



**EXPLORING THE LACK OF ENTREPRENEURIAL UNDERTAKING AMONG
GEOMATICS GRADUATES OF MANGOSUTHU UNIVERSITY OF
TECHNOLOGY FROM 2018 TO 2024**

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Master of Education (Higher Education)**

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DECLARATION

I, **Siyabonga Desmond Shadrack Khanyeza**, declare that

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ABSTRACT

Graduate unemployment remains a persistent challenge in South Africa, despite increasing access to higher education (HE). Entrepreneurship has been identified as a potential pathway to employment creation; however, limited entrepreneurial uptake among geomatics graduates remains evident. The aim of this study was to explore the factors contributing to the lack of entrepreneurial undertaking among geomatics graduates at Mangosuthu University of Technology (MUT) between 2018 and 2024.

A qualitative research approach, grounded in an interpretivist paradigm, was employed using a case study design and the Theory of Planned Behaviour (TPB) as a theoretical lens. Data was collected through semi-structured interviews with geomatics graduates and analysed using thematic analysis following Braun and Clarke's six-phase framework. The analysis revealed seven key themes: limitations in entrepreneurial training; barriers to entering entrepreneurship; social and individual circumstances; perceptions of the geomatics industry; entrepreneurial intentions and mindsets; career trajectory and professional development; and the practicalities of running a geomatics business.

The findings indicate that insufficient business training, regulatory constraints, financial barriers, limited industry exposure and perceptions of job security significantly influence graduates' reluctance to pursue entrepreneurship. The study concludes that strengthening entrepreneurship education within the geomatics curriculum, enhancing industry engagement and improving access to funding and professional support may foster entrepreneurial intentions among graduates. This research contributes to understanding entrepreneurship across non-business disciplines and offers practical recommendations for curriculum development and policy interventions in HE institutions.

DEDICATION

This thesis is dedicated to the graduates of Mangosuthu University of Technology, whose resilience and perseverance have profoundly shaped my academic and professional development. Despite systemic and socio-historical challenges they have demonstrated determination and achieved meaningful success.

This work is also dedicated to my colleagues at Mangosuthu University of Technology, whose commitment and dedication frequently go unacknowledged. Recognition is extended to those who lost their jobs due to institutional restructuring.

Above all, this work is dedicated to my mother and my children, whose support and patience have sustained me throughout this journey. This milestone represents a significant step toward attaining a doctoral-level scholarship.

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GLOSSARY OF TERMS

B. Tech	-	Bachelor of Technology
BSc	-	Bachelor of Science
CARS	-	Cadastral Advisory and Research Services
CIPC	-	Companies and Intellectual Property Commission
COVID-19	-	Coronavirus Disease of 2019
CV	-	Curriculum Vitae
DLRRD	-	Department of Land Reform and Rural Development
EE	-	Entrepreneurship Education
EI	-	Entrepreneurship Intentions
GIS	-	Geographic Information Systems
GISc	-	Geographic Information Science
GPA	-	Geomatics Profession Act 19 of 2013
GPS	-	Global Positioning System
HE	-	Higher Education
iOS	-	Apple Incorporated Operating System
KZN	-	Province of KwaZulu-Natal
MUT	-	Mangosuthu University of Technology
NGI	-	National Geo-spatial Information
NYDA	-	National Youth Development Agency
PC	-	Personal Computer or a Laptop
PGDHE	-	Postgraduate Diploma in Higher Education
RU	-	Rhodes University
SADC	-	Southern African Development Community
SAGC	-	South African Geomatics Council
SAGI	-	South African Geomatics Institute
SEDFA	-	Small Enterprise Development Finance Agency
SME	-	Small and Medium Enterprises
SMME	-	Small, Medium, and Micro Enterprises
STEM	-	Science, Technology, Engineering and Mathematics
SWOT	-	Strengths, Weaknesses, Opportunities, Threats
TPB	-	Theory of Planned Behaviour

UAV	-	Unmanned Aerial Vehicles
UCT	-	The University of Cape Town
UKZN	-	The University of KwaZulu-Natal
UniZulu	-	The University of Zululand
UoT	-	University of Technology
WIL	-	Work Integrated Learning

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CHAPTER 1

GEOMATICS AND ENTREPRENEURSHIP

1.1. INTRODUCTION

South Africa is grappling with a significant unemployment rate of 42%, as indicated by the latest statistics (Stats.SA, 2025), compounding this issue is the fact that approximately 50% of the unemployed population consists of qualified graduates. This situation highlights a potential disconnect between educational methodologies that seem to prioritise immediate employment needs and the nurturing of business-minded graduates. Such a framework has been prevalent in previously disadvantaged institutions.

Given the persistently high unemployment rate affecting graduates across the nation, there is a compelling need for research on this topic in South Africa. Specifically, it would be advantageous to examine the impact of entrepreneurship education on students, assessing whether it nurtures entrepreneurial intentions and attributes embedded in the training phase (Musetsho & Lethoko, 2017). Entrepreneurship is seen as a viable solution to tackle unemployment (Inoubli, 2024) and may offer a pathway to financial independence. Such a study could be invaluable in the South African context, where, despite having a well-educated workforce, unemployment rates remain alarmingly high. Promoting entrepreneurship could provide graduates with opportunities to make a positive contribution to the economy and carve out their own career paths.

Starting a business entails various financial considerations, including understanding tax laws and their implications, securing funding through loans and exploring asset financing options. On a positive note, an increase in new companies could foster a more stable society with improved job opportunities. This growth, however, may also lead to oversaturation in the entrepreneurial landscape. An influx of geomatics firms could intensify competition, potentially diluting the perception of geomatics as a specialised skill. Furthermore, if government-funded projects were cut or halted, businesses could face severe repercussions or even collapse.

The current hypothesis is that graduates are not pursuing entrepreneurship because they lack adequate education in this area. This disadvantage is compounded by the fact that many

graduates have backgrounds rooted in previously disadvantaged circumstances. It is argued that a different upbringing could have influenced their approach to business ventures, leading to different outcomes.

1.1.1. INSTITUTIONAL CONTEXT: MANGOSUTHU UNIVERSITY OF TECHNOLOGY

Mangosuthu University of Technology (MUT) is a public university of technology located in Umlazi, one of South Africa's largest townships, approximately 20 kilometres south of Durban in KwaZulu-Natal (KZN). The institution was established in 1979 as Mangosuthu Technikon through the joint efforts of the late businessman Harry Oppenheimer and the former Premier of Kwa-Zulu, Mangosuthu Buthelezi, after whom the institution was named. Its establishment was driven by the need to address the increasing national demand for technically skilled professionals during the early 1980s.

During its early years as a technikon, particularly from the mid-1980s to the mid-1990s, MUT developed a strong reputation for excellence in engineering and applied science programmes. At the time, these programmes were regarded as among the leading in the country, attracting high levels of student enrolment, especially from historically disadvantaged communities. The institution also drew students from neighbouring countries within the Southern African Development Community (SADC).

Following the restructuring of the higher education (HE) system in South Africa in the early 2000s, MUT was reclassified as a university of technology (UoT), while retaining its focus on career-oriented, practice-based education. The university continues to play an important role in widening access to HE and producing graduates with technical skills relevant to industry needs. However, like many South African HE institutions, MUT operates within a challenging socio-economic environment marked by high graduate unemployment and increasing expectations to enhance graduate employability beyond conventional employment routes.

MUT comprises three faculties: the Faculty of Engineering, the Faculty of Management Sciences and the Faculty of Applied and Health Sciences. These faculties offer a range of undergraduate and postgraduate programmes that prioritise applied learning, technological development and industry relevance. The geomatics programme is located within the Faculty

of Engineering and focuses on training professionals in surveying through a curriculum that combines theoretical knowledge with practical and work-integrated learning components.

As of 2024, the student enrolment was nearly 15,000 for the entire UoT. Of these, MUT continues to register about 100 new students in the geomatics section (MUT, 2024). The internal report also states that MUT recently achieved a student throughput rate for diploma programmes.

1.1.2. THE GEOMATICS PROFESSION

In modern usage, geomatics refers to surveying, and the two terms are commonly used interchangeably. Geomatics is a multidisciplinary professional field concerned with the acquisition, management, analysis and application of spatial and geographic data. It integrates traditional land surveying practices with advanced geospatial technologies and methodologies, including geodesy, photogrammetry, remote sensing, geographic information systems (GIS), geographic information science (GISc), spatial data infrastructure and engineering surveying. Collectively, these subfields support a wide range of socio-economic sectors, including urban and regional planning, environmental management, infrastructure development, land administration and disaster risk management.

Within the geomatics profession, each subfield comprises specialist practitioners who possess discipline-specific qualifications and competencies. In South Africa, practitioners within the engineering surveying branch of geomatics are formally categorised into three principal professional ranks: technician, technologist and professional. These categories are differentiated primarily by qualification level and industry experience. Technicians typically hold a diploma in surveying or geomatics obtained from one of the country's UoTs. Technologists must hold an advanced diploma or equivalent qualification, along with at least three years of relevant industrial experience. Professionals hold a Bachelor of Technology (B.Tech) degree, a Bachelor of Science (BSc) in Geomatics or Land Surveying, or an equivalent, and have at least 1 year of structured industrial training.

Among the various geomatics branches, engineering surveying plays a critical role in infrastructure development and construction projects. This specialisation is responsible for precise spatial measurement, positioning and alignment, which are essential for the planning,

execution and quality assurance of engineering works. Given its direct link to the built environment and economic development, engineering surveying is the primary focus of this research.

In South Africa, the geomatics profession is governed by the South African Geomatics Council (SAGC), which serves as the statutory regulatory authority. The SAGC is responsible for professional registration, accreditation of educational programmes and the enforcement of ethical and professional standards within the surveying and geomatics disciplines. Through its regulatory mandate, the council ensures that practitioners are appropriately qualified, competent and accountable, thereby safeguarding public interest and maintaining professional integrity within the sector.

Despite the increasing demand for spatial data and geospatial technologies across both public and private sectors, geomatics graduates face growing challenges in the labour market. These challenges include limited employment opportunities, industry saturation, rapid technological automation and restricted access to mentorship and entrepreneurial support systems. Consequently, entrepreneurship has emerged as an important alternative career pathway within the geomatics profession. Entrepreneurial engagement enables graduates to pursue self-employment, offer specialised geospatial services and contribute to innovation and economic growth within the broader spatial sciences industry.

1.1.3. RESEARCHER POSITIONALITY

The researcher has been a lecturer in the Department of Civil Engineering and Surveying at MUT since 2010. In addition, the researcher is a registered professional engineering surveyor with over 24 years of industrial experience and has served as a director of a geomatics company for 11 years.

The researcher's academic and professional qualifications include a National Diploma in Surveying from the then Mangosuthu Technikon, a B.Tech degree in Surveying from the Durban University of Technology (DUT) and a Postgraduate Diploma in Higher Education (PGDHE) from Rhodes University (RU). This combination of extensive industry experience and long-standing academic involvement within the geomatics discipline positions the researcher as an insider to both the educational and professional contexts under investigation.

This positionality provides valuable contextual insight into the curriculum, the institutional environment, entrepreneurship, and the labour-market realities faced by geomatics graduates.

However, recognising the potential for subjective influence associated with an insider position, the researcher adopted a reflexive stance throughout the research process. Reflexivity was maintained through continuous self-reflection, critical examination of assumptions and adherence to ethical and methodological rigour, ensuring that participants' perspectives were authentically represented and that researcher bias was minimised.

1.2. THE RESEARCH OBJECTIVES AND QUESTIONS

The primary objectives of the proposed study are:

- 1) To examine whether geomatics graduates have received adequate entrepreneurial training and skills during their university education.
- 2) To explore the career pathways of geomatics graduates, including their inclination towards entrepreneurship or formal employment.
- 3) To identify the challenges and barriers that influence graduates' decisions regarding entrepreneurial engagement.

The main research question is: to what extent are the geomatics graduates from MUT equipped to engage in entrepreneurial activities? This question is supported by three sub-questions, which are as follows:

- 1) How do geomatics graduates perceive the entrepreneurial training received during their studies?
- 2) What career pathways do geomatics graduates follow after completing their studies?
- 3) What challenges influence geomatics graduates' decisions to pursue or not pursue entrepreneurship?

1.3. THE RESEARCH PROBLEM

The primary aim of this study is to examine the extent to which geomatics graduates from MUT between 2018 and 2024 are equipped with the knowledge, skills and institutional support necessary to engage in entrepreneurial activities, and to explore the factors influencing their entrepreneurial intentions and participation within the profession. This period is particularly significant as it coincides with persistently high levels of graduate unemployment in South Africa and increasing policy emphasis on entrepreneurship as a mechanism for economic development and job creation (Stats.SA, 2025).

Although geomatics graduates acquire robust technical and analytical competencies in areas such as surveying, GIS, remote sensing and spatial data management, these skills have not translated into significant entrepreneurial activity within the profession. This observation aligns with existing literature, which suggests that technical competence alone is insufficient to stimulate entrepreneurial behaviour, particularly in the absence of entrepreneurial education (EE), institutional support and enabling ecosystems (Fayolle & Gailly, 2015).

Empirical evidence indicates that a substantial proportion of South African graduates continue to prioritise formal employment over self-employment, despite limited absorption capacity within the labour market (Bowmaker-Falconer & Meyer, 2021); (Fatoki, 2014a). In professional and technical fields such as geomatics, this trend is further compounded by regulatory barriers, capital constraints, limited exposure to business training and weak entrepreneurial role models (Urban & Kujinga, 2017). As a result, graduates often perceive entrepreneurship as high-risk, inaccessible or incompatible with their professional identity.

The limited entrepreneurial engagement among geomatics graduates is a matter of concern, as entrepreneurship has been widely recognised as a key driver of innovation, employment creation and economic growth, particularly in developing economies (Audretsch, 2007). In South Africa, small and medium enterprises (SMEs) are regarded as critical contributors to economic transformation and inclusive growth (NDP-2030, 2012). The absence of entrepreneurial initiatives within the geomatics sector may therefore contribute to industry stagnation, underutilisation of specialised skills and constrained career pathways for future graduates.

Against this backdrop, the present study seeks to explore the underlying factors influencing entrepreneurial intentions and behaviours among geomatics graduates from MUT. By examining graduates' perceptions, experiences and institutional influences, the study aims to generate context-specific insights that may inform curriculum development, policy interventions and support mechanisms to enhance entrepreneurial participation within the geomatics profession.

The proposed research aims to investigate the lack of entrepreneurial ambition and engagement among geomatics graduates from MUT from 2018 to 2024. Despite possessing robust technical skills essential for success in their field, recent data indicates that a significant majority of these graduates do not pursue entrepreneurial activities within their profession. This trend is concerning as entrepreneurial initiatives have the potential to drive job creation and contribute to the country's broader economic growth. The absence of such business ventures may lead to stagnation in the industry and limit career opportunities for future graduates.

1.4. SIGNIFICANCE OF THE STUDY

The findings of this study will have practical relevance for universities and curriculum designers. Insights into students' perceived skill gaps, industry challenges and support needs can inform the redesign of entrepreneurship modules, the integration of experiential learning and the alignment of curricula with industry realities. This may enhance graduates' readiness to pursue entrepreneurial pathways. By identifying factors that influence students' entrepreneurial intentions, the study can inform institutional strategies and national initiatives aimed at enhancing graduate employability and youth entrepreneurship, particularly within the Science, Technology, Engineering and Mathematics (STEM) field, which is mainly of an engineering nature but more specifically geomatics, which is considered a technical and scarce-skills discipline.

1.5. LIMITATIONS OF THE STUDY

This study is based on a small, purposively selected sample of geomatics graduates, which limits the extent to which the findings can be generalised to the broader population. The study also relies on self-reported data, which may be influenced by recall bias or social desirability.

In addition, the researcher's insider position as a lecturer in the geomatics programme may introduce potential bias, although reflexive practices were employed to mitigate this.

1.6. DELIMITATIONS OF THE STUDY

The study is delimited to geomatics graduates from MUT who completed their diplomas between 2018 and 2024. It focuses exclusively on graduates of the geomatics programme and excludes other engineering disciplines and institutions. The study adopts a qualitative approach, using semi-structured interviews, and does not aim to generalise the findings beyond the study context.

1.7. CHAPTER OUTLINE

This thesis is structured into six chapters.

Chapter 1 introduces the study by outlining the research background, problem statement, objectives, research questions and the study's significance.

Chapter 2 presents a comprehensive review of relevant literature, focusing on EE, graduate unemployment and entrepreneurial intentions, and establishes the theoretical framework underpinning the study.

Chapter 3 details the research methodology, including the research paradigm, design, population, sampling techniques, data production methods and ethical considerations.

Chapter 4 presents the study's results, organised according to the key themes that emerged from the data analysis.

Chapter 5 discusses the findings in relation to the research objectives, theoretical framework, existing literature and, occasionally, the paradigm.

Chapter 6 concludes the study by summarising the key findings, highlighting its contributions, acknowledging its limitations, and offering practical recommendations for policy, practice, and future research.

1.8. CONCLUSION

This chapter introduced the study, explaining its context and purpose. The research focuses on understanding why geomatics graduates from MUT (2018-2024) have shown limited or no involvement in entrepreneurial activities. The background section emphasised the broader issue of graduate unemployment in South Africa and highlighted entrepreneurship as a possible solution, particularly within the geomatics field. The chapter also outlined the research problem, objectives, significance, limitations and key questions, which are centred on graduates' training, available entrepreneurial opportunities and their views on EE. Furthermore, the study's importance was discussed from practical, theoretical and empirical perspectives, and its scope and limitations were clearly defined. These elements together form the foundation for the research. The next chapter will review the existing literature and present the theoretical framework guiding this study.

CHAPTER 2

LITERATURE REVIEW: UNDERSTANDING ENTREPRENEURSHIP AMONG UNIVERSITY GRADUATES

2.1. INTRODUCTION

This literature review examines a range of publications on entrepreneurship among university graduates. It is guided by the research questions outlined in the previous section. It examines the role of small, medium and micro enterprises (SMMEs) in the country's economic development, highlighting their contributions to unemployment and growth. Furthermore, this literature review examines the underlying factors that impact the success and growth of SMMEs. These limiting factors include government policies and regulatory frameworks. Finally, it identifies potential opportunities for graduate entrepreneurs within the evolving economic landscape.

The forthcoming literature will be examined alongside existing national and provincial policies, as well as mandated statements from state-funded developmental agencies regarding the establishment and funding of small businesses. Furthermore, an assessment of the course content of the relevant qualification will be conducted to determine whether it possesses sufficient epistemological depth to shape graduates' perspectives.

2.2. LEGALITY AND GOVERNMENT POLICIES

This section outlines the legal and policy frameworks that shape entrepreneurship in South Africa and provides important background for the study. Since entrepreneurial activity is influenced by individual characteristics and regulatory and institutional environments, understanding relevant government policies is necessary to situate the experiences of geomatics graduates within the broader socio-economic and policy context.

2.2.1. NATIONAL ACTS

The Companies Amendment Act 16 of 2024 updates South Africa's Companies Act 71 of 2008 to strengthen corporate governance, accountability and transparency. Overall, the Act aims to

create a more transparent, accountable and efficient corporate regulatory environment aligned with international best practices (South Africa, 2024).

The National Small Business Act 102 of 1996 offers a legislative basis for supporting small businesses in South Africa. The Act establishes categories for small businesses and provides guidance for national government approaches to small business development. The Act aims to promote economic growth, job creation and the development of micro- to medium-sized enterprises (South Africa, 1996). In addition, this Act provides a foundation for the provision of small business funding through agencies such as the National Youth Development Agency (NYDA), the Small Enterprise Development Finance Agency (SEDFA), and others.

The Companies Act 71 of 2008 provides a comprehensive regulatory framework for companies in South Africa, covering incorporation, governance, rescue, mergers and regulatory oversight through bodies such as the Companies and Intellectual Property Commission (CIPC) (South Africa, 2008), to promote transparency, efficiency and economic development (CIPC, 2025).

