.5% stated they did not have the required skills for them to innovate, while only 15.5 % said they have the required skills to innovate. An example of investment in skills development in an enterprise, is Amina Chem in Mthatha. According to the respondent from Amina Chem:

"One of our best business strategies is the graduate intake programme we have within the company. We target local graduate students with lab and physical science backgrounds. These students are given more practical experience within the company, while we employ entry-level employees with lab or chemical composition experience. This initiative we do through the Youth Fund Programme. We are able to employ, train and in return we get employees that to date have proven to be a worthwhile investment for us as a company, most particularly in our going green initiative".

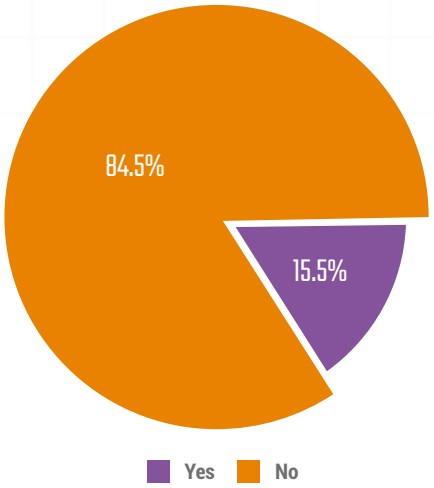


Figure 9: Innovation and Skills

The results indicate that one of the key issues affecting the innovativeness of enterprises is the lack of skills within their organisations. As mentioned in the first section of this analysis, the location of some of these enterprises means that their workforce may have limited education and training experience. In some cases, the adoption and adaption rate of innovation solutions versus the skills capacity in the workplace are at a mismatch.

Consequently, making it difficult for enterprises to innovate at the same rapidly changing nature of technologies and innovations in the market. The lack of skills within these enterprises may therefore be explained through the low levels of education and training provincially.

6.4 INTERNAL ORGANISATIONAL ENVIRONMENT

The internal business environment is made up of elements that affect the company's operations and success. As such, understanding an enterprise's internal environment will help in explaining its level of innovation.

When asked which place best describes the main place where businesses conduct their business, 83% stated that factory and manufacturing plant were the key places, 7% stated that they conduct their innovative activities in their homes/village/informal settlement, while 7% stated that they conduct their innovation activities on farmland or field.

Figure 10: Impact of Internal Environment of Innovation Activities

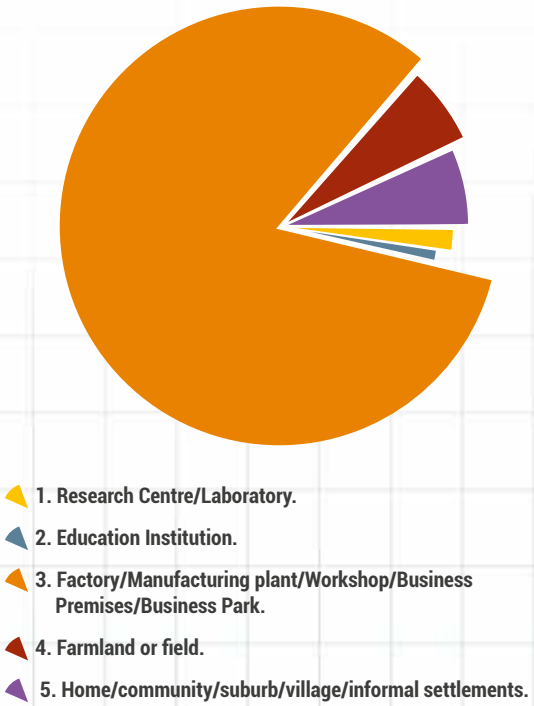
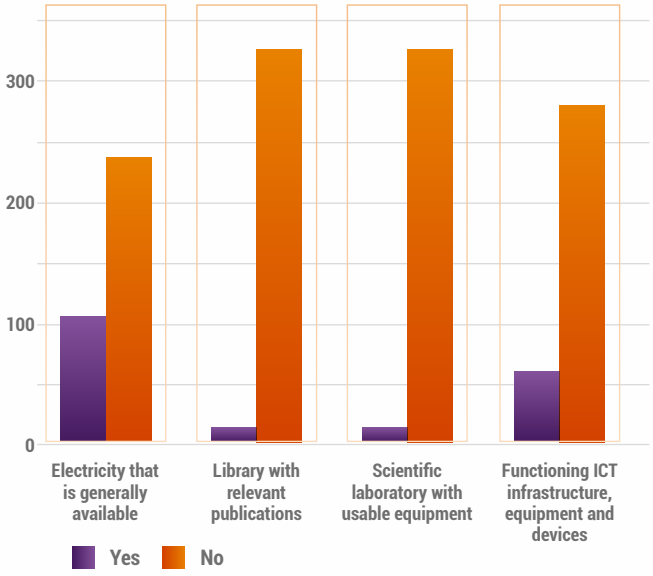
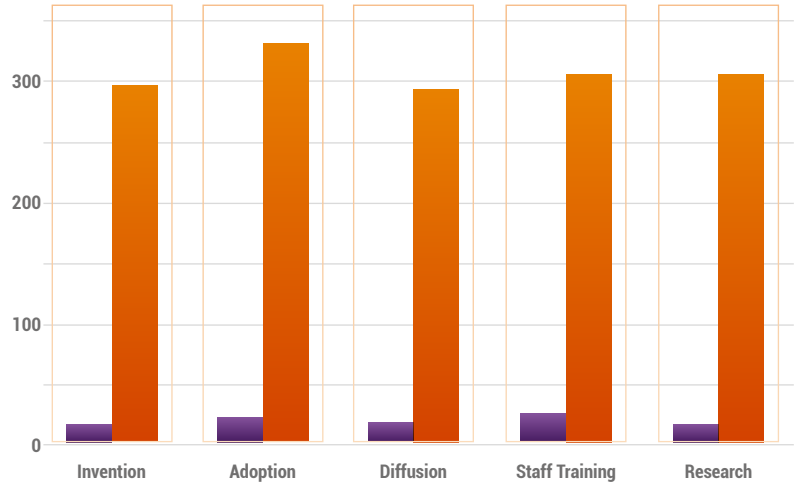


Figure 11: Access to Innovation Infrastructure



- Enterprises highlighted little to no access to adequate resources (electricity, ICT infrastructure, library).
- 61% of innovative organisations noted that the resources they need are not available in the province.
- 70.8% of these companies noted that such resources are available in other provinces while the rest source internationally.

Figure 12: Financial Commitment of Enterprises Towards Innovation



The above figure shows the different areas the enterprises' invested their profit/money in the period of 2019-2021. Overall, the enterprises did not invest much into any innovation activities, as the percentages are low across the different aspects. Only 6% of enterprises invested their profits in invention, 11% in adoption, 7% in diffusing, 12% in staff training and only 6% in research. The overall low levels of investment in the skills development of employees is a further indication that Eastern Cape enterprises are less likely to innovate. This is because enterprises that invest in the development of their employees are more likely to innovate because these employees will have the knowledge and skills to invent and adopt new knowledge.

Spending on research and development has also been noted to increase an organisation's propensity to innovate. This is largely because investing in research helps enterprises find new and improved methods of conducting work to achieve organisational goals. If these enterprises were investing in research, they could make use of external and internal resources to help with their level of competitiveness. The low investment in staff training and research means these enterprises are not fully able to absorb information and build their knowledge, thus creating a favourable environment for innovation.