2.2.2. GEOMATICS LEGALITIES AND PROFESSIONAL BODIES

The Department of Reform and Rural Development plays a pivotal role in advancing land governance and spatial information management within the national framework. Its operational mandate is executed through two specialised branches, namely Cadastral Advisory and Research Services (CARS) and National Geo-spatial Information (NGI), each with distinct purposes and functional responsibilities (DLRRD, 2025).

The primary objective of the CARS is to provide comprehensive cadastral advisory and research services that support land administration and reform initiatives. Among its core functions, it oversees the registration processes for professional land surveyors, technical surveyors and sectional title practitioners, ensuring compliance with statutory requirements.

The NGI, on the other hand, is tasked with delivering national geo-spatial information services to facilitate spatial planning, resource management and decision-making. Among its core functions are surveying services, mapping and the geo-spatial information support for the geomatics industry at large (DLRRD, 2025). As a result of the NGI's involvement in technological advancements within the profession, it also has a student training department that helps develop diploma graduates from MUT.

The Geomatics Profession Act 19 of 2013, colloquially referred to as the GPA, provides a regulatory framework for the geomatics profession in South Africa by establishing the SAGC, defining categories of registered practitioners and branches, reserving work for those categories, facilitating access to the profession, safeguarding professional integrity and ethics and instituting disciplinary and appeal procedures. The Act aims to transform the profession and protect the public interest in geomatics (South Africa, 2013). The SAGC's Code of Conduct outlines registered geomatics practitioners' obligations to perform work with integrity, transparency and competence, while prohibiting unethical conduct and misrepresentation, mandating accountability and transformation in the profession and protecting the public interest and environment (SAGC, 2017).

Geomatics, which includes traditional surveying and GISc, is regulated in South Africa under the GPA and overseen by SAGC. Registered practitioners fall into four categories: professional surveyors, technologists, technicians and in-training. Each of these categories has specialised roles such as land, engineering, mining, hydrographic and GIS surveying (SAGI, 2025). Furthermore, each of these special categories is trained at different tertiary institutions. It is worth mentioning that diploma graduates from MUT can be registered in two categories: technologist and technician.

The South African Geomatics Institute (SAGI) functions as an industry watchdog, ensuring that work reserved for registered practitioners is undertaken by individuals with the appropriate statutory registration. By promoting compliance with the GPA and maintaining peer discipline, SAGI helps prevent unauthorised practice and upholds the integrity of the profession (SAGI, 2025).

2.3. THEORETICAL FRAMEWORK OF THE STUDY

The theoretical framework provides the foundation for this study, guiding data production, sample analysis, and the overall approach to achieving the research objectives. It is important to distinguish between the conceptual and theoretical frameworks, as the latter is broader and encompasses the former (Regoniel, 2015). In this regard, the theoretical framework plays a critical role in directing the study by identifying key variables to be measured and determining the statistical or interpretive relationships to be examined (Borgatti, 1999).

Within this context, the Theory of Planned Behaviour (TPB), developed by Icek Ajzen in 1985, is adopted as the primary theoretical lens for this study. TPB is widely recognised as one of the most influential models for understanding and predicting human behaviour, particularly in contexts where behaviour is intentional and under volitional control (Ajzen, 2011). The theory posits that behaviour is primarily driven by behavioural intention, which is in turn shaped by three key constructs: attitudes towards the behaviour, subjective norms, and perceived behavioural control.

Despite its widespread application, TPB has not been without criticism, particularly regarding its ability to fully capture the complexity of human behaviour. Nevertheless, its structured and parsimonious nature makes it a valuable framework for examining behavioural intentions. As noted by Inoubli (2024), TPB is particularly effective for understanding intention formation, a critical precursor to action. In the context of entrepreneurship, intention represents the initial stage of the entrepreneurial process, making TPB particularly suitable for studies focused on entrepreneurial behaviour.

The selection of TPB for this study is therefore justified by its flexibility, its strong empirical support, and its alignment with the research questions and underlying paradigm. It provides a coherent framework for exploring and analysing the cognitive drivers of entrepreneurial intention. Below is the flow chart of Ajzen's TPB, which clearly defines its constructs.

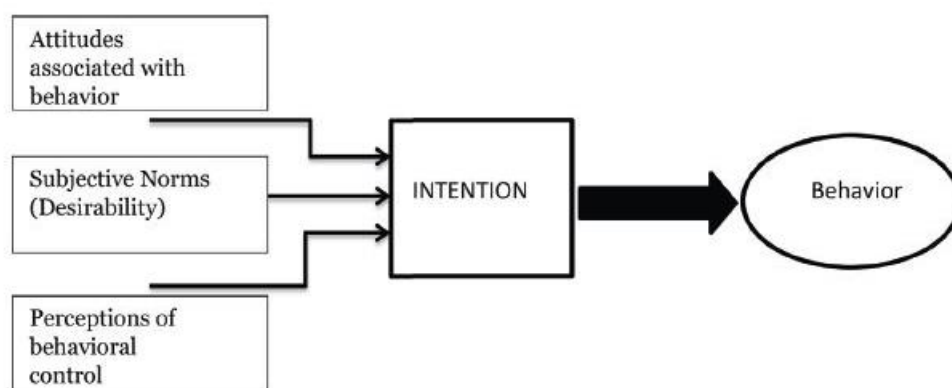


FIGURE 1: MODEL OF AJZEN'S THEORY OF PLANNED BEHAVIOUR

2.3.1. THE CRITIQUES OF THE TPB

Despite its widespread use, TPB has been subject to significant critique. A key limitation is the intention-behaviour gap, whereby intentions do not always lead to action due to contextual

constraints or changing circumstances (Sheeran, 2002); (Sniehotta et al., 2014). The theory has also been criticised for its rationalist focus, which underrepresents the roles of emotion, identity, intuition and social context in behavioural decision-making (Conner & Armitage, 1998). Within entrepreneurship research, TPB is seen as insufficient for capturing the dynamic, process-driven nature of entrepreneurial action and the influence of broader structural and institutional factors (Bagozzi, 2007), as also criticised by (Welter, 2011). These limitations indicate that while TPB is a valuable explanatory framework, it is insufficient on its own, thereby supporting the use of a qualitative, interpretivist methodological approach in the present study.

2.3.2. THE VALUE OF THE TPB

Ajzen's TPB provides a well-established framework for understanding intentional behaviour in contexts involving volitional control. The theory proposes that behaviour is driven by intention, which is shaped by attitudes towards the behaviour, subjective norms and perceived behavioural control (Ajzen, 2011). This was synthesised in a Madzikanda et al. (2022) description that TPB highlights the importance of individuals' attitudes, subjective norms, and perceived behavioural control in shaping entrepreneurial intentions.

TPB has been widely applied in entrepreneurship research to explain entrepreneurial intention, as it systematically captures the cognitive antecedents of action (Krueger Jr et al., 2000); (Liñán & Chen, 2009). Its usefulness has been supported across diverse cultural and educational settings, with combined evidence confirming its strong predictive validity for intention-related outcomes (Armitage & Conner, 2001); (Schlaegel & Koenig, 2014). As a result, TPB remains a prominent theoretical framework for examining entrepreneurial motivation and decision-making and is hence favoured for this research study.

The TPB also emerged as a widely applied framework for understanding behavioural intentions in agricultural contexts (Sok et al., 2021), particularly regarding the adoption of sustainable practices. The theory posits that behaviour is primarily influenced by an individual's attitudes, subjective norms, and perceived behavioural control, making it a useful tool for examining farmer decision-making. In one sub-Saharan Africa study, it was stated that the TPB provides a useful framework for analysing tax compliance by examining how attitudes, subjective

norms, and perceived behavioural control shape taxpayers' intentions and behaviour (Oseifuah, 2025).

2.4. ENTREPRENEURIAL INTENTIONS OF GRADUATES

This section reviews existing literature on entrepreneurial intentions among graduates to establish a theoretical foundation for analysing entrepreneurial behaviour. Since entrepreneurial activity is often preceded by intention, understanding the factors that influence graduates' entrepreneurial intentions is essential for explaining their career choices and levels of participation in entrepreneurial activities.

2.4.1. THEORETICAL FOUNDATIONS OF ENTREPRENEURIAL INTENTIONS

According to the famous and widely cited research by Ajzen (1985), the balance between intention and behaviour can be disrupted by external factors. For example, in a rebranded analogy, an intention to go to the beach on the weekend can be obstructed by an external factor such as the weather. This is despite all the preparation a person may have put in place, such as stocking up on items needed for a beach visit, to achieve that intention (Ajzen, 1985). Additionally, the most effective application of the TPB within the entrepreneurial ecosystem theory requires an understanding of how personal motivations and contextual barriers interact to influence entrepreneurial behaviour in developing regions such as South Africa (Madzikanda et al., 2022).

The TPB was developed based on the above findings. The methods used were derived from a particular study in which college women reported their intentions to lose weight over a two-month period, along with their engagement in various dietary behaviours and physical activities during that time. The findings showed that the intention to lose weight had a non-significant correlation of 0.16 with actual weight loss, but a significant correlation of 0.49 with the index of weight-control behaviours. Considering that dietary practices and physical activity represent concrete attempts to reduce weight, the results suggest that intentions were more effective in predicting behavioural efforts toward weight reduction than actual changes in body weight (Ajzen, 1985).

Within the TPB, the most detailed information about the determinants of a given behaviour is found in an individual's behavioural, normative and control beliefs. However, the theory does not specify the origins of such beliefs (Ajzen, 2011). The study found that intentions can predict not only an individual's attempt to perform a behaviour, but also its successful execution. It is therefore accepted that the behavioural intention is as good as the intention to attempt performing a given behaviour (Ajzen, 1985).

In a separate study that was undertaken to examine the role of culture on entrepreneurial intentions within the framework of the TPB, it was found that personal attitude had a significant influence on entrepreneurial intention (Mfazi & Elliott, 2022). The survey, conducted among more than 300 university graduates from one of South Africa's universities, emphasised the need to redefine various notions of culture. Another TPB-linked study by Malebana (2015) found a link between subjects' entrepreneurial intentions and their backgrounds. This study was conducted among more than 300 final-year students in the commerce programme.

2.4.2. DEMOGRAPHIC AND SOCIO-CULTURAL INFLUENCES

In a study by Farrington et al. (2012) involving 447 graduates from three universities, the researchers aimed to determine whether entrepreneurial intentions were associated with demographic profiles. The empirical results indicated that demographic variables do influence respondents' intentions to start their own businesses. Generally, it is perceived that many black Africans do not find entrepreneurship appealing; instead, they tend to opt for less risky job positions as there is a sufficient demand for qualified professionals offering lucrative packages (Farrington et al., 2012). While this viewpoint may hold some validity, it does not apply to the geomatics profession where the job market is saturated with graduates seeking employment. This disparity is precisely what this proposed research intends to explore.

Similarly, findings from a study by Fatoki (2010), based on a sample of 700 graduates, five primary determinants of entrepreneurial intentions were identified, including employment opportunities as a key motivating factor. In a slightly different study that investigated the main factors influencing entrepreneurial intention among students registered at one of the South African distance learning institutions, it was found through an online survey that entrepreneurship education and self-efficacy play a significant role in shaping students'

entrepreneurial intentions, with self-efficacy showing a stronger influence than factors like work preparedness and entrepreneurial orientation (Makhitha, 2025).

2.4.3. ROLE OF HIGHER EDUCATION IN SHAPING ENTREPRENEURIAL INTENTIONS

The HE system is frequently characterised as a pivotal mechanism for delivering quality education (Al Hinai et al., 2020). However, this function alone cannot fully account for the development of graduates' critical thinking and entrepreneurial inclination. Entrepreneurial intention, as articulated by Inoubli (2024), emerges from a pre-existing desire that subsequently influences decision-making processes. Thus, one might contend that education serves merely as a supplementary factor to an individual's inherent intention to pursue entrepreneurship.

Moreover, it has been observed that universities tend to prioritise disciplinary theories, often at the expense of practical business acumen (Fatoki, 2014a). It is posited that the integration of business management studies into the tertiary education curriculum should be obligatory for all graduates (Fatoki, 2014b). This strategic adjustment could address the current trend in which institutions primarily prepare students for roles as competent employees, failing to adequately impart essential business fundamentals.

There is an increasing need for tertiary institutions to play a more active role in developing graduates' awareness of entrepreneurship and preparing them for self-employment and business creation. As traditional employment opportunities become more limited, especially for new graduates, HE institutions are expected to equip students with entrepreneurial knowledge, practical skills and mindsets that support innovation, adaptability and independent economic participation. Strengthening entrepreneurial preparedness can enable graduates to identify opportunities, manage risk and create sustainable ventures, thereby contributing to employment creation and broader economic development (Skosana, 2014).

2.4.4. ENTREPRENEURIAL INTENTIONS IN ENGINEERING AND TECHNICAL FIELDS

Specifically, engineering programmes typically do not encompass entrepreneurial training, particularly at the undergraduate level, which contributes significantly to economic challenges within the nation (Antonites & Nonyane-Mathebula, 2012). Furthermore, the underutilisation of support programmes available to SMMEs by the South African National Department of Trade and Industry highlights a critical gap in resource awareness (Worku, 2016).

The investment in human capital through EE is vital (Antonites & Nonyane-Mathebula, 2012), fostering economic growth through knowledge dissemination and as an empowerment mechanism. It is crucial to establish training programmes tailored to specific engineering disciplines or vocational trades (Worku, 2016), acknowledging that business models vary significantly. Additionally, embedding these training initiatives within the academic curriculum, particularly for prospective Matric graduates, is essential (Worku, 2016).

Research indicates that engineers exhibit lower levels of entrepreneurial orientation compared to their counterparts in non-engineering fields (Antonites & Nonyane-Mathebula, 2012), a disparity that can be attributed to the prevailing lack of EE in South Africa. A novel theory of technopreneurship, explored through a “pretest-posttest” quasi-experimental design, investigated the entrepreneurial perceptions of non-business engineering students before and after an entrepreneurship intervention (Urban & Barreira, 2007). The findings, derived from quantitative analysis, indicate a significant increase in self-employment intentions, reinforcing the importance of educating recent graduates to foster entrepreneurial spirit. The study advocates integrating its outcomes with existing theoretical frameworks and calls for further research to elucidate the relationships among these variables (Urban & Barreira, 2007).

2.4.5. EXPERIENTIAL LEARNING AND INTERNSHIPS

Botha and Bignotti (2016) provide a different perspective, focusing on whether internships enhance entrepreneurial intentions. A survey of entrepreneurship and business management programmes across 23 South African tertiary institutions found that the positive influence of internships is paramount. The study further advocates for the incorporation of an internship component in such business programmes.

2.5. ENTREPRENEURSHIP EDUCATION

This section reviews existing literature on EE to examine the role of HE institutions in developing entrepreneurial skills and competencies among graduates. Since education is a key influence on entrepreneurial intentions and behaviour, analysing EE provides an important basis for understanding graduates' preparedness to pursue entrepreneurial career pathways and engage in venture creation.

2.5.1. PURPOSE OF ENTREPRENEURSHIP EDUCATION

Entrepreneurship is largely regarded as a viable strategy for addressing unemployment and as a potential pathway to financial independence. This study is particularly relevant in the South African context where unemployment rates persistently remain high despite a highly educated workforce. By fostering entrepreneurial activity, graduates may not only create opportunities for self-employment but also contribute meaningfully to economic growth and the development of sustainable careers (Inoubli, 2024).

A study that had similar patterns as this current one, in terms of paradigm and methodology, was carried out examining industrial design graduates from one of South Africa's UoTs, in order to understand the effectiveness of entrepreneurship education and its impact in supporting these graduates to start up business ventures (Mvula, 2022). Of the purposive sample of 22 graduates who participated in semi-structured interviews with open-ended questions, 45% had successfully established their businesses.

2.5.2. ENTREPRENEURSHIP EDUCATION IN HIGHER EDUCATION

The study by Kleine et al. (2020) revealed that EE has increased globally, with many universities incorporating entrepreneurship modules. Furthermore, this study found that experiential learning and an integrated curriculum are vital for developing the mindsets required for technology-driven entrepreneurial activities.

Closer to home, a study where data was collected from four academic staff members and more than 250 postgraduate students from both the University of KwaZulu-Natal (UKZN) and the University of Zululand (UniZulu), showed that these students had strong entrepreneurial mindsets and a willingness to pursue entrepreneurship (Mtshali & Mashau, 2024). Prior to this

study, the perception was that not all students aspired to become business owners and many preferred employment. The study confirms that attitudes form a foundation for intentions and that EE is an important tool for reversing negative perceptions of entrepreneurship.

Despite EE by some South African universities, it is claimed that the education system produces insufficient numbers of business owners, and this has been flagged as a gap in how EE is structured (Ramchander, 2019). Among the study's findings, the strength of entrepreneurship modules differed significantly between undergraduate and postgraduate qualifications, with the latter supported by robust mentorship, thereby adding another layer to this phenomenon.

In another study similar to the above, which collected data from 15 participants, the factors influencing graduates who start their own businesses were examined. The findings supported the experiential learning approach, but also revealed that entrepreneurial readiness does not solely lie with education; factors such as mentoring are also of paramount importance (Lose & Cheteni, 2024). Similarly, Qwabe et al. (2025) found in their study that EE fosters an entrepreneurial mindset across all graduates.

Price and Ronnie (2021) studied the packaging and delivery of EE within a South African UoT, to address shortcomings in the contents of modules. Fourteen EE courses across eleven disciplines were analysed, and semi-structured interviews were conducted with ten lecturers to understand their teaching and learning approaches. The findings highlight three contextual factors that significantly shape EE practices: students' socio-economic challenges, lecturers' levels of entrepreneurial engagement and industry experience. It was perceived that these elements influenced both curriculum development and classroom delivery and were identified as one of the bottlenecks to the effectiveness of EE (Price & Ronnie, 2021).

2.5.3. ENTREPRENEURSHIP EDUCATION IN THE GEOMATICS CURRICULUM

It was mentioned that in tertiary institutions that offer qualifications in geomatics, though this largely relates to the University of Cape Town's (UCT) phenomenon, the curriculum has largely remained the same for decades and requires a collective review, as it currently limits growth and transformation of the profession (Hull et al., 2024). The same applies to MUT; its diploma curriculum has remained the same over the past decades. It is therefore envisaged that

the resulting framework, based on the findings of Hull et al. (2024), will provide guidance for similar curriculum changes at MUT.

In a study by Raghubar and Allopi (2025), a number of geomatics practitioners in the province of KZN were asked about the importance of work-integrated learning (WIL). The findings demonstrated a consensus that WIL is as important as classroom learning and that it promotes the acquisition of discipline-specific knowledge and practical competence, which not only improves graduates' employability but also sets them on a path to success within the geomatics profession.

2.5.4. INCUBATION AND MENTORING

One of Africa's key strengths in entrepreneurship is rooted in social cohesion, which fosters the growth of social entrepreneurship and incubation across the continent (Bucci & Marks, 2022). However, there is limited understanding of how entrepreneurial learning occurs within incubators. This study investigated the learning experiences of social entrepreneurs in South African incubators, employing a phenomenological methodology to capture their lived experiences. However, it highlights that the needs of social entrepreneurs are often unmet. The findings indicate that, during incubation, social entrepreneurs acquire business and entrepreneurial knowledge from mentors, which they subsequently apply to transform themselves and their ventures.

An Italian study identified twelve strategies employed by university business idea incubators to foster student entrepreneurship, and at number one was mentorship (Mele et al., 2022). The article also provided examples of successful business ideas developed by students through their participation in these incubators. Role models such as family and friends play a significant part in influencing graduates' decisions to pursue an entrepreneurial path (Worku, 2016); however, many graduates lack such supportive backgrounds. The importance of familial pedigree in graduates' decisions to become entrepreneurs cannot be overlooked (Skosana, 2014).

A study carried out by Malebana and Mahlaole (2023) applied the TPB to examine the effects of pre-entrepreneurship exposure and work experience on students' entrepreneurial intentions at a South African UoT. The study's findings suggest that not only the amount of experience, but also its quality and type, matter. There are positive outcomes from pre-exposure to

entrepreneurial undertaking, which is more likely to stimulate intention (Malebana & Mahlaole, 2023).