The educational level of the population plays a key role in the regional innovation and economic development. OECD data and the NACI Science, Technology and Innovation report data show that human capital is by far the strongest determinant of innovation output, meaning that there is a strong correlation between educational attainment and the level on innovation in a region. According to the NACI STI report (2022), the Eastern Cape population has 25.8% of individuals above the age of 20 years have a National School Certificate (NSC) and only 11,6% have a post-schooling. The Eastern Cape is ranked fifth highest in the percentage distribution of education attainment data (Naci, 2022).

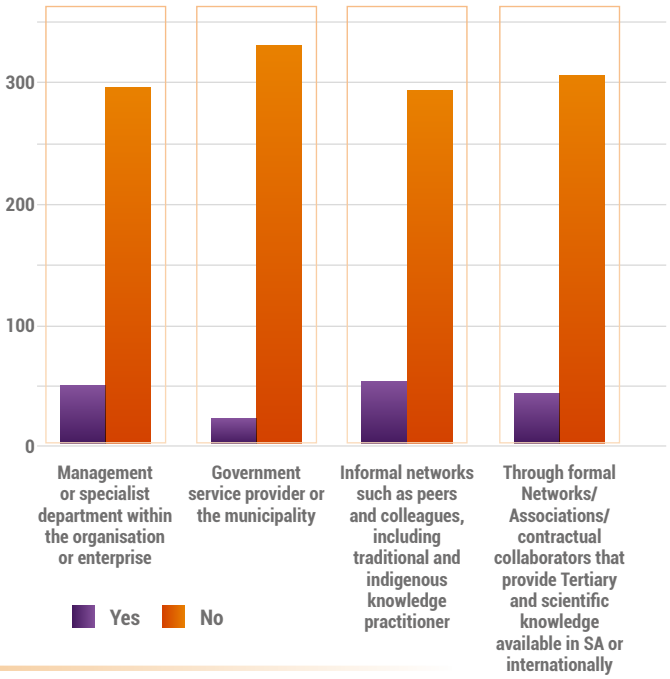
Case study: Use Amina Chem as an example

Intake of graduate students from Walter Sisulu University and local TVET with practical experience in lab work are linked to higher skills intake of staff.

6.5 MACRO OR EXTERNAL ORGANISATIONAL ENVIRONMENT

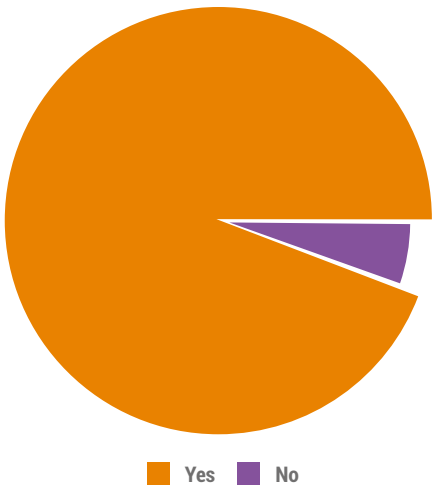
The majority of respondents indicated to have been aware of innovation opportunities through informal networks. Government departments received the least positive respondence to this question.

Figure 13: Innovation Awareness



6.6 INNOVATION NETWORKS

Figure 14: Innovation Networks



Findings indicated a great need for innovation networks, 85% of the enterprises indicated a need for innovation networks, most particularly for information-sharing purposes and incubation.

8% of the respondents indicated having formal agreements with STI agencies and those agreement relationships being fruitful. Most of the respondents have been in this agreement for more than 2 years - 70% of them benefiting from Incubation Programmes, 15% on Research and 15 % on Prototype Development.

The most recent and significant organisational change in NSI governance is the consolidation of Higher Education and Training and Science and Innovation Departments, under the common political oversight of the new Minister of Higher Education, Science and Technology. This integration provides an opportunity to strengthen linkages within the NSI that can intensify collaboration and coherence. Importantly, it is the collective of higher education institutions (public and private), science councils and other government STI entities, non-governmental organisations (NGOs) and the private sector, that constitute the NSI.