The above study resonates with the findings of Gabrielsson and Politis (2012) that revealed that work experience shapes the generation of new business ideas. Furthermore, these findings enhance the understanding of ways in which pre-work exposure interacts with the individual's learning during the early stages of entrepreneurial idea development (Gabrielsson & Politis, 2012). While the findings from a Bignotti and Le Roux (2020) study, showed that prior exposure to business-related activities positively influences entrepreneurial intentions.

Desta (2015) study examined the role of networks in facilitating the growth of SMMEs, focusing on four types: social, general business, managerial and ethnic networks. The research examined how these networks contribute to the development and performance of SMMEs. Data was collected from both local and foreign SME owners in the Free State province using stratified random and snowball sampling techniques. The findings indicated that networking positively influenced the growth of SMMEs. Furthermore, the study revealed that managerial networks are particularly significant for locally owned SMEs, whereas ethnic networks are more strongly associated with the growth of foreign-owned SMEs (Desta, 2015).

2.6. GEOMATICS ENTREPRENEURSHIP

This section examines entrepreneurship within the geomatics profession to contextualise entrepreneurial activity in a highly technical and regulated industry. Geomatics entrepreneurship requires compliance with professional regulations, specialised technical expertise and adaptation to rapid technological change. Understanding these factors is essential for analysing the opportunities and constraints faced by geomatics graduates within professional entrepreneurial contexts.

2.6.1. NATURE OF GEOMATICS ENTREPRENEURSHIP

According to Owusu-Awuah (2024), geomatics enterprises can adopt a sustainable, long-term entrepreneurial approach by offering a diverse catalogue of services. One of the key elements is the attainment of clients, which is followed by forming good surveying teams that usually assure these clients of the services rendered to them (Owusu-Awuah, 2024). On the other hand,

identifying clients and achieving working cash flow have proven to be obstacles. However, the entrepreneurial approach has several benefits, including client satisfaction, employment opportunities and a professional footprint, and is supported by new advanced technologies in delivering geomatics services.

2.6.2. REGULATORY AND LEGAL ENVIRONMENT

First and foremost, in order for geomatics businesses to be deemed legal and compliant with the GPA, the directors and past directors of personal liability companies are jointly liable together with the company for all debts and liabilities arising during their periods of office (SAGC, 2017). Consequently, the registration of geomatics firms entails a rigorous process in which the Memorandum of Incorporation serves as the primary legal document required for their establishment and registration (CIPC, 2025).

2.6.3. BUSINESS MODELS AND CATALOGUE OF SERVICES

Both GISc and GIS offer essential theoretical and technological foundations for spatially informed planning and decision-making for sustainability (Coetzee et al., 2013). GIS originated in developed countries and has increasingly spread into developing countries, such as South Africa (Musakwa, 2017; Serame & Afuye, 2024). The town planning profession was among the first to utilise this technology as it provided essential data for urban planning. It was found that GIS is underutilised; however, the study showed that some municipalities have made progress in its implementation despite various adversities, including a lack of political support (Musakwa, 2017). Although geospatial technologies are gaining increasing recognition across the geomatics and general society, vending companies continue to develop promising applications that aid their adoption in surveyors' everyday work and inform their decision-making processes (De Vries, 2022).

2.6.4. TECHNOLOGICAL INNOVATION IN GEOMATICS ENTERPRISES

Innovation can be understood as a departure from existing methods and the adoption of new approaches. In this sense, innovation represents a positive change that replaces outdated practices with more effective alternatives (Munir, 2021). Entrepreneurs play a central role in this process, as they identify and capitalise on emerging market trends and develop innovative

solutions to existing problems by applying novel ideas and strategies. Through innovation, entrepreneurs can design new products and services that respond to clients' evolving needs and thereby establish market specialisation areas (Munir, 2021).

As both a profession and an industry, geomatics is positioned at the forefront of transformation brought about by emerging technologies, and organisations of all sizes must adapt to this rapid growth, which comes with associated costs (Barry, 1999). These instruments support the development of strategies that enable the geomatics industry to remain competitive and to lead in addressing the challenges of the future (Barry (1999).

2.6.5. EMERGING TECHNOLOGIES AND INDUSTRY BARRIERS

The global construction industry has implemented integrated new technologies in its projects, including the use of Unmanned Aerial Vehicles (UAVs). A study by du Plessis and Amoah (2025) sought to identify factors limiting the adoption of UAVs for project monitoring in the South African construction sector. A qualitative research design was used, using open-ended interviews with 12 purposively selected industry professionals. The findings indicated that the implementation of UAVs is hindered by high procurement and operational costs, a shortage of trained pilots, aviation regulatory restrictions and software-related requirements. Although this technology is well embraced by the sector, these barriers significantly reduce its utilisation. As a result, despite the benefits associated with this technology, the South African construction industry continues to lag in its adoption. Addressing these constraints is crucial for enabling broader adoption and enhancing the effectiveness of project management (du Plessis & Amoah, 2025). The drone operation approval process in South Africa has numerous bottlenecks that pose significant challenges due to these regulatory procedures. These challenges include prolonged delays, prompting stakeholders in the drone industry to call for amendments to existing regulations (Mokoena et al., 2022).

2.7. FACTORS IMPEDING THE SUSTAINABILITY OF BUSINESSES

This section examines the main factors that hinder the sustainability and long-term success of entrepreneurial ventures in the South African context. Business sustainability is shaped not only by individual entrepreneurial skills but also by broader economic, institutional and socio-cultural conditions that affect access to resources and support. Understanding these challenges

is important for this study as they help explain the external constraints that may discourage graduates from pursuing entrepreneurship or limit the growth of their ventures.

2.7.1. GENERAL BARRIERS TO ENTREPRENEURIAL SUSTAINABILITY

The study by (Malebana, 2015) identified twelve key barriers that influenced students' entrepreneurial intentions, their attitudes toward becoming entrepreneurs and their perceived behavioural control. These barriers included: difficulty in finding the right business partner; challenges in obtaining finance; the high risks associated with launching a new venture; insufficient savings; limited financial skills; difficulty persuading others to support their business ideas; high taxes and bank fees; a lack of suitable business premises; inadequate general management skills; uncertainty about the future; diverse regulatory compliance requirements; and fear of failure.

In a study by Van Vuuren and Groenewald (2007), they identified four key factors that influence the establishment of small businesses and entrepreneurial ventures: personal management and involvement, the presence of role models, effective time management and support from partners and advisors. The findings further indicate clear differences in the needs and influencing factors across demographic and business-related categories, particularly between female and male entrepreneurs, across different age groups and at varying stages of the business life cycle.

The role of business is to develop markets, accumulate capital through trading and foster a commercial culture and skill set (Clover, 2004). Clover's thesis differentiates various models of entrepreneurship and the operational methods associated with each. The individual dynamics of business owners were examined, focusing on their backgrounds, influences from role models or family, and motivations for entrepreneurship (Clover, 2004). This study surveyed 44 agribusiness SMME owners to identify constraints on business performance and to examine the relationship between entrepreneurial quality and business success, as measured by loan repayment performance. The findings revealed eight significant perceived constraints: limited access to services, start-up funding shortages, inadequate management capacity, difficulty accessing tender contracts, high compliance costs, liquidity stress, lack of collateral and insufficient institutional support.

2.7.2. FINANCIAL AND FUNDING CONSTRAINTS

Finance is often regarded as one of the primary constraints on the survival and growth of any business, particularly during its early years (Clover, 2004). However, the background and determination of the business owner can positively influence this challenge, as determination is recognised as a crucial element in successfully running a business. Major barriers to entry have been identified, including difficulties in obtaining financial support, securing credit and accessing opportunities for entrepreneurial activities (Worku, 2016). Msomi and Olarewaju (2021) suggest that the reason for the scepticism in borrowing from government agencies may indicate a lack of confidence in these institutions. Consequently, loan accessibility requirements should be appropriately relaxed to accommodate small business owners across diverse levels of capacity and development.

SMMEs continue to encounter persistent barriers that constrain their establishment and growth. This study employed a quantitative research approach to identify the common and contrasting impediments affecting SMME development in South Africa (Khoase et al., 2020). The findings indicated that entrepreneurs widely perceive limited access to finance, high interest rates, the income tax system and high rental costs as the primary sources of financial strain hindering effective business operation and sustainability. Similar findings in a Peters and Brijlal (2011) study suggests that though SMMEs are a key driver in the country's economic growth, challenges such as limited access to markets and procurement, inadequate finance and credit, low skills and education levels, restricted access to information, and a shortage of effective support institutions have a negative impact (Peters & Brijlal, 2011).

The challenges faced by South African SMMEs are not entirely unique; however, the enduring effects of apartheid render them more complex to address. Despite having a democratic government for several decades, South Africa remains in a transitional phase. Such transitions are typically characterised by political uncertainty, which can deter foreign investment, thereby hindering development and providing fewer work opportunities for the geomatics sector and the like (Zondi, 2017). The findings suggest that the government is unable to effectively address this conundrum. Zondi's (2017) findings further suggest that unless the government designs and delivers training programmes that adequately address the varied requirements of all SMMEs, this will persist. This was echoed by Peters et al. (2025), whose study highlighted

the need to reassess support systems to promote meaningful economic development for South Africa's diverse population.

It was found that the SMMEs that have received support from both the private and public sectors held much more potential to contribute to sustainable and inclusive economic growth (Peters et al., 2025). The study found that, despite the government's efforts to stimulate SMME development in South Africa, the effectiveness of these interventions remains largely inconclusive three decades into democracy.

To stimulate SMMEs' desire to access funding, Baloyi and Khanyile (2022) conducted a study proposing a modernised funding model to enhance SMMEs' access to external finance. A purposive sampling strategy was employed, consisting of 24 in-depth interviews and 160 completed survey questionnaires. The study's key outcomes included the development of a blended funding model. These findings suggest that restructuring lending instruments to integrate both public and private financial resources can foster the desired appetite for funding among both funding institutions and SMMEs. Based on the study's findings, the lower limit should be at least R250, 000, with a maximum of R2 million. Commercial banks should employ more developmental and flexible assessment practices when evaluating loan applications (Baloyi & Khanyile, 2022).

2.7.3. SOCIO-ECONOMIC AND CULTURAL IMBALANCES

The 2013 report found that South Africa has a lower entrepreneurship rate (11%) compared to other African countries, such as Zambia (40%), Nigeria (27%), Ghana (26%), Angola (22%) and Botswana (21%). These findings are consistent with historical trends, where South Africa has consistently ranked poorly in entrepreneurial activity (Musetsho & Lethoko, 2017). Studies such as this largely support the notion that South Africa's historical context and a stagnant economy are major underlying factors that exacerbate the challenges its graduates face in finding employment.

In comparison to other ethnic groups, it is said that the black majority of the population in South Africa demonstrates a lower level of engagement in entrepreneurial activities (Preisendörfer et al., 2012). The article's findings, based on 24 expert interviews, identified five principal explanatory patterns, with particular emphasis on mindset and social networks as the most influential factors. Furthermore, socio-cultural values, in particular the notion of

social capital, emerged as critical areas for further research in addressing the underrepresentation of black entrepreneurship within the South African context (Preisendörfer et al., 2012).

Another study that seems to support the above provides an analysis of the low levels of entrepreneurship among indigenous Africans through the lens of socio-cultural theories (Co, 2003). The socio-cultural theoretical perspective accounts for differences among societies and cultures in shaping entrepreneurial behaviour. Among the five key socio-cultural theories examined were: Weber's protestant ethic, Hagen's withdrawal of status, social mobility, marginality and role models (Co, 2003).

Zwane and Osuigwe (2024) found that entrepreneurship interventions, such as lecture-based approaches, have a greater influence on entrepreneurial intentions. It is further stated that if those interventions include a practical business skills programme, they have a much greater impact. Overall, the study suggests that providing entrepreneurship programmes could help overturn the negative entrepreneurial intentions among disadvantaged youth.

A correlation has been established between the problems experienced by ethnic entrepreneurs and their marketing skills. Enhancing the marketing skills of ethnic entrepreneurs can help address unemployment and strengthen the South African economy. The research has also established that a positive relationship exists between ethnical and cultural background and successful small businesses in South Africa (Van Scheers, 2010).

2.7.4. MARKET OPPORTUNITIES AND INDUSTRY CONDITIONS

Engineers play a crucial role in the knowledge economy due to their formal education (Antonites & Nonyane-Mathebula, 2012) and they are expected to uncover opportunities others might miss. A study examining the entrepreneurial orientation among engineers in South Africa revealed that it is at a notably low level (Antonites & Nonyane-Mathebula, 2012).

Research conducted on eligible businesses within the five geographical zones of the Vaal Triangle found that a significant proportion of these enterprises fail within three years of their establishment (Worku, 2016). Compared with businesses in other countries, South African firms tend to have a markedly shorter lifespan, whereas their international counterparts typically survive for at least seven years. The key factors leading to these failures include

inadequate financing, a lack of mentorship programmes and insufficient training. Further in-depth investigation will be undertaken to determine whether these findings are directly related to the issues at hand (Worku, 2016).

It is anticipated that engineers with an entrepreneurial orientation could make significant contributions to the growth of entrepreneurship within the country (Antonites & Nonyane-Mathebula, 2012). Additionally, a separate study by Luiz and Mariotti (2011) assessed South Africa's performance in fostering an entrepreneurial economy. This study surveyed 609 university students to evaluate their perceptions of entrepreneurship, available opportunities and their overall attitudes towards entrepreneurship in South Africa.

The findings indicated that South Africa ranks poorly in the Global Entrepreneurship Monitor survey (Luiz & Mariotti, 2011), placing it among the lowest globally. Consequently, this study highlights the pressing need for initiatives that aim to enhance economic conditions. Such measures could facilitate market expansion, create employment opportunities and enhance the overall well-being of the population (Luiz & Mariotti, 2011).

2.7.5. EFFECTS OF UNEMPLOYMENT ON ENTREPRENEURIAL ENGAGEMENT

Because of the rising unemployment in South Africa, Shambare (2013) suggests that entrepreneurship is an alternative career pathway. The stumbling block is that university graduates lack interest in pursuing entrepreneurial careers. Moreover, South African economic policies have introduced initiatives to promote youth entrepreneurship, but these measures have had a minimal impact on students' willingness to engage in entrepreneurial activities (Shambare, 2013). This study examined the barriers to entrepreneurship experienced by students, surveying 235 university students using self-completion questionnaires. The study identified two distinct categories of students: sceptics and optimists. The key themes influencing this research include family and social influence, exposure to entrepreneurial activity, access to entrepreneurial support and educational factors. The paper, therefore, concluded by discussing practical strategies to address the lack of student engagement in entrepreneurship.

The high rate of youth unemployment in South Africa is linked to several issues, and among these, limited youth participation in entrepreneurial activities (Iwara et al., 2019). The discussions around this issue have focused on physical, environmental, economic and political

factors, with comparatively little attention given to social and cultural influences. Given that these social and cultural factors shape every society, interventions that ignore them may be insufficient, found Iwara et al. (2019). The study employed a mixed-methods research design, focusing on socio-cultural factors influencing young graduates' low entrepreneurial engagement in Thohoyandou. Of the 56 participants, the study identified three key influences: reference groups and family (35%), personal lifestyle and standards (34%) and societal entrepreneurship orientation (31%).

2.7.6. INSTITUTIONAL CONSTRAINTS AND CORRUPTION

Graduate employment in the public sector, through learnerships and graduate programmes targeting youth, is a critical intervention in addressing skills development and tackling high youth unemployment levels (Mchunu, 2019). However, persistent concerns regarding corruption and maladministration in the public sector have undermined trust in key public institutions. There is a rise in corruption-related concerns among South African citizens, and this study has found that perceptions of public sector corruption influence young graduates' attitudes toward public sector recruitment processes, their trust in public institutions and their willingness to pursue public sector employment after graduation (Mchunu, 2019).

A study was conducted to examine the relationship between corruption and productive entrepreneurship and to assess whether country-specific characteristics influence this relationship (Avnimelech et al., 2014). This paper made three key findings: first, countries with higher levels of corruption tend to experience lower levels of entrepreneurship. Second, the findings indicate that this adverse effect is considerably stronger in developed countries than in developing ones. Third, the study investigates whether the magnitude of corruption's impact varies across countries' specific economic characteristics. Overall, the results highlight the importance of combating corruption not only in developing nations but also in developed economies (Avnimelech et al., 2014).

2.8. RESEARCH GAP AND OPPORTUNITIES

Although research on EE and graduate entrepreneurship is increasing, very few studies have examined how graduates in geomatics or within the geomatics industry form start-up businesses. Most existing studies focus on broad graduate entrepreneurship or specific fields,

such as engineering, while paying little attention to the unique characteristics of geomatics. This includes its professional requirements, regulatory frameworks and technical aspects. As a result, there is limited knowledge of what motivates geomatics graduates to start their own businesses, the challenges they face and the factors that contribute to their success. This lack of research makes it difficult to fully understand how specialised training, the structure of the geomatics industry and professional accreditation influence entrepreneurial opportunities in this field. Therefore, there is a clear need for research that focuses specifically on entrepreneurship within the geomatics profession.

2.9. CONCLUSION

The literature indicates that technical skills alone do not guarantee entrepreneurial uptake. Attitudes, norms and control beliefs shape entrepreneurial intentions among engineering/technical graduates. They are significantly influenced by curriculum design, mentorship, access to finance, sectoral market structures and the national entrepreneurial state. There appears to be an opportunity to examine the influence of EE on students and determine whether such training would contribute to the development of entrepreneurial intentions (CIPC, 2025).

CHAPTER 3

METHODOLOGY OF THE STUDY

3.1. INTRODUCTION

This chapter presents the research methodology employed to investigate the factors contributing to the limited entrepreneurial activity among geomatics graduates. The study begins by outlining its philosophical paradigm, followed by a detailed explanation of the research design and the methods used for data production and analysis. The chapter justifies the choice of an interpretivist paradigm and a qualitative approach, both considered suitable for exploring graduates' personal experiences, perceptions and interpretations of entrepreneurship within their professional context. In addition, it describes the target population, the sampling techniques used and the procedures for data production and analysis. Measures taken to ensure the trustworthiness of the findings and adherence to ethical standards are also discussed. By clearly explaining these methodological decisions, the chapter demonstrates how the interaction between the theoretical framework and the chosen research design supports the study's objectives and ensures that the findings are credible and rigorous.

3.2. PARADIGM OF THE STUDY

This study is situated within a particular philosophical paradigm that shapes how knowledge is understood, produced and interpreted. Kuhn and Hacking (1970) explain a paradigm as a shared framework of assumptions, values, concepts and research practices that guide inquiry within a scientific community. Paradigms, therefore, extend beyond research methods alone; they influence what is accepted as valid knowledge, which research questions are considered important and how results are interpreted. As a result, the selection of a paradigm is not neutral but reflects deeper assumptions about reality and knowledge, or, academically speaking, ontology and epistemology.

In this study, the choice of paradigm is informed by two key factors. First, the participants are geomatics graduates. Second is the nature of the phenomenon being examined: their lived experiences and perceptions of entrepreneurial ambition. Since the study aims to explore

personal meanings and interpretations rather than to test measurable cause-and-effect relationships, a paradigm that prioritises understanding and interpretation is required.

The research follows a qualitative approach and draws on Mittwede's (2012) identification of four major paradigms commonly associated with qualitative research: positivism, postpositivism, critical theory and constructivism. Similarly, Bunniss and Kelly (2010) identify positivism, postpositivism, critical theory and interpretivism as dominant paradigms in health and social science research. Across these classifications, interpretivism is consistently characterised by its focus on meaning, context and the understanding that reality is socially constructed.

Based on these considerations, this study is located within the interpretivist paradigm. Interpretivism assumes that social reality is not fixed or objective but is created and shaped through human interaction and experience. Unlike positivism, which seeks universal laws and objective truths, interpretivism aligns with Kuhn and Hacking (1970) view that knowledge is shaped by paradigms and historical context. From this perspective, understanding is always influenced by theoretical frameworks and human interpretation, and multiple realities may coexist, shaped by individuals' experiences, beliefs and social environments.

Although grounded theory was initially considered as a possible methodological approach, it was found to be unsuitable for the aims of this study. The intention here is not to develop a formal theory, but rather to interpret and understand participants' existing experiences. While Bunniss and Kelly (2010) note that grounded theory is often associated with interpretivist epistemology, its structured emphasis on theory generation goes beyond the scope of the present research.