The emergence of the new Ministry facilitates a perspective on the NSI that focuses and mobilises the separate and complementary roles of Higher Education, Science, Technology and Innovation (HESTI) institutions in knowledge generation and technological innovation. This gives rise to a fresh construct, namely the HESTI institutional landscape, or HESTIIL, to apply in exploring and intensifying coherence and coordination. Such efforts can and must significantly enhance the social and economic impact of the NSI and ultimately impact on the regional and local innovation system. A HESTIIL perspective is highly significant in that it incorporates a large swathe of STI institutions that contribute to the functioning of the NSI, including the public, private and the non-profit sectors. The HESTIIL in its entirety, as a subject of this review, constitutes a substantial contextual representation of the NSI. Therefore, for all practical purposes, the HESTIIL is an apt generalisation of the entire NSI, unless the context dictates otherwise.

Global innovation trends indicate that accelerated globalisation, coupled with advances in technologies has resulted in increased competition for scarce scientific resources (Selander et al., 2010). As a result, organisations are faced with structural and organisational shortcomings. Internal models of innovations may be unable to supply the skills and resources needed to adopt and use new innovations. Due to this, traditional innovation methods are less likely to be feasible in the long run. Research from the 1960s and 1970s placed emphasis on the value of external resources in a firm's innovation process (Gibbons & Johnston, 1974; Almodovar and Aurora, 2009). To provide their knowledge and technological expertise and to lower the risk connected with the invention process, innovative enterprises use external resources. The importance placed on external resources has made innovation networks take on some of the roles and responsibilities that were exclusively performed by firms.

The emergence and development of innovation networks are closely linked to the concept of open innovation, wherein innovation is the direct result of collaboration between network actors on production, policy, skills, and other key factors. Innovation networks are viewed as a group of actors connected by a complex relationship that are eventually geared toward the development of an innovation. Furthermore, these groups of actors are only defined as innovation networks when their collaborative activities advance the competitive advantage of a given organisation/sector. As such, the key functions of an innovation network are to use "real and virtual infrastructures and technologies that serve to nurture creativity, trigger invention, and catalyse innovation in a public and/or private domain context" (Desmarchelier, Djellal, & Gallouj, 2019:28).

DIFFERENT TYPES OF INNOVATION NETWORKS

Traditional Innovation Networks - Technology innovation is the focus of traditional innovation networks, which are multi-agent cooperation systems of various sizes. An industrial, technological, and market bias define traditional innovation networks. The primary targets of these networks are technological advances with a strong scientific and technical R&D dimension, and the dominating agents within these networks typically come from the industrial sector and the market sector (Morrar, Gallouj, & Hammadou, 2012).

Public Private Innovation Networks - Partnerships between public and commercial service organisations in innovation. They typically prioritise service output over innovation, and their justification is the notion that adding a market logic will improve performance. This form of innovation network adds a new aim alongside technological innovation, namely non-technological innovation. As such, this form of network addresses the bias in the traditional type of innovation network (Morrar, Gallouj, & Hammadou, 2012).

Public Service Innovation Networks - Joint partnerships used in public services to produce value through a co-innovation strategy. To co-produce innovations in the field of public services (sector) or public services (function), they engage a variety of public and private agents, particularly citizens, regardless of the innovation's nature (Morrar, Gallouj, & Hammadou, 2012).

CHAPTER 7

Conclusion & Policy Recommendations

CHAPTER SEVEN. CONCLUSIONS AND POLICY RECOMMENDATIONS

7.1 INTRODUCTION

This chapter provides the conclusion and research recommendations derived from this study. The study provides key policy recommendation on creationg an enbaling environmention for innovation. Most particularly, this chapter focuses on direct policy recommenrations for the Agricutural sector, as defines as the sleeping againt of the province..

7.2 MAIN FINDINGS

In the main findings, the study found that Eastern Cape enterprises are predominantly none-innovators and those that are innovative are innovative in non-technological ways. The barriers to innovation are the lack of policy direction and support to direct innovation in the province. Business mechanism support in rural and marginalised areas need to be strengthened. Financial and non-financial support to innovators needs to be clearly defined and outlined in policies, and implementation plans need to be developed that favour and encourage innovation in the business sector. Enterprises are aware of the importance of innovation and its benefits in remaining sustainable and competitive in the market.

1. ADOPTION AND ADAPTION OF OTHER'S INNOVATION ARE THE MOST PREVALENT TYPES OF INNOVATION IN THE EASTERN CAPE.

- The interviewed enterprises showed little engagement with innovation activities, only 10% were involved in the product, 11% in the process, 8% in organisational and 10% in marketing.
- Most of these enterprises stated that the innovations they implemented were not new in their respective sectors/markets.

2. ENTERPRISES DO NOT HAVE THE NECESSARY SKILLS AND RESOURCES TO INNOVATE.

- Enterprises highlighted little to no access to adequate resources (electricity, ICT infrastructure, library).
- 61% of innovative organisations noted that the resources they need are not available in the province. Enterprises in the agriculture sector sourced their resources in other provinces.
- 84.5% of these businesses highlighted a lack of necessary skills that hindered their ability to innovate.

3. AN EMPHASIS ON A MORE ORGANISED/INCLUSIVE PROVINCIAL INNOVATION NETWORK.

- 85% of the enterprises indicated a need for innovation networks most particularly for information-sharing purposes and incubation.
- Only 8% of the respondents indicated having formal agreements with STI agencies and those agreement relationships being fruitful.
- Enterprises indicated a great interest in an innovation network, particularly for the sharing of information.

4. A LACK OF AWARENESS OF GOVERNMENT SUPPORT INITIATIVES FOR INNOVATION.

- 68% of enterprises showed little to no awareness of policies and initiatives around innovation.
- Enterprises who were engaged in innovative activities made use of their own funds. An exception was noted in agricultural enterprises who were actively involved in government support initiatives (funding or coaching).

7.3 POLICY RECOMMENDATIONS

1. POLICY DESIGN, ALIGNMENT AND PROMOTION OF SCIENCE, TECHNOLOGY AND INNOVATION (STI) INITIATIVES INTO THE ECONOMIC GROWTH POLICIES.

This study locates a case on the innovation predisposition of enterprises in the agricultural sector of O. R Tambo. The findings indicate that enterprises in the agricultural sector rarely participate and invest in innovation activities. The poor state of innovation in the participating enterprises alludes to a number of policy issues, one of which being an innovation-driven agenda in the enterprise development policies of the agricultural sector. Current policies in the agricultural sector refer to skills development and training for the Forth Industrial Revolution (4IR) as the sector's response or participation in the innovation space.

However, very little is said about capacitating enterprises or entrepreneurs in this sector to participate in innovations to promote growth and competitiveness. Therefore, this study recommends an agricultural enterprise development policy that is embedded in the deliberate promotion of Science, echnology and Innovation to promote enterprise growth and competitiveness in the sector. The study further recommends that this innovation-centred enterprise development policy should be aligned with the National Systems of Innovation Policies of South Africa, together with the National Framework for Local Economic Development.

The innovation enterprise development policy should speak to the promotion of innovation, invention, adaption, or adoption solutions and innovative activities in the sector. The policy should be linked to direct funding models to ensure that enterprises that participate in this space are financially capacitated to function optimally.

2. DELIBERATE AND DIRECT RESEARCH AND DEVELOPMENT INVESTMENT IN INNOVATIONS IN THE AGRICULTURAL SECTOR.

To harness Science, Technology and Innovation (STI) for the various dimensions of food security, it is necessary to make the food system itself is more innovative. This includes, among other things, defining a research agenda that focuses on local farmers, investing in human capacity, enabling infrastructure for food systems, putting appropriate governance structures in place for agricultural innovation, and strengthening knowledge flows between farmers and scientists.