It is important to note that entrepreneurship research has traditionally been dominated by positivist approaches, which focus heavily on quantitative measurement, prediction and generalisation (Chell, 2013; Baker & Powell, 2018; Mamabolo & Myres, 2019). Although these approaches are useful for identifying broader patterns and trends, they often overlook the subjective aspects of entrepreneurship, such as personal motivation, identity and meaning. In contrast, the interpretivist paradigm allows for deeper exploration of these human elements by prioritising participants' perspectives over predefined variables.

In line with a research by Schwandt (1994), interpretivism views social action as embedded within complex systems of beliefs, intentions and capabilities. This makes the paradigm particularly appropriate for the present study as it supports an in-depth examination of how geomatics graduates form and interpret their entrepreneurial ambitions within specific social, institutional and personal contexts. Ultimately, the interpretivist position adopted in this research reflects (Kuhn & Hacking, 1970) argument that scientific inquiry is not simply about uncovering objective reality but about understanding phenomena through paradigms that shape how reality is perceived and interpreted.

3.3. APPLICATION OF THE TPB FRAMEWORK

This study applies the TPB as an analytical lens to guide the research design, data collection and data analysis processes. Rather than revisiting the theoretical foundations of the model, the framework is operationalised by translating its core constructs, which are: attitude, subjective norms and perceived behavioural control, into measurable and interpretable components within the study. These constructs inform the development of data-collection instruments, ensuring that participants' responses reflect the underlying cognitive factors that influence entrepreneurial intention.

Furthermore, the framework guides the coding and thematic analysis of qualitative data by providing predefined categories for identifying and interpreting patterns and relationships. This allows the study to systematically examine how participants construct meaning around entrepreneurial behaviour within their specific contexts. In this way, TPB is not only used as a theoretical reference point but also as a practical tool that structures the methodological approach and strengthens the coherence between the research questions, data collection and analysis procedures.

3.4. LOCATION OF THE STUDY

The study was conducted at MUT, located in the south of Durban, KwaZulu-Natal, South Africa. MUT is a UoT that offers career-oriented programmes to produce graduates with applied technical and professional skills. Among these programmes is geomatics, offered within the Faculty of Engineering by the Civil Engineering and Surveying Department. MUT

was chosen as the research site due to its significant role in producing geomatics graduates who obtain a diploma in surveying and enter a labour market characterised by high levels of graduate unemployment and a low rate of entrepreneurial activity. This setting provided an appropriate and meaningful context for examining graduates' views, experiences and challenges regarding entrepreneurship in the geomatics field, particularly within the realities of a developing-country environment.

3.5. DATA PRODUCTION

This section outlines the data production process employed in this study, including the research method, data production procedures and the rationale for the selected sample size. It describes how semi-structured interviews were conducted with geomatics graduates, the modes of interview administration and the ethical considerations observed throughout the process.

3.5.1. SAMPLE SIZE

Determining an appropriate sample size in qualitative research is contingent on various factors, including epistemological, methodological and practical considerations (Baker & Edwards, 2012). A related study conducted by Musetsho and Lethoko (2017) involving graduates from the University of Venda utilised a sample size of 46 from a cohort of 69 graduates for that academic year. Given the comprehensive nature of their master's research, replicating such a sample size in this study is untenable due to time constraints.

Baker and Edwards (2012) provided a thorough examination of the question of "how many is enough", indicating that their findings were somewhat inconclusive yet highlighted the dependence of sample size on multiple variables. Many participants in their study suggested a sample size range of eight to 15 individuals. Furthermore, the purposive sampling approach discussed by Mack et al. (2005) reinforces this perspective, positing that a minimum of eight and a maximum of twelve participants may be sufficient for achieving meaningful insights.

Additional considerations influencing sample size include the level of qualification pertinent to the study and the available timeframe. According to Moser and Korstjens (2018), sample sizes in qualitative research can be estimated and may range from 10 to 20 individuals, particularly in complex research areas. Given the common attributes shared among the target

sample, such as demographics and background, this approach allows for a more focused and insightful analysis of participants' perceptions of entrepreneurship, minimising the need to account for numerous confounding variables.

For this study, the data production process involved a purposive sample of 15 graduates who graduated between 2018 and 2024, following the guidance provided in the existing literature on sample size estimation, at the researcher's discretion. This study posited that a sample comprising 15 graduates would be adequate, reasonable and justifiable.

3.5.2. DATA PRODUCTION PROCESS

Data for this study was collected through semi-structured interviews to gain in-depth insights into the experiences, perceptions and views of geomatics graduates regarding entrepreneurship and start-up formation, as suggested by Moser and Korstjens (2018). This method was chosen to provide participants with the flexibility to express their perspectives while ensuring that discussions remained aligned with the study's research objectives. An interview guide comprising open-ended questions was used to maintain consistency across interviews while allowing for probing and clarification as needed.

The semi-structured interviews, lasting 30-60 minutes, allowed participants sufficient time to share their views with geomatics graduates. These interviews were conducted either face-to-face or via online platforms, depending on the participants' availability. All interviews were audio-recorded with participants' consent and later transcribed verbatim to ensure accuracy and support systematic qualitative analysis.

The data production process involved a purposive sample of 15 graduates who graduated between 2018 and 2024. To gain insights into the participants' experiences, perceptions, thoughts and feelings, face-to-face and virtual interviews were conducted, as suggested by Moser and Korstjens (2018). After obtaining the gatekeepers' permission from the MUT, the Faculty Officer from the Engineering Faculty at MUT assisted in obtaining the contact information for potential participants. All necessary ethical guidelines were strictly adhered to throughout the interaction with the potential participants at that early stage.

The plan was to conduct in-person interviews, but due to participants' unavailability, busy schedules or location, only five of the fifteen were conducted in person and ten were conducted

virtually. This was in line with the literature, as the precedent has been set that in the event of unforeseen challenges, interviews may be conducted virtually, as explored by Brondani et al. (2011). However, it is essential to address concerns about the security of electronic files obtained virtually, particularly regarding the confidentiality of research participants.

3.6. DATA ANALYSIS

Data analysis adhered to the theoretical framework and was coded accordingly. The analysis focused on identifying codes and themes in the transcripts (Baloyi & Khanyile, 2022). A thematic model was used to synthesise data and categorise the themes accordingly (Baker & Edwards, 2012). In some research projects, the use of software packages such as NVivo is acceptable (Elliott, 2022), however, for this research, it was used sparingly to assist in formulating the codes. The qualitative data collected through semi-structured interviews was analysed using thematic analysis, guided by the six-phase framework developed by (Braun & Clarke, 2006). The process began with the formulation of the interview transcripts, which were grammar corrected and read multiple times to develop a deep understanding of the content.

3.6.1. THEMATIC ANALYSIS

The study employed thematic analysis to interpret qualitative data collected from geomatics graduates regarding their entrepreneurial undertakings. Thematic analysis is a widely used method for systematically identifying, organising and reporting patterns of meaning within qualitative datasets (Braun & Clarke, 2006). This method was particularly suited to the study as it enabled an in-depth exploration of graduates' perceptions, experiences and challenges related to entrepreneurship, while allowing for flexibility in interpretation. The analysis involved multiple readings of the interview transcripts to facilitate familiarisation with the data, from which themes emerged through the systematic development of codes (Baloyi & Khanyile, 2022). Consistent with qualitative research practices, the data was synthesised and organised into coherent categories to support interpretation (Baker & Edwards, 2012). Themes were developed both inductively from the data and deductively in relation to the research questions and existing literature (Magasi, 2022). The data analysis process was guided by Braun and Clarke's (2006) six-phase thematic analysis framework.

3.6.1.1 PHASE 1: FAMILIARISATION WITH THE DATA

Familiarisation with the data was achieved by the researcher transcribing all interview responses verbatim. The transcripts were read and re-read several times to develop a thorough understanding of the data and to become familiar with participants' experiences and perspectives. This iterative process enabled the analysis to remain closely grounded in the data while systematically organising the transcripts into analytically meaningful components. Initial notes and reflections were recorded to capture early ideas and patterns before coding began.

3.6.1.2 PHASE 2: GENERATING INITIAL CODES

Initial codes were developed inductively through line-by-line analysis of the transcripts. Meaningful segments of text relevant to the research objectives were identified and labelled with short descriptive codes, often using participants' own words. Coding was conducted manually and iteratively, with new codes added and existing ones refined as analysis progressed.

An example of how codes were used to generate themes is demonstrated by identifying the codes: *academic content*, *business module content*, *business elements in other modules* and *curriculum deficiencies*. These related codes were grouped during the thematic analysis, resulting in *Theme 1: Limitations in Entrepreneurial Training*, with the sub-theme *Lack of Business Modules*. A full list of codes is provided in the Appendix section of this thesis.

3.6.1.3 PHASE 3: SEARCHING FOR THEMES

The researcher reviewed the full list of codes and grouped related codes into broader categories. These categories represented potential themes reflecting common patterns among participants, such as challenges, attitudes and skills related to entrepreneurship. This phase marked a shift from descriptive coding to more interpretive analysis, as well as to the theoretical framework underpinning the study.

For example, the codes *business module contents*, *curriculum deficiency*, *lack of practical training* and *absence of entrepreneurship education* were grouped together as they all reflected concerns related to academic preparation for entrepreneurship. These codes were therefore clustered into a broader theme titled *Limitations in Entrepreneurial Training*.

3.6.1.4 PHASE 4: REVIEWING THEMES

Preliminary themes were reviewed and refined to ensure they accurately represented the data. The researcher revisited the transcripts to confirm that each theme was supported by sufficient evidence. Some themes were merged, refined or discarded to improve clarity and coherence.

For example, two preliminary themes related to *industry barriers* and *institutional constraints* were initially identified as separate themes. However, after reviewing the coded extracts, these were merged into a single theme titled *Structural and Institutional Barriers to Entrepreneurship*, as the data showed significant conceptual overlap.

3.6.1.5 PHASE 5: DEFINING AND NAMING THEMES

Final themes were clearly defined and named to capture their core meaning and relevance to the research questions. Detailed descriptions were developed for each theme and sub-themes were identified to reflect nuanced aspects of the data.

3.6.1.6 PHASE 6: PRODUCING THE REPORT

The final phase involved presenting the themes in a coherent narrative within the findings chapter. Verbatim extracts from the interviews were used to support the analysis. The findings were then discussed in relation to all perspectives: research objectives, the theoretical framework, research paradigm and existing literature to demonstrate their significance and contribution. This systematic approach ensured that the analysis was rigorous, transparent and grounded in participants' experiences.

3.7. TRUSTWORTHINESS OF THE STUDY

To ensure the quality and integrity of the research findings, the study adhered to five established criteria for trustworthiness: credibility, transferability, dependability, confirmability and reflexivity (Korstjens & Moser, 2018). These criteria are widely recognised in qualitative research for enhancing rigour and transparency.

3.7.1. CREDIBILITY

As a form of validation, participants were requested to elaborate and support their statements with follow-up questions as per Korstjens and Moser (2018) approach. This form of

verification lent credibility to the researcher's interpretation of responses. Credibility refers to the confidence in the truth of the findings. In this study, credibility was established through several strategies, including prolonged engagement with the data, accurate transcription and the use of direct quotations.

All interviews were transcribed word-for-word to preserve participants' exact responses. Direct excerpts from these transcripts were included in the results section to illustrate key themes and maintain authenticity. To ensure accuracy and credibility, both audio recordings and transcripts were thoroughly reviewed and verified multiple times.

3.7.2. DEPENDABILITY

This process includes the aspect of consistency, which enables dependability through the coding trail and theme development (Korstjens & Moser, 2018). The data was viewed through all lenses, from the paradigm to the theoretical framework to the research questions. To ensure dependability, a record of all research activities was maintained, including interview guides, questionnaires, coding decisions and notes on theme development. No modifications to the research data production process were employed during the study, thereby ensuring transparency.

Braun and Clarke (2006) describe dependability as the expectation that results would remain the same even if the same study were carried out by different people using the methods described herein. A uniform semi-structured interview guide was employed for all participants to maintain consistency in questioning. Every stage of data collection and analysis was thoroughly documented, including interview schedules, audio recordings, transcripts and coding frameworks. Transcripts were systematically coded using thematic analysis, with codes applied consistently across all interviews. Further details regarding coding are provided in the data analysis section above.

3.7.3. TRANSFERABILITY

Transferability refers to the extent to which research findings are applicable to other contexts (Korstjens & Moser, 2018). In this study, transferability was enhanced through the provision of rich, detailed descriptions of the research setting, participant characteristics and data production procedures. The role of MUT as a UoT and its relevance to geomatics education

were clearly articulated. Furthermore, contextual information was provided to enable readers to assess the applicability of the findings to comparable settings, including socio-economic factors such as high graduate unemployment and limited entrepreneurial uptake.

3.7.4. CONFIRMABILITY

Confirmability is paramount to impartiality, where the triangulation of data is the primary focus (Korstjens & Moser, 2018). Like dependability, this triangulation encompasses all facets, including interviews, literature, theoretical framework and paradigms. Confirmability, therefore, ensures that findings are shaped by participants' experiences rather than researcher bias. The strategies employed included scribbling in a journal to record personal meanings and assumptions derived from the responses provided.

In order to show that findings come from the data and not from the researcher's views, all interpretations were supported by direct extracts from interview transcripts. The researcher maintained reflective notes during data analysis to identify and bracket personal assumptions about entrepreneurship.

3.7.5. REFLEXIBILITY

According to Korstjens and Moser (2018), reflexivity is about one lens and that of the observer. Intricate information, such as descriptions of the environment or reactions of the participants, including frowning, retorting or any other facial expressions, can only be observed and depicted by the interviewer (Mack et al., 2005).

As reflexivity entails critical self-awareness of the researcher's role and influence within the research process, the researcher took deliberate steps to ensure that their professional background in geomatics, academic positioning and entrepreneurial experience did not unduly shape interactions with participants. These influences were consciously bracketed, except in limited instances where clarification or assistance with discipline-specific terminology was necessary.

3.8. LIMITATIONS OF THE STUDY

One limitation of this study is the use of a relatively small, purposively selected sample. This may restrict the extent to which the findings can be generalised to the broader population of geomatics graduates in South Africa. However, this limitation is consistent with qualitative research, which emphasises in-depth understanding rather than broad statistical representation.

The study also relies on self-reported data, which may be affected by recall bias, social desirability or selective reporting. As a result, participants may downplay certain challenges or overemphasise their entrepreneurial intentions, potentially influencing the accuracy of the findings.

A further limitation relates to the researcher's insider role as a lecturer in the geomatics programme at MUT. While this position supports access to participants and provides contextual insight, it may also introduce potential bias. To address this, reflexive practices, bracketing and systematic coding methods were applied throughout data production and analysis.

Additionally, the study is situated within a specific institutional and socio-economic context characterised by high graduate unemployment and limited entrepreneurial support structures. These contextual conditions may shape participants' experiences and perceptions in ways that may not be directly transferable to other institutional or geographical settings.

This study will focus specifically on graduates from MUT who obtained surveying diplomas between 2018 and 2024. The selection of this timeframe is intentional, as it captures a diverse range of experiences and perspectives. Notably, this period encompasses the significant disruption caused by the COVID-19 pandemic, which marked a transition from traditional academic and professional practices to emerging approaches shaped by technological adaptation and remote learning. Furthermore, this period introduced a new world order in which people were forced to find new ways of living. Even though the syllabus remained the same before and after COVID-19, the research aims to provide insights into how these changes influenced the preparedness, adaptability and professional integration of surveying graduates in the geomatics industry.

3.9. DELIMITATIONS OF THE STUDY

This study is limited to geomatics graduates from MUT who completed their qualifications between 2018 and 2024. The selected timeframe was deliberately chosen to capture a range of graduate experiences during a period of major socio-economic and educational change. The study focuses only on graduates of the geomatics programme and excludes those from other engineering programmes in the faculty. This focus enables a detailed, discipline-specific examination of entrepreneurial intentions. Although the core curriculum remained largely the same before and after the pandemic, graduates from this period experienced very different learning environments and labour market conditions. Studying this group, therefore, allows the researcher to examine how these contextual changes may have influenced graduates' readiness for work, adaptability and integration into the geomatics profession, particularly in relation to entrepreneurial intentions and career development.

The study is further restricted to a single higher education institution and does not aim to compare MUT with other UoTs or traditional universities in South Africa. In addition, the study includes only graduates, not current students, to explore post-graduation experiences and career paths. Methodologically, the study adopts a qualitative approach and uses semi-structured interviews to gather in-depth information on participants' experiences, perceptions and attitudes towards entrepreneurship. As a result, the findings are not intended to be statistically generalised to all geomatics graduates in South Africa.

3.10. ETHICAL CONSIDERATIONS

Ethical considerations were adhered to throughout this study, ensuring the protection, dignity and rights of the participants. Ethical clearance was obtained from UKZN prior to data production. Permission to access participants was granted by MUT as the gatekeepers. The gatekeepers' permission, as well as the ethical clearance, are attached in the Appendix section of the thesis.

All participants were fully informed about the purpose of the study, the voluntary nature of their participation and their right to withdraw at any stage without penalty. Informed consent was obtained before conducting the interviews. Confidentiality and anonymity were maintained by excluding identifiable information and using codenames in all transcripts and

reports. Participants were codenamed in the order of their responses, P001-P015, corresponding to the first 15 to respond. Although the participants were anonymised, the university in this study was disclosed, potentially revealing their identities.

Audio recordings, transcripts and related research data were coded by participants' pseudonyms, securely stored and accessed only by the researcher. No coercion or incentives were used, and care was taken to ensure that participants were not exposed to physical, psychological or professional harm during the research process.

3.11. CONCLUSION

This chapter detailed the research methodology adopted to examine the factors behind the limited entrepreneurial activity among geomatics graduates. It justified the choice of an interpretivist paradigm and a qualitative approach, both suited to exploring graduates' lived experiences and perceptions of entrepreneurship. The chapter also explained the application of the TPB as the guiding framework for research design, data collection and analysis.

Furthermore, the chapter provided a comprehensive overview of the study, situating the investigation within the broader context of graduate unemployment in South Africa and identifying entrepreneurship as a potential solution, particularly in the geomatics discipline. It outlined the research problem, objectives, significance, limitations and key questions, which centred on graduates' training, entrepreneurial opportunities and views on EE. The study's practical, theoretical and empirical contributions were highlighted, and its scope and boundaries were clearly defined. Together, these elements established the foundation for the research, leading into the next chapter, which reviews relevant literature and presents the theoretical framework underpinning the study.

Details of the study setting, sampling process, data production steps and the use of Braun and Clarke's six-phase thematic analysis were provided to demonstrate how the data was systematically analysed. Steps taken to ensure trustworthiness were mostly guided by the article by (Korstjens & Moser, 2018). These were listed as credibility, transferability, dependability, confirmability, and reflexivity, and were discussed along with ethical considerations and study limitations. Together, these choices created a strong and reliable foundation for presenting and interpreting the findings in the next chapter.

CHAPTER 4

RESULTS OF THE STUDY

4.1. INTRODUCTION

This chapter presents the empirical findings from the qualitative analysis of interview transcripts. It explores how participants perceived and experienced entrepreneurship within the geomatics profession and how they understood the phenomenon under investigation. The chapter highlights participants' experiences of limited entrepreneurial opportunities and support and shows how key patterns and themes emerged from the data. The findings are organised around seven major themes, each illustrated with verbatim excerpts from participants' narratives. The following presents the themes in detail. For each theme and its sub-themes, the narrative narration is provided and supported by extracts from the participants.

4.2. THEME 1: LIMITATIONS IN ENTREPRENEURIAL TRAINING

Participants consistently expressed concern about the inadequacy of entrepreneurial training in the geomatics curriculum at MUT. In most cases, they commended MUT's strength in technical training, but some felt the programme could have been improved in its content and software training, as well as in business development related to entrepreneurship in the geomatics context.

4.2.1. SUB-THEME 1: LACK OF BUSINESS MODULES

When asked whether there were any entrepreneurship modules in their curriculum and whether the curriculum prepared them for the business world, participants described the business-related modules as non-existent, especially those tailored to geomatics practice. Many felt that the modules contained no entrepreneurial topics and were insufficient in preparation, as they did not equip them with the skills necessary to start or manage a business.

When asked a direct question on whether the curriculum prepared them for entrepreneurship or not, these were some of their responses:

Nothing, it didn't prepare me. It prepared me for employment, that's all, but not for being an entrepreneur (P001).

Another participant added;

No, the curriculum focuses on the technical aspects, with little emphasis on business (P008).

Another participant went even further by detailing the contents of one module:

... there was a minor subject called Civil Management I, but it never really touched on entrepreneurial aspects. It was more about understanding how it works in general in the construction industry, yeah (P010).

4.2.2. SUB-THEME 1: INADEQUATE EXPOSURE TO SPECIALISED SOFTWARE

Although students were exposed to technical instruments, some believed that the integration of software, GIS applications and modern surveying technologies was lacking. This limited their competitiveness compared to other graduates and their general preparedness for private practice, let alone running it.

In addition to the lack of entrepreneurship preparedness by the curriculum, participants voluntarily stated concerns over the inability to access specialised software packages during their training:

A geomatics business entails owning equipment and other assets, such as software, to conduct the work (P003).

Another participant revealed:

Exposing students to the stringent use of computer software may reveal other viable entrepreneurial avenues. Remove the stigma of having an employee mindset (P014).

Another participant suggested:

I recommend introducing the latest survey equipment technology at the tertiary level. Additionally, software such as Model Maker, Civil Designer and MicroStation is also utilised (P006).

4.2.3. SUB-THEME 1: DISCONNECT BETWEEN CURRICULUM AND REALITY

Participants emphasised that industry engagement, such as having guest lectures, workshops or survey camps, would be valuable and that the current setup is insufficient. They expressed the need for a curriculum that more closely mirrors real-world practice, especially in business operations and entrepreneurial realities.

To establish other shortfalls of the curriculum, some participants suggested:

...the curriculum focuses on the technical aspects, with little emphasis on business ... The mentorship programs need workshops to discuss business

matters. It would be beneficial to establish mentorship programs. It must be included in the curriculum (P008).

Another participant added:

MUT could introduce business modules that teach the fundamentals of business, but these must be tailored to the geomatics profession, as it's not the same across all professions (P009).

4.3. THEME 2: STRUCTURAL AND INSTITUTIONAL BARRIERS TO ENTREPRENEURSHIP

Participants highlighted several external challenges that hinder graduates and young professionals from starting their own businesses. One of the biggest obstacles includes a lack of funds, what some perceive as strict rules and regulations and a competitive job market. These barriers often discourage new entrants from taking the risk of entrepreneurship, even if they have the technical skills. Financial constraints mean they struggle to raise the capital needed to start a business. Regulatory requirements can be complicated, creating extra pressure. Furthermore, the competitive labour market makes it challenging for them to find stability while establishing a business. Together, these factors create a challenging environment for young geomatics practitioners who want to become entrepreneurs.

4.3.1. SUB-THEME 2: FINANCIAL CONSTRAINTS

Access to capital emerged as the main obstacle. Participants reported difficulties in obtaining funding from agencies such as NYDA or SEDFA, as well as the unpredictable nature of their application processes and the lengthy waiting periods that followed. The delayed responses and the lack of awareness of the criteria used to grant funding are concerning. This is exacerbated by the lack of trust in government-run institutions due to corruption.

In trying to establish why funding is one of the barriers that prevent graduates from taking up entrepreneurship, these were what the participants stated:

Firstly, their requirements are just a business plan. They also want you to achieve a certain level of BEE status and sometimes compel you to hire a certain number of people from the community. The community is also consulted about your proposed funding (P003).

Another participant shared:

It is likely due to a lack of financial funding or start-up capital, as well as the experience needed to deliver services for us as recent graduates. Additionally, securing projects depends on connections, which we currently lack (P012).

One other participant stated:

The first problem is always finances for purchasing or hiring equipment and its maintenance. You will need a fast PC and software packages. It all costs a lot of money. After doing all that, there is still the possibility of not getting any jobs (P015).

4.3.2. SUB-THEME 2: REGULATORY AND PROFESSIONAL RESTRICTIONS

Some participants felt limited by professional registration and its categories, as these place technicians at the very bottom of the scale. They indicated that without complete registration or partnering with a professional, entrepreneurial opportunities are restricted.

In order to establish whether the graduates understand the main role players in the geomatics profession, this is what they shared:

On the industry side, specific work should be categorised by registration. Currently, a diploma qualification does not permit you to perform cadastral work. Still, a BSc qualification will enable you to do so, even if you are not experienced in that kind of work. There is a lot of engineering work that the BSc guys should not be doing because they are out of their depth (P005).

Another participant said:

... provided they follow all the registration requirements. That is essential for anyone who wants to be in the business, as you need to demonstrate that you are qualified for the job and marketable (P009).

Another participant added:

Yes. Rendering of a service as a registered professional or technologist. There is work reserved for specific categories of registration, which is a challenge. SAGC make it hard to operate a business as technicians who hold a diploma qualification (P014).

4.3.3. SUB-THEME 2: LABOUR MARKET INSTABILITY

When participants were probed about employment and unemployment, they shared that unemployment, limited job openings and instability caused by events such as COVID-19 further hinder entrepreneurial transitions. Participants described employment as both a competing priority and a fallback plan.

When probed about the market opportunities, these were the participants' responses:

...there are not many people in Black communities with geomatics businesses; there are only a few. Indeed, there are many challenges, but it offers an alternative to unemployment (P001).

Additional comments by another participant:

As I mentioned, it is the expensive resources and the mindset. Lack of training, we are not being taught any significant lessons on entrepreneurship. I recall a speech given during our graduation ceremony; one of the speakers emphasised that we should look for entrepreneurial opportunities wherever we go, especially when we are unemployed (P008).

Another participant added:

I have pursued further studies and worked in public service, but I am not currently employed in geomatics. Look around, there is a lot of construction taking place, and yet we are struggling to find jobs (P015).

4.4. THEME 3: SOCIAL AND INDIVIDUAL CIRCUMSTANCES

Participants' social and economic backgrounds played a significant role in shaping their thoughts about starting a business. Those who had strong financial support or beneficial connections were more confident and open to entrepreneurial opportunities. On the other hand, participants with limited resources or weak networks found it more challenging to envision themselves as business owners. These background factors either helped them move forward or created barriers that hindered their progress. Access to professional networks often provided guidance, mentorship and opportunities, while the lack of such support made entrepreneurship seem risky and out of reach.

4.4.1. SUB-THEME 3: SOCIO-ECONOMIC FACTORS

Several participants from disadvantaged backgrounds described their circumstances as both a motivator and a challenge. While financial hardship inspired some to consider entrepreneurship, this also limited their capacity due to a lack of confidence.

To establish socio-economic challenges encountered by graduates in the entrepreneurial journey, this is what they shared:

Coming from a poor background means having to start from scratch, beginning with other things first, and then building ourselves from the ground up (P002).

Another participant said:

A poor background situation can be a motivation. The person who is trying to overcome that problem usually succeeds in finding a solution, and sometimes that is how the business idea is born (P010).

Another participant added:

I think your family's finances and your entrepreneurial ambitions are disconnected; neither depends on the other. If you are not business-minded, you are not going to be business-minded because of your family's finances... We have seen it with some students who came from good families; they couldn't care less about their studies (P014).

4.4.2. SUB-THEME 3: SOCIAL AND PROFESSIONAL NETWORKING

Networking was found to be a key factor in creating business opportunities. Participants who had family businesses, industry connections, or strong peer support felt more confident about starting their own ventures. These networks provided them with access to valuable resources, including advice, funding and potential clients. On the other hand, those without such connections often faced greater challenges and felt less prepared to enter the entrepreneurial space. This demonstrates that having the right relationships can significantly impact turning business ideas into reality.

When asked a direct question on whether networking with other geomatics entrepreneurs is good or not, this is what the participants said:

If I can find someone who can mentor me, someone who has been on this path of being in business, specifically the geomatics business, that would be ideal... Nevertheless, I would like to start and continue with my work experience, and then later build on it with my company. For now, I should work and gain more experience, and then at a later stage (P001).

Another participant added:

The guys who had started their companies had industry connections and knew influential people in the built environment who encouraged them to pursue entrepreneurship (P007).

4.4.3. SUB-THEME 3: INFLUENCE OF ROLE MODELS

Seeing what others could do, such as fellow graduates who had started their own businesses, had a significant impact on participants' views of entrepreneurship. This has led some to believe that starting a business is possible and achievable. On the other hand, when they observe their

peers' struggles, it quickly foils any inspiration to undertake a career in business ownership. It appears that both positive and negative experiences by others have shaped their mindsets.

Similar to the above, when asked directly about the influence of role models, participants said:

I know just two, and they are doing well based on what I have observed, and I would like to emulate them someday (P007).

Another participant added:

The industry should establish mentorship programs and connect students with industry partners who support them, such as young entrepreneurs. Show us how to fill in a tender document. Promote partnerships between companies to enable them to share projects (P011).

4.5. THEME 4: PERCEPTIONS OF THE GEOMATICS INDUSTRY

Participants' understanding of the geomatics industry significantly influenced their perception of entrepreneurship as a career choice. Those who understood the industry well were more likely to view business ownership as a possible and rewarding option. They recognised opportunities such as the growing demand for geospatial services and technological advancements. However, their perceptions also included awareness of risks such as high start-up costs, stringent regulations and market saturation. This mix of opportunity and risk shaped participants' confidence levels in pursuing entrepreneurship in the geomatics field.

4.5.1. SUB-THEME 4: INDUSTRY STRUCTURE AND OPPORTUNITIES

Participants identified numerous business opportunities in the geomatics field. These included engineering, surveying, GIS services, technical drafting, cadastral work for property boundaries, drone piloting and even the sale or leasing of surveying equipment. They also saw potential in offering subsidiary services that meet specific client needs and in creating partnerships with professionals from other disciplines, such as construction. This demonstrates that entrepreneurship in geomatics is not limited to traditional roles but can also take the form of innovative, collaborative ventures.

To assess participants' understanding of what constitutes a geomatics business and the structure of the industry, critical for engaging in entrepreneurial activities, the following responses were provided:

Geomatics involves land demarcation and some construction, and therefore, it is closely tied to infrastructure development. So, being a geomatics entrepreneur not only contributes to the country's development but also to its economy (P004).

Another participant added:

In the context of geomatics, providing accurate services is essential. When doing the job, you need to satisfy the clients, and that way, they will keep coming back and even pass on a good word about you (P005).

Another participant's view was:

Entrepreneurship, in the context of geomatics, refers to the process of creating a business that offers services. It also means the upliftment of others (P015).

4.5.2. SUB-THEME 4: CHALLENGES FACING THE INDUSTRY

Corruption, nepotism, unfair competition and difficulty obtaining work were frequently mentioned. Concerns about unqualified or unregistered practitioners undercutting the industry also surfaced. Some participants reported that corruption and the cumbersome processes for applying for government funding were stumbling blocks.

To determine participants' awareness of challenges within the geomatics industry, the following responses were provided:

The risks of owning a geomatics company include failing to secure clients and struggling to market your work, as well as the risk of investing substantial capital without the necessary expertise to deliver due to inadequate training...In addition, legal problems arise from failing to comply with SAGC's laws for doing work for which you are not correctly registered (P003).

Another participant added:

Corruption is one of them; there is too much nepotism. One cannot simply enter a project as a stranger. No one can empower a stranger without expecting something in return. Politics often closely follow corruption, which can be influenced by different political camps or parties. All this is detrimental to the country's economy, as it directly impacts the government's tendering systems (P007).

Another participant stated:

Trust and credibility are crucial; you know it is very hard for clients, such as big companies or those involved in tenders, to accept you when you are new, straight out of the box, over those who have been around for a long time (P012).

4.5.3. SUB-THEME 4: IMPACT OF TECHNOLOGY IN GEOMATICS

Participants were aware that technological advances are transforming the geomatics profession. Some participants welcomed these innovations, viewing them as opportunities to enhance efficiency and develop new services. They believed that adopting modern tools could help businesses stay competitive. However, others were concerned that these changes might result in fewer jobs or render specific traditional roles obsolete. This mix of optimism and concern shows how technological progress can both open doors and create challenges for professionals in the field.

Probed on the advent of technology as a threat or a barrier to starting up geomatics firms, this is what they said:

High technology is beneficial for production, as you said; it is faster and more reliable. However, in terms of capital, they are expensive and acquiring it requires a substantial amount of money. Therefore, it is a disadvantage for individuals starting a business (P002).

Another participant said:

Technological developments are always welcome in the profession. It does add a layer of complexity for new entrepreneurs entering the market. Yes, technology speeds up production, but at the expense of the economy. It is time-saving, but you can work alone, thereby eliminating manual labour from the equation (P004).

Another participant's view was:

It is beneficial because it keeps you challenged and helps you stay current with the latest trends. It reduces the threat of having unqualified people taking our jobs. However, it is expensive tech, and it makes it difficult for new companies to compete. Aside from the cost factor, the technology is well-suited for surveying and is indeed necessary (P008).

4.6. THEME 5: ENTREPRENEURIAL INTENTIONS AND MINDSETS

Participants' personal beliefs, motivations and emotional attitudes played a significant role in shaping their decisions about entrepreneurship. Those who believed in their ability to succeed and felt motivated by independence or financial growth were more likely to take steps toward starting a business. Positive emotions, such as confidence and optimism, encouraged entrepreneurial action, while the fear of failure or uncertainty often held others back. This

suggests that internal factors are just as important as technical skills or even access to funding in determining whether to pursue entrepreneurship.

4.6.1. SUB-THEME 5: MINDSET AND PERSONAL AMBITIONS

Participants showed a wide range of attitudes toward entrepreneurship. Some were highly motivated and confident, feeling empowered to take risks and start their own businesses. Others were more cautious or even discouraged, worried about failure and financial uncertainty. Interestingly, many participants experienced both empowerment and fear simultaneously, wanting the freedom and opportunities that entrepreneurship offers, yet also feeling anxious about the challenges it entails. This mix of confidence and concern highlights the complexity of the decision to become an entrepreneur.

To explore the TPB component related to ambition, participants were asked about their mindset, and the following responses were recorded:

Currently, due to my lack of experience, I would like to remain an employee for now to gain more knowledge. From my point of view, business is more complicated than being employed, because in business, you must always be sharp on the service side. Still, you must also be skilled in administration and possess good business acumen (P001).

Another participant noted that:

Currently, it is better to be an employee because the owners are under considerable pressure. I do not want that for now, that is why I would rather be an employee (P002).

Another participant stated:

Unemployment is a cruel reality, but it can also be a motivating force. However, with geomatics, it is challenging because the equipment is expensive, and it is not easy to get started (P009).

A further view from one other participant was:

Being an employer myself would be better for me and give me a chance to do things my way. There is a lot to consider when working with people, especially those who lack strong interpersonal skills (P014).

4.6.2. SUB-THEME 5: BUSINESS AMBITIONS

For many participants, entrepreneurship represented a way to improve their lives, gain independence and achieve financial security. Some were motivated by difficult circumstances,

such as poverty, and saw starting a business to escape hardship. Others viewed entrepreneurship as part of a long-term plan for personal growth and career success. This indicates that the reasons for pursuing business ownership varied.

Still trying to explore the TPB component related to ambition, participants were asked about their business desires, and the following responses were recorded:

I had considered starting a surveying business, but it is expensive, and I also want to gain more experience first (P006).

Another participant said:

Looking at the people surrounding me, I would be more comfortable being an employer. However, being an employer is not as easy as it seems, but it is still paramount to freedom, as I also want to create opportunities for others (P007).

One other participant shared:

I think it would be better if you had your own practice. Although there are challenges that come with it, you need to secure clients, complete your own reports, and then you are ultimately responsible for everything that happens (P011).

Another participant added:

I prefer to be an employee, as I am still trying to gain experience. It is an opportunity for me to be exposed and learn (P013).

4.6.3. SUB-THEME 5: BARRIERS TO BUSINESS INTENTIONS

Although many participants were interested in entrepreneurship, some lacked knowledge of the practical steps required to start a business. Others feared losing the security that comes with a regular job. For these individuals, formal employment seemed safer and more stable than the risks of business ownership. Participants also shared several reasons why they could not start a company or even develop strong intentions to do so. These included lack of financial resources, limited access to information and mentorship, fear of failure and uncertainty about market conditions. Together, these factors created significant barriers to turning entrepreneurial interest into action.

To examine the TPB component of intention in relation to financial barriers, participants were asked about their future plans for entrepreneurship. Their responses are presented below:

The intent is there, but the factors that might stop me from starting a geomatics company or pursuing entrepreneurship in geomatics would be the purchase of expensive equipment that enables me to deliver my services effectively (P001).

Another participant added:

It is easy to open a company, but that is as far as that goes; the only challenge is finding work for that company, because getting clients might prove difficult. Then there is the resource issue, which needs capital. Then you have to wait a while before you get paid for delivering your service (P002).

Another participant said:

Yes, the biggest challenge is finances. The second biggest is working experience. You need to know your story in this business; otherwise, a lot could go wrong. As I have said, your reputation is critical; once you have a bad reputation, you may have to relocate to a new area (P006).

4.7. THEME 6: CAREER TRAJECTORY AND PROFESSIONAL DEVELOPMENT

Participants viewed entrepreneurship as just one of several career options in the geomatics field. Many weighed the idea of starting a business against other paths, such as pursuing professional registration or continuing with further studies to specialise. For some, entrepreneurship seemed appealing for its independence and potential financial rewards, while others preferred the stability and recognition that come with formal qualifications or academic advancement. This shows that career decisions in geomatics are influenced by personal goals, perceived risks and the value placed on professional credentials.

4.7.1. SUB-THEME 6: ACADEMIC QUALIFICATIONS

Qualifications such as advanced diplomas, board exam results and specialised training were seen as essential stepping stones. Participants believed academic progress enhanced credibility and business potential. Some of them have undertaken a journey to further their studies in geomatics and civil engineering.

To explore graduates' understanding of the various qualifications within the geomatics field and their implications for career roles, participants were asked to share their perspectives. Their responses are outlined below:

... the process is somewhat lengthy when you have a diploma qualification; it is better if you have a BSc degree. So, when you are coming from a diploma stream, you have to go through a lengthy process (P005).

Another participant added:

I tried looking for a job, but when I didn't get one, I pursued a certificate in facilitation management, then a BSc in Geomatics (P009).

Another participant gave this detailed account:

It is a challenging situation for surveying graduates; they suffer immensely. Another problem we are facing is the issue of unqualified and unregistered surveyors. The government should clamp down on this because these individuals secure government contracts through the tender system, leaving us to suffer. SAGC/SAGI should ensure that all government departments, including municipalities, comply with geomatics laws and regulations (P015).

4.7.2. SUB-THEME 6: CAREER PATHWAYS

Many participants viewed entrepreneurship as a future goal rather than something to pursue immediately. They preferred to first gain experience in either the public or private sector, believing that this would help them build skills, professional networks and financial stability before taking the risk of starting a business. For these individuals, working in established organisations was seen as a stepping stone toward entrepreneurship, providing the knowledge and confidence needed to succeed later.

Participants were invited to describe their career trajectories following graduation. Their accounts are summarised below:

I completed my geomatics studies and then pursued a degree in civil engineering. I furthered my studies in civil engineering, earning an advanced diploma in the field. That is how I landed my current position as a civil engineering technologist (P003).

Another participant added:

I went to work and continued with my studies. I enrolled for another diploma in civil engineering (P007).

Another participant said:

I stayed at home for two months before starting work at a surveying company. At the end of that particular contract, I started my own laundromat business. During that time, I found a mentor who took me under his wing and did a low-cost housing project in Belfast (P011).

Yet another participant confirmed further studies:

After graduation, I decided to pursue a different career. I studied civil engineering (P013).