The agricultural innovation system is a useful tool to analyse the ecosystem and supporting mechanisms and infrastructure that facilitate agricultural innovation. Key stakeholders, such as farmers, research and education systems, firms (e.g. input suppliers, agricultural producers, processing, distribution, wholesale and retail), agricultural extension, government departments, and non-governmental actors are vital for this growth and food security. The data presented in this study indicate that agricultural enterprises' participation in innovation at product and process levels are low.

Therefore, indicating that investment in input costs are low and the output produced by these enterprises is not competitive or sustainable to drive economic growth. Largely, the farming practices in this region do not promote sustainable economic contributing outputs. The output scale of this region, most particularly, of fresh produce is not producing sustainable quality standard outputs. The economic performance of the agricultural sector presented in this study places the very nature the findings have alluded to.

An example of research and development investment for innovation in the agricultural sector is advancements in seedling and modern agricultural technologies. This would involve equipping local farmers with the necessary equipment and teaching them how to effectively make use of modern farming practices. Such developments can help cut production costs, while increasing production output.

This study recommends a blended regional innovation network for the OR Tambo district municipality agricultural sector. An innovation network that would take into account the role of technology and innovative solutions in advancing the agricultural sector, promotion and support of public and private partnership to drive an innovation agenda and lastly concerted public sector policy priority design, development and support of an innovation agenda for local economic development. This study has argued for the need of innovation and technology as a key recommendation for improvement in the agricultural sector. This study has also alluded to the importance of private and public investment support to improve the sector. It is therefore against this background that this research recommends a blended regional innovation network.

3. ESTABLISHING AND SUPPORTING INNOVATION NETWORKS.

Provincial innovation strategic leadership through an innovation strategy:

The findings of this study indicate that there is a misalignment in how innovation is understood and supported and the lack of policy direction is much needed.

- Development of the Eastern Cape Innovation Strategy: Integration of STI policies into the provincial economies, DSI, STIC Department of small business and development initiatives most particularly CFERI initiatives and SEDA opportunities.
- The role of innovation in driving economic and social change in the EC Province:
  - R&D Investment
  - Entrepreneurship programmes and Dynamic Innovative SMME Sector - Strengthening of Science-Industry linkages e.g. eNtsa in NMU - Automotive Component Technology Station – ACTS
  - Digital transformation and strengthening of the ICT sector
- Design and alignment of regional/ local innovation policies to the National Innovation Policies.

INNOVATION ADVOCACY

Innovation Championship-Regional Innovation Forums at the district municipal level that support and encourage communities of practice through innovation:

- Ensure the effective and efficient functioning of multi-stakeholder innovation forums/platforms
- Provide innovative design support and policy advice which is grounded in sound integrated stakeholder perspectives
- Advance the co-creation and implementation of strategic innovation initiatives in districts ie Innovation Fair
- Entrepreneurship must find expression in the education system
- Establishment of a business centre – One stop shop
- District Sector Focus Incubation Programmes
- Incentives to attract and retain existing investors
- Economic infrastructure improvement
- Alignment of District MSME strategy with other relevant strategies and policies
- Social and Creative Intervention

Below is a list of available funding mechanisms available to assist innovators:

FUNDING MECHANISM AVAILABLE TO ENTERPRISES IN THE NSI	
SUPPORT MECHANISM INFORMATION	**SUMMARY OF SUPPORT MECHANISM GOALS**
R&D Tax Incentive Programme | DST https://goo.gl/L7Kwwe	Offers a tax deduction to encourage locally registered businesses to invest in R&D in South Africa. The R&D tax incentive can be accessed by companies of all sizes and in all sectors undertaking R&D.
Industry Innovation Partnership (IiP) | DST https://goo.gl/DvMg1K	Provides co-funding to support organised industry partners in their R&D and innovation initiatives. In this initiative, industry actors work together and decide on R&D programmes appropriate to enhancing their competitiveness.
Technology and Human Development Programme (THRIP) | The DTI/NRF https://goo.gl/iRLmwp	A triple-helix partnership programme of the DTI that promotes collaboration between industry and academia/science councils, and enhances competitiveness in South African industries through new technology and skills generation.
Support Programme for Industrial Innovation (SPII) | The DTI https://goo.gl/D2Lj1C	Offers grants to all South African registered enterprises, in manufacturing or services, that are engaged in pre-competitive development activity leading to the commercialisation of the product, process, system or prototype being developed
Manufacturing Competitiveness Enhancement Programme (MCEP) | The DTI/IDC https://goo.gl/QGCZdM	Financial support in the form of loans to manufacturing companies to stimulate their competitiveness and ensure job retention in the sector.
Technology Stations | DST/TIA https://goo.gl/Axa4HD	A network of 18 centres with state-of-the-art equipment and experts in specialised fields located at universities of technology to provide science, engineering and technology services to SMMEs and entrepreneurs for product development, product improvement, prototype development and a range of other engineering services.
Strategic Partnership Programme (SPP) | the dti https://goo.gl/Phgvqw	Develops and supports programmes or interventions aimed at enhancing the manufacturing and services capacity of suppliers with linkages to strategic partner supply chains, industries or sectors.
Seed Fund | DST/TIA https://goo.gl/Axa4HD	Assists researchers from higher education institutions, science councils, technology entrepreneurs and SMMEs to advance their research outputs and ideas towards proof of concept, development of prototypes and business cases.
Technology Development Fund | DST/TIA https://goo.gl/Axa4HD	Assists innovators from higher education institutions, science councils, SMMEs and start-ups to advance technologies along the innovation value chain, from proof of concept to prototyping to technology demonstration.
Commercialisation Support Fund | DST/TIA https://goo.gl/Axa4HD	Connects technology innovators from higher education institutions, science councils, SMMEs and start-ups to onward business and investment opportunities, and helps to prepare innovators for follow-on funding, through limited support for market testing and validation.

FUNDING MECHANISM AVAILABLE TO ENTERPRISES IN THE NSI	
SUPPORT MECHANISM INFORMATION	**SUMMARY OF SUPPORT MECHANISM GOALS**
Technology Venture Capital | the DTI/IDC https://goo.gl/VVUuDr	Provides funding and business support to small companies at early stages of the commercialisation of innovative products, processes and technologies across all sectors which have the potential to make a significant developmental impact on the South African economy.
Technology Localization Programme | DST/CSIR https://goo.gl/M2Htai	Raises the capabilities of local manufacturing companies so that they can earn a share of recapitalisation investments and, ultimately, enter export markets as competitive suppliers into the Original Equipment Manufacturers (OEM) global supply chains.
Seda Technology Programme (Stp) | DSBD https://goo.gl/LrTB4p	Provides financial and non-financial support to small enterprises through technology transfer, quality services and business incubation.

Sourced: Centre for Science, Technology and Innovation Indicators (CeSTII). 2020. Innovation performance in South African businesses.

7.4 STUDY LIMITATIONS

The study faced several limitations during the implementation phase. One of the major limitations of this study was the availability of participants. Because the study provides an Industry perspective, this consequently resulted from the sample being drawn from the selected sectors. Below follows a list of the limitations this study had embarked on:

- Availability of a cohort database between government entities, universities, and the private sector.
- Right of entry into the sample (gatekeepers unavailable)
- Availability of participants due to strikes and registration periods in the 'post-schooling sector.
- Unavailability of participants due to industry production dates and deadlines.

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ecsecc
eastern cape socio economic consultative council

12 Gloucester Road, Vincent, East London, 5217
Postnet Vincent, Private Bag X9063, Suite 302, Vincent, 5247

+27 (0)43 701 3400
+27 (0)43 701 3415
info@ecsecc.org
www.ecsecc.org