4.7.3. SUB-THEME 6: PROFESSIONAL REGISTRATION

Participants saw professional bodies like SAGC and SAGI as important gatekeepers of trust and credibility in the industry. Many believed that being registered with these organisations was essential for gaining client confidence. Without official registration, practitioners felt that clients might question their qualifications and professionalism. This demonstrates that formal recognition by professional bodies is not only a legal requirement but also a crucial factor in establishing a reputation and securing business opportunities in the geomatics sector.

In addition to exploring participants' understanding of geomatics business structures, they were asked to reflect on the significance of professional registration as a potential barrier to entrepreneurial entry:

...one must be correctly registered with the SAGC, the custodian of the profession, and in the correct category of registration, which can be technician, technologist, or professional. Entrepreneurship in geomatics is a service-based business that is guided by the law, meaning it offers services for which one is registered (P003).

Another participant discussed:

SAGC must market the profession, as many people are unaware of the field of geomatics. They must remove the red tape and allow technicians to run their private companies without being probed. ... There is work reserved for specific registration categories, which is a challenge. SAGC makes it hard to operate a business as a technician who holds a diploma qualification (P014).

4.8. THEME 7: PRACTICALITIES OF RUNNING A GEOMATICS BUSINESS

Participants demonstrated an understanding of the practical and managerial tasks involved in running a geomatics business. They recognised that entrepreneurship is not only about technical work, but also involves responsibilities such as managing staff, handling finances, marketing services and ensuring compliance with regulations. This awareness reflects an understanding that owning a business requires strong organisational and leadership skills in addition to technical expertise.

4.8.1. SUB-THEME 7: BUSINESS MANAGEMENT SKILLS

Participants emphasised the importance of possessing a diverse range of business skills to succeed as entrepreneurs in the geomatics field. These included financial management to handle budgets and cash flow, marketing to attract clients and promote services and people management to lead teams effectively. They also emphasised the importance of understanding tendering processes to secure projects and possessing strong business planning skills to establish goals and strategies. This demonstrates that technical knowledge alone is insufficient; entrepreneurs must also develop strong business and leadership skills to run a successful company.

Participants highlighted that entrepreneurship in the geomatics field demands a wide range of business and leadership skills. They emphasised that technical expertise alone is insufficient for establishing and managing a successful enterprise:

From my point of view, business is more complicated than being employed, because in business, you always have to be sharp on the service side. Still, you also have to be skilled in administration and be a good businessperson. Like marketing involves many aspects, it encompasses a wide range of elements (P001).

Another participant added:

In the context of geomatics, providing accurate services is essential. When doing the job, you need to satisfy the clients, so they will keep coming back and even pass on a good word about you (P007).

Another participant indicated:

For me, it means service delivery. To be an entrepreneur in geomatics, you need to know how to deliver services to clients and ensure your work is always accurate, following established procedures and guidelines (P009).

4.8.2. SUB-THEME 7: DISCIPLINE-SPECIFIC BUSINESS ACTIVITIES

Participants identified various entrepreneurial activities, such as hiring out equipment, performing cadastral work, merging with other professionals and offering GIS services, as means of diversifying business activities.

To assess graduates' willingness to start private practices, they were asked to identify potential business activities they believed were viable within the geomatics profession. Their suggestions included:

In the context of geomatics entrepreneurship, it is about being creative or identifying problems.... So, if I were to open a geomatics company, I would like to assist people in resolving land boundary disputes they may encounter (P001).

Another participant added:

It is not as simple as buying and selling a product; it is a service offering. Remember that geomatics encompasses data production and data processing (P003).

Another participant included:

Geomatics involves land demarcation and some construction, and therefore, it is closely tied to infrastructure development. So, being a geomatics entrepreneur not only contributes to the country's development but also to its economy (P004).

Another participant stated:

However, GIS is part of geomatics and seems interesting because it requires minimal equipment, just a fast PC and the necessary software. There might be better opportunities with GIS instead (P010).

4.8.3. SUB-THEME 7: IMPORTANCE OF PRACTICAL EXPERIENCE

Participants claim that experience is crucial because it provides practical knowledge that goes beyond what is learned in theory. For aspiring entrepreneurs, working in the public or private sector first helps build technical expertise, understand industry standards and develop problem-solving skills. Many feared that without experience, starting a business can feel riskier because the person may lack confidence and the ability to deliver professionally and competently.

When participants were asked if insufficient experience posed a barrier to pursuing entrepreneurship, the following responses were provided:

I had considered starting a surveying business, but it is expensive, and I also want to gain more experience first (P006).

Another participant echoed the same statement:

I will eventually start a geomatics business. I am busy gaining experience and understanding the industry (P008).

Another participant included:

Yes, I will start a company, but only when I have gained more experience and achieved financial stability, which will allow me to manage the risks (P011).

4.9. CROSS-THEME COMPARISON

Overall, the themes indicate that geomatics graduates are well-trained in technical skills but face numerous challenges when starting their own businesses. These challenges include structural barriers, such as regulations and educational gaps in business training, as well as economic difficulties, including a lack of funding. Graduates' intentions to become entrepreneurs are influenced by personal motivations, their financial and social background and their perception of the geomatics profession. Participants see clear opportunities in the industry, such as embracing new technologies and diverse service areas. The lack of entrepreneurial training and institutional support reduces their confidence and ability to take practical steps toward business ownership.

4.10. CONCLUSION

This chapter has presented the empirical findings of the study, organised into seven interconnected themes that reflect the lived experiences, perceptions and challenges of aspiring geomatics entrepreneurs. Collectively, these themes reveal that while graduates possess strong technical competence, their entrepreneurial intentions are shaped by a complex interplay of curriculum design, socio-economic positioning, industry structures and individual motivations. The findings highlight critical gaps in entrepreneurial training within the geomatics curriculum, as well as external barriers such as financial constraints, regulatory requirements and limited access to professional networks. Personal and background factors, including confidence and personal aspirations, further influence whether entrepreneurship is pursued immediately, delayed or abandoned in favour of a stable career as an employee.

The analysis also highlights the significance of social capital, professional recognition and prior work experience in influencing entrepreneurial readiness. Participants demonstrated awareness of emerging industry trends and operational requirements but expressed a need for stronger managerial and business development skills to translate opportunities into viable enterprises. While the geomatics sector offers diverse business avenues and technological innovations,

structural and institutional challenges continue to limit confidence and practical preparedness among graduates.

In summary, while the programme effectively delivers strong technical training, its limited emphasis on entrepreneurial preparation, such as business modules and exposure to specialised software, appears to constrain graduates' confidence and perceived control over starting independent ventures. These gaps likely influence their attitudes and intentions toward entrepreneurship. The following discussion explores the implications of these findings and considers how curriculum enhancements could better support graduates in pursuing diverse career pathways, including self-employment.

CHAPTER 5

DISCUSSION OF RESULTS

5.1. INTRODUCTION

This chapter moves beyond descriptive findings to interpret these results in relation to the study's research questions, existing literature and theoretical framework. This chapter discusses the meaning of the findings presented in Chapter 4. The purpose of this study was to determine whether geomatics graduates from MUT receive adequate preparation to engage in entrepreneurial ventures and to understand the factors that shape their entrepreneurial intentions. The aim was to understand how academic structures influence entrepreneurial development, as shown in the previous chapter. Seven themes were identified from the analysis, including educational content, additional software training, the importance of practical experience, the significance of role models, current business and career paths, limited business exposure, personal background and challenges with funding, among others.

Guided by the interpretivist paradigm, which partly assumes that knowledge is socially constructed and shaped by individual experiences, this discussion acknowledges that the insights gained reflect participants' subjective experiences and meanings. The findings are examined in relation to existing literature and through the lens of the study's theoretical framework, to determine how the results confirm or dispel what is currently known regarding entrepreneurship development. Ajzen's TPB, comprising attitudes, subjective norms, and perceived behavioural control, provides a lens for explaining how graduates form or do not form entrepreneurial intentions. Each theme is now interpreted to explore how environmental, institutional and personal factors influence graduates' readiness and willingness for entrepreneurship.

This discussion will also consider the implications of the findings for curriculum development, policy interventions and professional practice, and will offer recommendations to bridge the gap between technical competence and entrepreneurial capability. This section will critically examine how the identified themes align with or diverge from prior research on entrepreneurship in technical professions and how they contribute to understanding entrepreneurial intention within the context of geomatics.

5.2. THEME 1: LIMITATIONS IN ENTREPRENEURIAL TRAINING

Sub-themes: *Lack of Business Modules, Inadequate Exposure to Specialised Software and Disconnect between Curriculum and Reality.*

This theme examines graduates' perspectives on how well the geomatics programme prepared them for entrepreneurship, with a focus on business modules, software exposure and curriculum alignment with industry needs. The findings indicate that while the programme is strong in developing technical competencies, entrepreneurial preparation is perceived as inadequate. In particular, the lack of dedicated business modules and limited exposure to both basic and advanced geomatics software were highlighted as significant gaps in preparing graduates for business ownership. Participants frequently noted a disconnect between classroom learning and the practical demands of running a geomatics firm, particularly in financial management, tendering processes and funding applications.

Using the TPB theoretical framework, these findings suggest that insufficient entrepreneurial preparation negatively influences both attitudes and perceived behavioural control. Limited business education contributed to neutral or negative attitudes towards entrepreneurship, with business ownership perceived as risky and uncertain. More importantly, inadequate practical training reduced graduates' confidence in their ability to manage a geomatics firm, thereby weakening entrepreneurial intention, which is a key predictor of behaviour within the TPB framework.

From an interpretivist perspective, these perceptions reflect how students construct meaning from their educational experiences. It is not merely the presence of entrepreneurial content that matters, but how students interpret its relevance and applicability to real-world practice. Graduates' subjective sense of preparedness strongly shaped their entrepreneurial orientation and willingness to consider self-employment.

These findings align with existing research on entrepreneurial intentions (Farrington et al., 2012; Mfazi & Elliott, 2022) and studies in other engineering-related fields, which similarly report gaps between technically focused curricula and entrepreneurial skill development (Malebana & Mahlaole, 2023). However, the present study extends this body of knowledge by demonstrating how these gaps are experienced within the geomatics discipline, where technical

competence is prioritised at the expense of business preparedness. Unlike prior studies that broadly identify curriculum shortcomings, the findings here highlight specific deficiencies in financial management, tendering processes and software application, suggesting that entrepreneurial intention is not only influenced by the presence of business content but by its practical relevance and contextual alignment. This reinforces the argument that curriculum design plays a critical role in shaping perceived behavioural control and, ultimately, entrepreneurial intention.

5.3. THEME 2: STRUCTURAL AND INSTITUTIONAL BARRIERS TO ENTREPRENEURSHIP

Sub-themes: *Financial Constraints, Regulatory and Professional Restrictions and Labour Market Instability.*

This theme examines external factors influencing graduates' entrepreneurial intentions, with particular attention to financial constraints, regulatory requirements and labour market instability. The findings indicate that entrepreneurship is perceived not only as a personal or skills-based challenge but as an activity significantly constrained by institutional and economic conditions beyond graduates' direct control. High costs associated with specialised geomatics equipment and software, complex regulatory and professional registration processes and labour market uncertainty were consistently identified as major barriers to business formation.

Participants described the cost of equipment and software as prohibitive for newly qualified graduates, often making self-employment financially unrealistic. Regulatory requirements imposed by both government and professional bodies were viewed as time-consuming and difficult to navigate, further delaying entry into entrepreneurship. In addition, labour market instability encouraged many graduates to prioritise secure employment to ensure financial survival, reinforcing the perception that entrepreneurship is a high-risk career option, particularly in the early stages of professional life.

From an interpretivist perspective, these constraints are socially constructed through graduates' interactions with institutions, industry norms and prevailing economic conditions. Graduates' perceptions of limitations were shaped not only by objective barriers but also by how these

barriers were interpreted as defining what was feasible and appropriate at their career stage. These shared meanings actively influenced decision-making and entrepreneurial orientation.

When interpreted through the lens of the TPB, the findings highlight the central role of perceived behavioural control. Financial and regulatory barriers substantially reduced graduates' confidence in their ability to start and sustain a business, thereby weakening entrepreneurial intention, which is a key determinant of behaviour within the TPB framework. Furthermore, subjective norms within professional bodies and industry culture reinforced traditional employment pathways, signalling that entrepreneurship was not a normative or expected choice for new graduates.

These findings are consistent with existing research, which identifies access to capital, regulatory complexity and economic uncertainty as significant inhibitors of entrepreneurship among young graduates (Worku, 2016; Msomi & Olarewaju, 2021). Studies in developing economies similarly report that financial and regulatory burdens delay entrepreneurial entry and reinforce reliance on formal employment (Khoase et al., 2020). However, this study extends the existing literature by illustrating that these structural barriers are not only experienced as external constraints but are also internalised by graduates as limitations on their own capabilities, thereby directly shaping perceived behavioural control. In contrast to studies that treat such barriers as predominantly economic or institutional, the findings here highlight their cognitive and interpretive dimensions, demonstrating how institutional conditions influence not only feasibility but also graduates' sense of agency. This reinforces TPB's explanatory power by showing how external constraints are mediated through perceptions, ultimately shaping entrepreneurial intention in the geomatics context.

Overall, this theme suggests that entrepreneurial intention is shaped not only by individual mindset and skills but also by the structural and institutional environments that influence perceptions of feasibility and risk. Supporting graduate entrepreneurship may therefore require interventions beyond curriculum reform, including policy support and industry partnerships to reduce entry barriers for geomatics graduates.

5.4. THEME 3: SOCIAL AND INDIVIDUAL CIRCUMSTANCES

Sub-themes: *Socio-economic Factors, Social and Professional Networking and Influence of Role Models.*

This theme examines how graduates' social and personal backgrounds influence entrepreneurial confidence and perceived opportunities, with particular attention to socio-economic background, networks, mentoring, and role models. The findings indicate that entrepreneurial intentions are strongly shaped by social environments, with access to financial stability, family or community support and exposure to successful entrepreneurs playing critical roles in how participants assess the feasibility and desirability of business ownership. In the geomatics sector, social capital emerged as an important resource, as networks and relationships often facilitated access to information, opportunities and professional guidance.

Graduates from financially constrained backgrounds frequently expressed heightened risk awareness, prioritising stable employment to meet immediate income needs and family responsibilities. For these participants, entrepreneurship was perceived as financially unstable and potentially disruptive to household security. In contrast, some participants viewed socio-economic hardship as a motivator, perceiving entrepreneurship as a pathway to upward social and economic mobility. These contrasting perspectives highlight the complex and context-dependent nature of entrepreneurial intention.

When interpreted through the TPB, these findings emphasise the role of subjective norms and attitudes in shaping entrepreneurial intention. Family expectations, community values and the presence of entrepreneurial role models significantly influenced perceptions of entrepreneurship's acceptability and attainability. Participants who had exposure to successful entrepreneurs tended to hold more positive attitudes towards business ownership, whereas those without such exposure associated entrepreneurship with uncertainty, failure and excessive risk.

From an interpretivist perspective, entrepreneurial intentions are socially constructed through ongoing interactions with social structures and significant others. Participants interpreted their personal circumstances and relationships, shaping what they perceived as realistic or achievable career options. These interpretations evolved through interactions with peers,

families and institutions, reinforcing the view that entrepreneurial intention is socially situated rather than purely individual.

These findings align with existing research, which demonstrates that socio-economic background, social capital and role models significantly influence entrepreneurial intention (Farrington et al., 2012; Preisendörfer et al., 2012). Prior studies suggest that strong networks enhance confidence by providing mentorship and access to resources, while economic hardship often increases risk aversion and delays entrepreneurial entry (Mele et al., 2022; Bucci & Marks, 2022). However, this study extends the literature by revealing the dual and context-dependent nature of socio-economic influence, in which financial constraints operate both as a barrier and a motivator for entrepreneurial pursuit. Unlike existing studies that tend to present socio-economic status as a unidirectional influence, the findings here highlight its interpretive dimension, demonstrating how individuals construct meaning around their circumstances in ways that either constrain or enable entrepreneurial intention. This reinforces the relevance of TPB by illustrating how subjective norms and attitudes are shaped by socially embedded experiences, ultimately influencing perceptions of entrepreneurship as attainable or desirable in the geomatics context.

Overall, this theme indicates that entrepreneurship education alone may be insufficient to generate entrepreneurial intention when social and economic realities constrain perceived options. Supporting graduate entrepreneurship may therefore require broader interventions, including mentorship programmes, networking initiatives and targeted support for financially vulnerable students.

5.5. THEME 4: PERCEPTIONS OF THE GEOMATICS INDUSTRY

Sub-themes: *Industry Structure and Opportunities, Challenges Facing the Industry and Impact of Technology in Geomatics.*

This theme examines graduates' perceptions of the geomatics industry, with particular attention to its structure, emerging opportunities, challenges and technological change. The findings indicate that participants viewed the industry as both promising and increasingly complex. While new opportunities were identified in areas such as surveying, GIS, remote sensing and advanced technologies, participants also expressed concerns about automation, market

saturation, unethical practices by unqualified practitioners and intense competition. These mixed perceptions shaped how graduates evaluated entrepreneurship as a viable career pathway.

Participants described the industry as offering niche opportunities, particularly in specialised and technology-driven services. However, these opportunities were often perceived as difficult for new graduates to access, who lacked capital, professional networks, or formal recognition. Concerns about unethical tendering processes, oversupply in certain market segments and professional regulation further contributed to scepticism about entering the market as entrepreneurs. As a result, graduates expressed cautious optimism, recognising potential growth while remaining wary of instability and risk.

When interpreted through the TPB, these findings highlight the role of attitudes and perceived behavioural control in shaping entrepreneurial intention. Negative perceptions of industry ethics and stability weakened attitudes towards entrepreneurship, while rapid technological advancement reduced perceived control, particularly among graduates who felt their training lagged behind innovations such as automation, drone technologies and advanced GIS platforms. Without confidence in maintaining technological relevance, entrepreneurship was viewed as risky and difficult to sustain.

From an interpretivist perspective, these industry perceptions are socially constructed through workplace experiences, interactions with industry actors and institutional narratives. Graduates' interpretations of opportunity and risk were shaped by meaning-making processes rather than purely objective industry conditions. These socially constructed understandings influenced how participants positioned themselves within the industry and assessed their entrepreneurial possibilities.

These findings align with the existing literature, which highlights technological disruption, automation and digital innovation as forces reshaping careers in geomatics and related fields (Munir, 2021). Although empirical studies on market saturation within the geomatics discipline remain limited, previous research suggests that ethical concerns and regulatory complexity discourage entrepreneurial entry among early-career professionals (Mchunu, 2019). However, this study extends the literature by illustrating how these industry-level dynamics are interpreted by graduates as both opportunity and constraint, producing a tension between optimism and perceived risk. Unlike prior studies that primarily emphasise structural changes

within the industry, the findings here foreground the interpretive processes through which graduates assess technological change, market conditions and professional ethics in relation to their own capabilities. This highlights how industry perceptions are filtered through attitudes and perceived behavioural control, reinforcing the TPB's explanatory relevance in understanding how evolving industry conditions shape entrepreneurial intention in the geomatics context.

Overall, this theme demonstrates that industry perceptions play a critical role in shaping entrepreneurial pathways. Even when opportunities are recognised, negative views regarding ethics, competition and technological uncertainty can suppress entrepreneurial intention. Supporting graduate entrepreneurship may therefore require closer alignment between education and industry developments, alongside stronger ethical regulation and greater transparency within the profession.

5.6. THEME 5: ENTREPRENEURIAL INTENTIONS AND MINDSETS

Sub-themes: *Mindset and Personal Ambitions, Business Ambitions and Barriers to Business Intentions.*

This theme examines graduates' entrepreneurial intentions and mindsets, focusing on their ambitions, business goals and perceived barriers to entrepreneurship. The findings indicate that mindset plays a crucial role in shaping entrepreneurial intention, with confidence, self-belief and risk perception strongly influencing whether graduates view entrepreneurship as a viable career option. While some participants expressed strong aspirations to start their own businesses, others preferred stable formal employment, suggesting that entrepreneurial intention is not uniform but varies according to individual attitudes and perceived feasibility.

Graduates with entrepreneurial ambitions often associate business ownership with independence and long-term financial security. However, these positive attitudes were frequently weakened by fear of failure, self-doubt and a perceived lack of readiness, particularly in relation to access to capital and practical business skills. In contrast, participants who preferred formal employment cited income stability, family responsibilities and economic uncertainty as key factors shaping their career choices. This suggests that mindset alone is

insufficient to translate intention into action when significant personal and contextual barriers are present.

When interpreted through the TPB, these findings highlight the interactions among attitudes, perceived behavioural control, and subjective norms. Positive attitudes were evident among participants who viewed entrepreneurship as desirable and achievable. However, low perceived behavioural control, reflected in feelings of inadequate skills, limited resources and financial insecurity, reduced entrepreneurial intention. Social norms, including family expectations and peer influence, often favoured secure employment over entrepreneurship, discouraging risk-taking and reinforcing traditional career pathways.

From an interpretivist perspective, entrepreneurial mindsets and intentions are socially constructed through lived experiences, cultural expectations and institutional contexts. Participants' meanings of entrepreneurship were shaped by personal histories, exposure to entrepreneurship education and broader socio-economic conditions. As such, entrepreneurial intention is best understood as a context-dependent orientation that develops through social and structural influences rather than as a fixed individual trait.

These findings align with existing research highlighting the role of mindset, confidence and risk tolerance in entrepreneurial intention. Previous studies suggest that graduates' decisions are often driven more by perceived capability than by actual competence, with fear of failure and uncertainty acting as significant barriers (Shambare, 2013). Similarly, research in developing economies indicates that socio-economic pressures limit graduates' willingness to pursue entrepreneurship, even when attitudes are positive (Van Scheers, 2010). However, this study extends the literature by demonstrating the interplay between mindset and structural conditions, showing that positive entrepreneurial attitudes do not necessarily translate into intention or action when perceived behavioural control remains low. Unlike notions that treat mindset as a primary driver of entrepreneurship, the findings here highlight its limitations when not supported by adequate resources, skills and enabling conditions. This reinforces the relevance of TPB by illustrating how attitudes alone are insufficient and must be complemented by strong perceived behavioural control and supportive subjective norms to effectively shape entrepreneurial intention.

Overall, this theme demonstrates that while entrepreneurship education can foster positive attitudes and aspirations, structural barriers and low perceived behavioural control continue to limit the transition from mindset to action. Supporting graduate entrepreneurship, therefore, requires not only mindset development but also practical interventions that enhance confidence, reduce risk and improve access to resources.

5.7. THEME 6: CAREER TRAJECTORY AND PROFESSIONAL DEVELOPMENT

Sub-themes: *Academic Qualifications, Career Pathways and Professional Registration.*

This theme examines how graduates perceive their career pathways, with particular attention to qualifications, professional registration and long-term objectives. The findings indicate that most participants did not view entrepreneurship as an immediate or primary career option after graduation. Instead, they prioritised gaining work experience, achieving professional registration and developing technical expertise, positioning entrepreneurship as a future or secondary goal rather than an entry-level choice.

Participants emphasised the importance of professional recognition and credibility before launching a business. Professional registration was widely perceived as a symbol of legitimacy, competence and employability, particularly within technical and regulated fields such as geomatics. As a result, entrepreneurship was often postponed until graduates felt established and confident in their professional identities. This suggests that entrepreneurial readiness is shaped more by career sequencing than by a lack of interest in business ownership.

When interpreted through the TPB framework, these findings highlight the influence of subjective norms and perceived behavioural control on entrepreneurial intention. Industry expectations and professional standards encouraged graduates to follow conventional pathways of registration and formal employment, making entrepreneurship appear premature and risky without sufficient professional experience. Confidence in pursuing entrepreneurship increased once graduates had acquired credentials and practical experience, indicating that perceived behavioural control strengthened as professional security increased.

From an interpretivist perspective, graduates' priorities reflect socially constructed notions of success, legitimacy and professional identity. Institutional messaging, professional bodies and industry norms shaped how participants interpreted appropriate career trajectories. Entrepreneurship was therefore not viewed as an alternative to professional development, but as a pathway that gains legitimacy through alignment with dominant professional expectations.

These findings align with existing research suggesting that professionalisation often delays entrepreneurial entry, particularly in fields that require formal registration (De Vries, 2022). Studies in engineering and other technical professions similarly report that graduates prioritise employment and professional status as preparatory stages for entrepreneurship, using these to build skills, networks and reduce perceived risk (Antonites & Nonyane-Mathebula, 2012). However, this study extends the literature by demonstrating how this delay is not merely a strategic career decision, but a socially reinforced expectation embedded within professional norms and institutional structures. This reinforces the relevance of TPB by illustrating how perceived behavioural control strengthens over time through experience and credentialing, while subjective norms regulate the timing and acceptability of entrepreneurial action within the geomatics profession.

Overall, this theme demonstrates that professional development priorities significantly influence entrepreneurial readiness. While entrepreneurship is viewed as a viable and desirable pathway, it is often delayed until graduates achieve job security and professional stability. This highlights the importance of considering career sequencing and professional norms when evaluating the impact of entrepreneurship education on graduates' intentions.

5.8. THEME 7: PRACTICALITIES OF RUNNING A GEOMATICS BUSINESS

Sub-themes: *Business Management Skills, Discipline-Specific Business Activities and Importance of Practical Experience.*

This theme examines graduates' perspectives on the practical requirements of launching and managing a geomatics business, with a focus on management skills, discipline-specific operations and hands-on experience. The findings indicate that while participants were aware of key operational responsibilities such as tendering, staff management, financial

administration and the use of specialised equipment, many lacked confidence in their ability to perform these tasks effectively. Deficiencies in core business skills, including marketing, financial management and strategic planning, were highlighted as major limitations.

Participants' strong exposure to the technical aspects of geomatics provided them with a partial understanding of business ownership; however, this was not sufficiently complemented by training in broader management functions. As a result, entrepreneurship was perceived as complex and demanding, with many graduates unsure about their ability to manage a business holistically. This gap between technical competence and business readiness reduced graduates' willingness to pursue entrepreneurship, even when opportunities within the geomatics sector were recognised.

When interpreted through the TPB theoretical framework, these findings emphasise perceived behavioural control as a central determinant of entrepreneurial intention. Limited business training weakened confidence in operating a geomatics firm, while awareness of the complexity of business ownership shaped negative or cautious attitudes. Graduates who felt unprepared to meet business demands were therefore less likely to engage in entrepreneurial activity, despite having technical expertise.

From an interpretivist perspective, participants' understandings of business ownership were socially constructed through their educational experiences, institutional preparation and industry exposure. Entrepreneurship was not viewed as unattainable but rather as requiring additional experience, mentorship or training before it became realistic. These interpretations shaped how graduates constructed meanings of readiness, competence and legitimacy in relation to entrepreneurship.

These findings align with existing research indicating that graduates in engineering and built-environment disciplines often possess strong technical knowledge but lack entrepreneurial competencies, such as marketing and financial planning (De Vries, 2022). Prior studies also suggest that practical business skills are critical for venture success, particularly in technical fields (Owusu-Awuah, 2024). However, this study extends the literature by demonstrating how the gap between technical expertise and business competence is not only a skills deficit but also a perceptual barrier that shapes graduates' sense of readiness for entrepreneurship. Unlike previous research, which primarily frames this issue in terms of curriculum limitations, the

findings here highlight how awareness of business complexity reduces perceived behavioural control, thereby discouraging entrepreneurial action. This reinforces TPB's explanatory value by illustrating how perceived competence, rather than actual technical ability, plays a decisive role in shaping entrepreneurial intention in the geomatics context.

Overall, this theme demonstrates that while graduates understand the operational realities of business ownership, limited exposure to business management significantly reduces entrepreneurial readiness. Supporting entrepreneurship in technical programmes, therefore, requires integrating discipline-specific business skills alongside technical training to enhance confidence, competence and perceived feasibility.

5.9. CONCLUSION

In summary, this chapter explained the study's findings by linking them to the research questions, existing theories and relevant literature. Using Ajzen's TPB, it was found that the entrepreneurial intentions of geomatics graduates are shaped by factors such as education, social influences, industry expectations and personal attitudes. The strength of the TPB is that it effectively explains how attitudes, subjective norms and perceived behavioural control work together to influence intention, while the interpretivist paradigm helps situate these experiences as meaningful constructions rather than objective shortcomings.

The results reveal that graduates are technically skilled but lack strong business knowledge, practical entrepreneurial training and access to financial or institutional support. These gaps make them less confident about starting businesses and more likely to choose traditional employment. Social pressures from family, professional bodies and industry norms also encourage graduates to pursue jobs rather than entrepreneurship.

Other challenges, such as complex regulations, high start-up costs and rapid technological changes, make entrepreneurship seem risky and unrealistic. Graduates often view starting a business as something to do later in their careers rather than immediately after graduation.

The discussion makes it clear that teaching entrepreneurship alone is not enough. It needs to be combined with practical business skills, mentorship, industry partnerships and supportive systems. This study contributes new knowledge by demonstrating how professional

requirements and technical norms in geomatics influence entrepreneurial choices in South Africa. All these insights highlight opportunities for curriculum enhancement, stronger industry engagement and targeted entrepreneurial support to strengthen graduates' entrepreneurial readiness.

The following chapter will provide recommendations on practical steps to enhance the entrepreneurial readiness of geomatics graduates at MUT. These include changes to the curriculum, stronger institutional support, greater industry collaboration, and policy measures to help graduates balance technical training with business skills. The goal is to turn these findings into tangible actions that benefit universities, professional bodies and policymakers.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

This chapter presents recommendations derived from the study's findings and discussions. The recommendations aim to address the factors contributing to the limited entrepreneurial engagement among MUT's geomatics graduates. Guided by the interpretivist paradigm and Ajzen's TPB theoretical framework, the recommendations aim to enhance graduates' entrepreneurial intentions by positively stimulating their attitudes toward entrepreneurship, strengthening perceived behavioural control, and reshaping subjective norms across academic, professional, and industry contexts.

The recommendations are organised into four key areas: pedagogical and curricular; experiential learning; institutional policy; and industry and professional bodies. Together, these recommendations aim to bridge the gap between technical competence and entrepreneurial readiness within geomatics education.

6.2. PEDAGOGICAL AND CURRICULUM RECOMMENDATIONS

This section outlines pedagogical and curricular recommendations based on the study's key findings and informed by the TPB. The findings identified gaps in graduates' entrepreneurial preparedness, particularly in business skills, alignment with industry needs and perceived behavioural control. In response, the recommendations propose ways to strengthen entrepreneurship education within the geomatics curriculum that are contextually relevant and professionally grounded. The overall aim is to improve graduates' confidence, competence and intention to pursue entrepreneurial opportunities within the geomatics sector.

6.2.1. INCLUSION OF GEOMATICS-SPECIFIC ENTREPRENEURSHIP MODULES

It is recommended that MUT incorporate compulsory, discipline-specific entrepreneurship modules within the geomatics curriculum. These modules should extend beyond regular business training and incorporate practical, industry-relevant content tailored to the geomatics

profession. Key areas of focus should include tendering and bidding processes, pricing strategies for surveying services, diverse professional services that could be entrepreneurial, financial management for technical firms and compliance with professional and national regulations.

Embedding entrepreneurship education within the core curriculum can shape these graduates' attitudes toward entrepreneurship by positioning it as an alternative to employment as the primary choice. From the TPB perspective, this integration is expected to strengthen two critical determinants of entrepreneurial intention: positive attitudes toward entrepreneurship and perceived behavioural control. By equipping students with relevant knowledge and practical skills, the programme can enhance their confidence and capability to pursue entrepreneurial ventures within the geomatics sector.

6.2.2. CURRICULUM ALIGNMENT WITH THE GEOMATICS INDUSTRY

It is recommended that the geomatics curriculum at MUT undergo review in close collaboration with industry stakeholders to ensure its continued relevance and alignment with current professional practices and entrepreneurial realities. This process should involve integrating contemporary case studies, emerging business models and addressing ethical challenges specific to the geomatics sector. This can be achieved by expanding the scope of existing structures, such as industrial advisory boards. By incorporating these elements into the curriculum, students will gain exposure to practical scenarios that reflect the industry's dynamic nature.

The recommended alignment will address the perceived disconnect between academic training and real-world business demands, as highlighted by study participants. Again, from a TPB perspective, this approach can enhance graduates' confidence in their preparation for entrepreneurship by reinforcing perceived behavioural control and shaping positive attitudes toward self-employment. Ultimately, a curriculum that aligns with industry expectations will better equip graduates to navigate both the technical and entrepreneurial aspects of their careers.

6.3. EXPERIENTIAL LEARNING RECOMMENDATIONS

This section presents experiential learning recommendations based on the study's findings and guided by the TPB and an interpretivist perspective. The findings show that graduates' entrepreneurial intentions are strongly influenced by practical exposure, social interaction and opportunities for real-world learning. In response, the recommendations emphasise strengthening experiential learning pathways that enable students and graduates to engage directly with entrepreneurial activities in the geomatics sector. The aim is to improve confidence, perceived behavioural control, and socially constructed understandings of entrepreneurship through the learning experiences.

6.3.1. MENTORSHIP AND ROLE MODEL PROGRAMMES

It is recommended that MUT, in conjunction with other industry partners such as SAGI, introduce structured mentorship programmes that connect current students and the new graduates with experienced geomatics entrepreneurs. These programmes should provide opportunities for interaction, knowledge sharing and guidance on both technical and business aspects of the profession. Exposure to role models who have successfully established entrepreneurial ventures can positively influence graduates' attitudes toward entrepreneurship and reshape subjective norms by demonstrating that entrepreneurial success is achievable.

Interpretivists believe that mentorship facilitates meaning-making through social interaction and experiential learning, enabling graduates to construct practical understandings of entrepreneurship within their professional context. Mentorship can strengthen behavioural control by offering real-life insights and building confidence in entrepreneurial decision-making.

6.3.2. GRADUATE DEVELOPMENT AND SUPPORT

Since many graduates only learn about entrepreneurship at a very late stage, institutions such as MUT should include phased entrepreneurial modules, as they do with other similar modules, such as communication skills subjects. Furthermore, they should include post-graduation entrepreneurial training and support for graduates who wish to transition from employment into entrepreneurship.

By offering flexible and progressive entry points into entrepreneurship, institutions can reduce perceived barriers and sustain graduates' interest in self-employment. From the TPB perspective, phased pathways can strengthen perceived behavioural control and positively influence attitudes by demonstrating that entrepreneurship is achievable.

6.3.3. EXPANSION OF PRACTICAL BUSINESS-FOCUSED TRAINING

The study emphasises the importance of gaining practical experience in business operations alongside technical skills. It is recommended that entrepreneurship education within geomatics programmes include applied components such as business simulations, business plans with rigorous SWOT (strengths, weaknesses, opportunities, threats) analysis, mock tender submissions and project-based learning that reflect real business scenarios. By bridging theory and practice, these initiatives can foster greater preparedness and encourage graduates to consider entrepreneurship as a viable career pathway.

Experiential learning initiatives can strengthen perceived behavioural control by allowing students to practise entrepreneurial tasks in safe environments, thereby reducing the fear of failure and uncertainty associated with business start-ups.

6.3.4. INCLUSION OF ENTREPRENEURIAL INCUBATION DURING WIL

As many MUT geomatics graduates perceive entrepreneurship as a later-stage career option, it is recommended that the business training form part of their WIL. Methods can be developed and implemented, including business development during studies or after graduation, as part of a programme. Those programmes should be structured to include exposure to entrepreneurial activities within geomatics firms, such as client acquisition, resource management, personnel management and project management. Partnerships with small and medium-sized geomatics enterprises could provide students with first-hand experience of the realities of business ownership.

This approach would reinforce learning through social interaction and observation, which aligns with the interpretivist view that knowledge and meaning are constructed through lived experiences. In addition, from the TPB perspective, offering these methods during WIL training would provide a gradual entry point into entrepreneurship, thereby reducing perceived barriers and sustaining graduates' interest in self-employment.

6.4. INSTITUTIONAL POLICY RECOMMENDATIONS

This section presents institutional policy recommendations based on the study's findings and guided by the TPB. The findings indicate that graduates' entrepreneurial intentions are influenced not only by individual attitudes and skills but also by institutional structures, access to resources and organisational support. In response, the recommendations focus on strengthening institutional systems that support entrepreneurship, particularly through dedicated support structures and improved access to funding. The aim is to reduce structural barriers and enhance perceived behavioural control, thereby creating an enabling environment for graduate entrepreneurship within the geomatics discipline.

6.4.1. ESTABLISHMENT OF THE ENTREPRENEURSHIP SUPPORT STRUCTURE

It is recommended that MUT establish or strengthen an entrepreneurship support unit that specifically caters to students and graduates in technical disciplines, such as geomatics. This unit should offer a comprehensive range of services, including business advisory support, mentorship programmes, guidance on accessing funding opportunities and start-up incubation tailored to the unique requirements of geomatics enterprises.

Such institutional endorsement can positively influence attitudes toward entrepreneurship and strengthen perceived behavioural control by reducing structural and informational barriers to business start-up, thereby aligning with the principles of the TPB.

6.4.2. IMPROVED ACCESS TO START-UP FUNDING AND RESOURCES

Given the financial constraints highlighted in the study, it is recommended that MUT, in collaboration with relevant stakeholders, establish strategic partnerships with government agencies, development finance institutions and private sector organisations to create accessible funding opportunities for graduate entrepreneurs. These initiatives could include funding programmes, equipment-sharing schemes, bursary-like funding models for best achievers and subsidised access to specialised geomatics software, all aimed at boosting geomatics start-up firms.

From the lens of Ajzen's TPB, improving access to financial resources may encourage graduates to perceive entrepreneurship as a feasible and attractive option earlier in their careers, thereby increasing the likelihood of entrepreneurial engagement.

6.5. INDUSTRY AND PROFESSIONAL BODY RECOMMENDATIONS

This section presents industry and professional body recommendations, informed by the study's findings and guided by the TPB. The findings indicate that graduates' entrepreneurial intentions are strongly influenced by professional regulations, industry practices and the ethical environment within the geomatics sector. In response, the recommendations emphasise strengthening collaboration between HE institutions, professional bodies and industry stakeholders to support entrepreneurship. The aim is to enhance perceived behavioural control and reshape subjective norms by promoting professional legitimacy, ethical practice and formal endorsement of entrepreneurship within the geomatics profession.

6.5.1. STRENGTHENED COLLABORATION WITH PROFESSIONAL BODIES

It is recommended that professional geomatics bodies, primarily SAGC and, subsidiarily, SAGI, collaborate more closely with HE institutions to promote and support early-career entrepreneurship among graduates. This collaboration could include initiatives such as simplified registration pathways for graduate-led firms, structured mentorship programmes facilitated by professional associations and clear, accessible guidance on regulatory and compliance requirements for new entrepreneurs. Most importantly, it would eliminate any ambiguities regarding work reservations for diploma graduates. This was flagged by most participants' responses, who believed they were barred from operating geomatics companies due to a lack of knowledge at their level of study.

Such measures would help reduce uncertainty surrounding professional compliance and enhance graduates' confidence in navigating regulatory environments. From the TPB perspective, this approach can positively influence perceived behavioural control and subjective norms by signalling institutional and professional endorsement of entrepreneurship as a legitimate career.

6.5.2. ETHICAL PRACTICES AND TRANSPARENCY IN INDUSTRY

It is recommended that industry stakeholders actively promote ethical conduct, transparency and fair competition across the geomatics sector. Initiatives should include developing and enforcing clear ethical guidelines, taking action against exploitative practices, and addressing concerns about market saturation. By fostering a professional environment founded on integrity and fairness, the industry can enhance graduates' perceptions of entrepreneurship as a viable and respectable career option. Voluntary associations, such as SAGI, should take the lead in combating corruption within and around tendering processes issued by government departments by insisting on serving on adjudication panels as a watchdog.

A positive industry commitment to ethical standards can reshape subjective norms and influence how graduates evaluate entrepreneurial participation, thereby strengthening positive attitudes toward entrepreneurship and reducing the perceived risks associated with entering the market. This, in turn, encourages greater entrepreneurial engagement among geomatics graduates, thereby embedding the TPB elements.

6.6. CONTRIBUTION OF THE STUDY

This section outlines the study's key contributions to knowledge, with particular emphasis on its theoretical and empirical significance. The study contributes to the growing body of entrepreneurship research by offering context-specific insights into entrepreneurial intentions within the geomatics discipline. By combining the TPB with an interpretivist qualitative approach, the study advances understanding of how entrepreneurial intentions are shaped in technical and professional education contexts in South Africa.

6.6.1. THEORETICAL CONTRIBUTION

This study contributes to the entrepreneurship literature by applying the TPB within the context of geomatics education at a South African UoT. While TPB has been widely used to study entrepreneurial intentions, limited research has examined how discipline-specific education and industry perceptions shape students' attitudes, subjective norms and perceived behavioural control. The findings, therefore, extend theoretical understanding of how entrepreneurial intentions are formed within technical and professional fields.

6.6.2. EMPIRICAL CONTRIBUTION

Empirically, the study provides context-specific qualitative evidence on students' lived experiences, perceptions and meaning-making regarding entrepreneurship. By foregrounding students' voices, the study addresses a gap in South African research on entrepreneurship readiness among geomatics students and offers insights often absent in survey-based studies.

6.7. RECOMMENDATIONS FOR FUTURE RESEARCH

Future studies could investigate how entrepreneurial intentions among geomatics graduates evolve over the training period, particularly as they gain professional experience and become registered. Comparative studies across institutions and other allied disciplines could also provide deeper insight into how entrepreneurship education functions within different technical fields. Further research could also explore the perspectives of academics, industry experts and policymakers to develop a more comprehensive understanding of entrepreneurship development within the engineering professions, starting with geomatics.

6.8. CONCLUSION

The recommendations presented in this chapter provide a comprehensive framework for enhancing entrepreneurial readiness among geomatics graduates, by addressing gaps in curriculum design, practical exposure, institutional support, industry collaboration and graduate development. These measures aim to create an environment that enables entrepreneurship within the geomatics profession. Implementing these recommendations will require coordinated efforts from MUT, professional bodies, industry stakeholders and policymakers. Ultimately, these interventions have the potential to enhance the alignment between technical competence and entrepreneurial capability, thereby contributing to economic growth and professional diversification in South Africa's geomatics sector.

In conclusion, the study has successfully achieved its objective and answered the research questions, thereby contributing to the limited body of research on entrepreneurship within technical and professional disciplines in the South African context. The study demonstrates that the lack of entrepreneurial undertaking among geomatics graduates at MUT is not due to

a lack of interest in entrepreneurship, but rather to structural, educational and contextual barriers. Addressing these challenges requires a coordinated effort by all stakeholders, including the government, HE institutions and industry, to create an enabling environment that transforms entrepreneurial intention into action.

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APPENDICES

8.1. CODEBOOK TO THEMES

THEME 1: Limitations in Entrepreneurial Training

Sub-theme 1.1: Lack of Business Modules

- Academic content
- Business module contents
- Contents of business elements in other modules
- Curriculum deficiency
- Entrepreneurial training
- Insufficient training
- Introduction of business modules
- Optional modules
- Practical knowledge
- Student training
- Sufficient training
- Tailor-made modules for geomatics businesses

Sub-theme 1.2: Inadequate Exposure to Specialised Software

- Equipment
- Exposure to geomatics software
- GPS
- Surveying software
- Technical knowledge
- Technical training
- Totalstations

Sub-theme 1.3: Disconnect Between Curriculum and Reality

- Core business module
- Curriculum change
- Guest lectures
- Industry experts
- Survey camps
- Survey practice
- Webinars
- Workshops

THEME 2: Barriers to Entry into Entrepreneurship

Sub-theme 2.1: Financial Constraints

- Bursary-like funding
- Delays with funding
- Finances
- Financial support
- Funding
- Funding agencies
- Funding application process
- Government funding agencies' visibility
- Lack of capital
- NYDA, SEDFA
- Public advertisements of NYDA/SEDFA

Sub-theme 2.2: Regulatory and Professional Restrictions

- Professional registration
- Prohibiting concurrent business and employment
- SAGC limitations for technicians
- SAGC, SAGI
- Special licensing for drones
- Tax laws / Taxes
- Tender system/s

Sub-theme 2.3: Labour Market Instability

- Covid-19 impact
- Not getting jobs for companies
- Public service
- Unemployment
- Work reservation

THEME 3: Social and Individual Circumstances

Sub-theme 3.1: Socio-economic Factors

- Background
- Disadvantaged background
- Family business
- Family support
- Motivated by being poor
- Not taking advantage of family support
- Poor background
- Social background

Sub-theme 3.2: Social and Professional Networking

- Connections or contacts
- Exposure to business
- Industry experts
- Informal business exposure
- Networking
- Partnerships with graduates
- Partnerships with other geomatics categories
- Social networking

Sub-theme 3.3: Influence of Role Models

- Already have business
- Business success
- Good university / Reputation
- Others have started businesses
- Outlook / Success of business

THEME 4: Perceptions of the Geomatics Industry

Sub-theme 4.1: Industry Structure and Opportunities

- Construction industry
- Construction projects
- Engineering work
- Geomatics company
- Intertrade within geomatics companies
- Survey firm
- Survey industry
- Surveying company
- Types of surveys

Sub-theme 4.2: Challenges Facing the Industry

- Corruption
- Getting work / Obtaining work
- Nepotism
- Not getting jobs for companies
- Stealing of business ideas
- Unqualified surveyors
- Unregistered practitioners

Sub-theme 4.3: Impact of Technology in Geomatics

- By-service offering (drafting, GIS)
- Dangers of technology, job loss
- Embracement of technology
- Fewer assets required for GIS
- Potential outsourcing due to technology

THEME 5: Entrepreneurial Intentions and Mindsets

Sub-theme 5.1: Mindset and Personal Ambitions

- Business-mindedness
- Discouragement
- Empowerment of others
- Negative mindset
- Not being motivated
- Outlook of the profession
- Positive mindset

Sub-theme 5.2: Business Ambitions

- Business start-up
- Entrepreneurship choices
- Motivated by being poor
- Origins of business intentions
- Owning a business

Sub-theme 5.3: Barriers to Entrepreneurial Intentions

- Employment
- Job seeking
- No intentions to start a company
- No knowledge of how to start a company
- Safety of having a job

THEME 6: Career Trajectory and Professional Development

Sub-theme 6.1: Academic Qualifications

- Advanced diplomas
- Further studies
- Good pass in board exams
- Qualifications
- Surveying diploma

Sub-theme 6.2: Career Pathways

- Career path
- Employment
- Later stage entrepreneurship
- Work experience
- Working environment

Sub-theme 6.3: Professional Registration

- Profession
- Professional registration
- Reputation
- SAGC / SAGI

THEME 7: Practicalities of Running a Geomatics Company

Sub-theme 7.1: Business Management Skills

- Business training
- Financial management
- Marketing
- People management
- Presentation of business plan
- Running the business
- Services for payment

Sub-theme 7.2: Geomatics-specific Business Activities

- Beacon relocation
- Cadastral work
- Cross-border trading
- Leasing as a business
- Other services (equipment vending/hiring)
- Trading

Sub-theme 7.3: Importance of Practical Experience

- Additional software training
- Business training
- Experience
- Getting work
- Insufficient training
- Skills gap
- Survey camps
- Technical knowledge
- Training
- Work experience

8.2. GATEKEEPER PERMISSION



Research Directorate

UMLAZI KWAZULU-NATAL

PO Box 12363 Jacobs 4026 Durban

Tel: 031 907 7400

10 October 2025

REF: RD0/21/2025

Mr Siyabonga Desmond Shadrack Khanyeza
University of KwaZulu-Natal

Dear Mr Khanyeza

PROTOCOL: 'The lack of entrepreneurial undertaking among geomatics graduates of Mangosuthu University of Technology (MUT) since 2018 till present.'

The MUT Research Ethics Committee considered your application at their meeting held on 19 September 2025. It is my pleasure to inform you that permission to conduct the research project above was granted.

The approval is valid for two years from 19 September 2025. Any changes to the project must immediately be brought to the attention of the MUT Research Ethics Committee.

Your acceptance of this approval denotes your compliance with South African National Research Ethics guidelines (2004) and the MUT Research Ethics Policy, Procedures and Guidelines

Good luck with your research.

Yours sincerely,

Dr A Mienie
Director: Research

22 October 2025

Siyabonga Desmond Khanyeza (218086350)
School of Education (Prior Restructuring)
Edgewood Campus

Dear SD Khanyeza,

Protocol reference number: HSSREC/00009568/2025

Project title: Exploring the lack of entrepreneurial undertaking among geomatics graduates of Mangosuthu University of Technology from 2018 to 2024.

Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 21 October 2025 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

Incidents of adverse events and serious adverse events (AEs and SAEs) should be reported in writing to HSSREC, the study sponsors, and any regulatory authority (where appropriate), within 7 working days of the occurrence for local sites and 14 days for all other South African sites.

This approval is valid until 22 October 2026.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,



Doctor Shamila Naidoo (Interim Chair)

/nng

Humanities and Social Sciences Research Ethics Committee

Postal Address: Private Bag X5400, Durban, 4000, South Africa

Telephones: +27 (0)31 260 8350/4557/3597 Email: hssrec@ukzn.ac.za Website: <https://research.ukzn.ac.za/Research/Ethics>

Founding Campuses:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

INSPIRING GREATNESS

8.4. PARTICIPANTS' INFORMATION LETTER



UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

Research Ethics

COLLEGE OF HUMANITIES

Participant Information Letter

10 September 2025

1. Introduction

Dear Prospective Participant

You are invited to take part in a research study titled *“Exploring the Lack of Entrepreneurial Undertaking Among Geomatics Graduates of Mangosuthu University of Technology from 2018 to 2024”*, which is being conducted by Mr Siyabonga Khanyeza, a master’s student in the College of Humanities at UKZN, whose student number is 218086350 and who is supervised by Prof. Lester Shawa.

2.1. Purpose of the Research

The main objective of the proposed study is to investigate the factors surrounding graduates’ lack of entrepreneurial ambition. This includes investigating whether the graduate training programme provided enough for them to aspire to engage in a business undertaking. The study also aims to establish whether there is a link between business ambition and the background of these graduates.

2.2. Outline of the Methodology

This research project has been approved by both the UKZN’s and MUT’s respective Research Ethics Committees; the approval documents are enclosed. If you agree to take part, your contribution will be to avail yourself of a one-on-one recorded interview session that will take approximately half an hour, during which you will be asked questions relating to your business knowledge as a geomatics graduate. The reason for recording the interviews is to improve efficiency in extracting transcripts, rather than using a scribbled journal. The questions will not require any personal information, but will only be based on your experience as a Surveying student during your study period and after graduating.

2.3. Confidentiality

Your identity will not be revealed for this study, and the handling of any personal information will comply with the Protection of Personal Information Act 4 of 2013. The interview transcripts will be kept safely and disposed of at the completion of this study. All information you provide will be kept strictly confidential and used only for research purposes. Data will be anonymised and stored securely.

2.4. Risks, Discomforts and/or Costs to Participants

There are no anticipated risks associated with this study. While there will be no intended benefit to participating in this research, discretion will be used regarding reimbursement of transport costs for participants.

2.5. Deception or Concealment

There will be no deception or concealment.

2.6. Termination of Participation

Your participation is entirely voluntary. You may withdraw at any time without penalty. Should a participant withdraw before the study is concluded, their information will be withdrawn, destroyed and not used further in this study. In an unfortunate situation, the researcher may terminate a participant's involvement at their discretion. Such situations would include unethical behaviour by the participant, such as intoxication, soliciting, or extortion.

2.7. Findings and Feedback

The results of this study will be encapsulated in a thesis that will be made available at MUT/UKZN libraries and in online publications. Arrangements will be made to inform interested participants of the outcomes of this study at its conclusion.

2.8. Benefits to Participants

While there may be no direct benefit to you, your participation will yield valuable insights into the trends that lead graduates not to pursue the business interests of their profession after graduation.

2.9. Sponsorship

The research is funded by the researcher, and no income is anticipated for undertaking this study.

2.10. Contact Persons

If you have any questions or concerns, please feel free to contact me, my supervisor, and both UKZN and MUT. The contact details are provided below.

Student Full Name	:	Mr. Siyabonga Khanyeza
Student Number	:	218086350
University	:	University of KwaZulu-Natal
Campus	:	Edgewood Campus

College : College of Humanities in School of Education
Degree : Master's Degree: Higher Education (M.Ed.)
Supervisor : Prof. Lester Shawa
Supervisor's email: shawwa@ukzn.ac.za

Student Contact Details

[REDACTED] : [REDACTED]
[REDACTED] : [REDACTED]
Other email : [REDACTED]
[REDACTED] : [REDACTED]
[REDACTED] : [REDACTED]

For complaints or queries, please contact:

University of KwaZulu-Natal	Mangosuthu University of Technology
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION Research Office, Westville Campus Govan Mbeki Building KwaZulu-Natal, SOUTH AFRICA Tel: 27 31 2604557 Fax: 27 31 2604609 Email: HSSREC@ukzn.ac.za	Research Directorate MUT Main Campus [REDACTED] [REDACTED] KwaZulu-Natal, SOUTH AFRICA [REDACTED] [REDACTED]

Warm regards,

Siya Khanyeza, a master's student in Higher Education (M.Ed.) at UKZN.

8.5. TYPICAL INFORMED CONSENT FORM



Research Ethics



**UNIVERSITY OF
KWAZULU-NATAL**
**INYUVESI
YAKWAZULU-NATALI**

COLLEGE OF HUMANITIES

Informed Consent Letter

07 November 2025

Greetings Prospective Participant

My name is Siyabonga Khanyeza, a lecturer in the Civil Engineering & Surveying Department at MUT. I'm doing research for a master's degree in Higher Education at UKZN, Edgewood campus. My student information is as follows:

Student Number : 218086350
Supervisor : Prof. Lester Shawa
Supervisor's email : shawa@ukzn.ac.za
Student Contact Details

Tel. No. : [REDACTED]
[REDACTED] : [REDACTED]
[REDACTED] : [REDACTED]

You are being invited to consider participating in a study that involves researching the factors surrounding graduates' lack of entrepreneurial ambition after graduating. The study needs to randomly select a sample of 10 to 15 graduates who obtained diplomas in Surveying from MUT between 2018 and 2024. If you agree to participate in this study, you will be available for a one-on-one, electronically recorded interview lasting no longer than half an hour, at a location yet to be confirmed but in a conducive environment.

It is envisaged that this study will provide guidance on the training methods for these graduates, as well as reveal the truth behind the lack of graduates' entrepreneurial desires.

There are no anticipated risks associated with this study. There will be no tangible benefit for participating in this research, monetary or otherwise. However, transport costs will be reimbursed.

You may withdraw at any time during the study without any repercussions. Similarly, the researcher may withdraw a particular participant if the situation becomes uncomfortable for both parties. Should a participant withdraw before the study is concluded, their information will be withdrawn, destroyed and not used further in this study.

Your identity will not be revealed for this study, and the handling of any personal information will comply with the Protection of Personal Information Act 4 of 2013. The interview transcripts will be kept safely and disposed of at the completion of this study. All information you provide will be kept strictly confidential and used only for research purposes.

This study has been submitted for ethical clearance to both MUT and UKZN and has been approved. The respective approval documents have been enclosed.

In the event of any problems or concerns/questions, you may contact the researcher and/or the university at the details provided below.

University of KwaZulu-Natal	Mangosuthu University of Technology
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION Research Office, Westville Campus Govan Mbeki Building KwaZulu-Natal, SOUTH AFRICA Tel: 27 31 2604557 Fax: 27 31 2604609 Email: HSSREC@ukzn.ac.za	Research Directorate ██████████ ██████████ ███████████ ███████████ ███████████ ████████████████████ ██ ████████████████████ ██

CONSENT for participation in this study.

I ----- have been informed about the study titled
“Exploring the Lack of Entrepreneurial Undertaking Among Geomatics Graduates of Mangosuthu University of Technology from 2018 to 2024” by Mr. Siyabonga Khanyeza.

1. I understand the purpose and procedures of the study as stated above.
2. I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.
3. I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without fear.
4. I’m aware that the researcher will not be responsible if an injury occurs to me because of study-related activities.
5. If I have any further questions/concerns or queries related to the study, I understand that I may contact the researcher as indicated above.
6. I hereby provide consent to:
 - a. Audio-record my interview. YES / NO
 - b. Video-record my interview. YES / NO

Signature of Participant

Date

Signature of Witness

Date

8.6. SCHEDULE OF INTERVIEW QUESTIONS

Research Interview Schedule

Research Title: Exploring the Lack of Entrepreneurial Undertaking Among Geomatics Graduates of Mangosuthu University of Technology from 2018 to 2024.

Introduction

Dear Participant, you are invited to participate in a research study seeking to understand why MUT Geomatics/Surveying graduates (2018-2024) are not actively engaging in entrepreneurship. The study will explore your career journey, perceptions of entrepreneurship, challenges and possible solutions. Your responses will provide valuable insights that may inform future curriculum development, graduate support, policy recommendations, as well as government support.

Consent Statement

- Your participation in this study is voluntary.
- You may withdraw at any time without penalty.
- All information will be kept confidential and used only for academic purposes.
- You are to remain anonymous, and there will be no mention of participants' names in the final findings.

By continuing with this interview, you confirm that you have read and understood the above and you consent to participate. You also confirm that you understood the contents of the consent form that you signed and submitted.

Instructions

- This is a semi-structured interview schedule.
- Please answer as openly and honestly as possible.
- There are no right or wrong answers.
- Questions may require follow-up for clarification.

Section A: Background Information

1. In what year did you graduate from MUT with your geomatics qualification?
2. What level of qualification did you obtain? (Diploma, Degree, Postgraduate)
3. What is your current employment status? (Employed / Self-employed / Unemployed / Further Studies)
4. If employed, in which sector or type of organisation are you working?

Section B: Career Pathways & Aspirations

5. After graduation, what career path did you initially pursue? Why?
6. Did you ever consider starting your own geomatics-related business? Please explain.
7. What do you think is better, to be a business owner or an employee? Why?

Section C: Perceptions of Entrepreneurship

8. What does entrepreneurship mean to you in general? What does it mean in the context of geomatics?
9. Do you believe entrepreneurship is a viable option for MUT geomatics graduates? Why or why not?
10. Have you thought of starting your own geomatics business?
11. What factors discouraged you (or your peers) from pursuing geomatics entrepreneurship?
12. Do you know of any MUT geomatics graduates from the last five years who successfully started geomatics-based businesses? Do you know what inspired their journey to starting up?

Section D: Education and Training

13. During your studies at MUT, were there any courses/modules related to entrepreneurship or business management?
14. Were you ever invited to entrepreneurial workshops, short courses or guest lectures? If so, was this voluntary or compulsory?
15. Do you think that the MUT geomatics curriculum prepared you enough for entrepreneurship? Why or why not?
16. What kind of entrepreneurial or business-related training would you have found useful?

Section E: Socio-economic and Cultural Factors

17. How has your family background or upbringing influenced your career choices, especially in entrepreneurship?
18. Do you think financial background (e.g., access to capital, family support) plays a role in whether graduates start businesses?
19. Is there a stigma associated with graduates from disadvantaged backgrounds pursuing entrepreneurship? Please explain.

Section F: Challenges and Opportunities

20. What do you think are the biggest challenges for geomatics graduates who want to start a business?
21. Are you aware of government or private-sector funding and support programmes (e.g., NYDA, SEDFA, funding, mentorship)?
22. If yes, would you have tried to access them for funding?
23. Do you think that the advancements of technology in geomatics, such as drones and robotic totalstations, provide a competitive advantage for entrepreneurs, or do these bring an added layer of difficulty to enter the market due to their high costs?

Section G: Forecast

24. In your opinion, what would encourage more MUT geomatics graduates to start businesses?
25. Do you see yourself pursuing entrepreneurship in the future? Why or why not?

26. What recommendations would you give to MUT, government or industry to better support graduates in entrepreneurship?

Closing

Is there anything else you would like to share regarding this topic, or do you have any general views on entrepreneurship?

8.7. PROOFREADING CERTIFICATE

LAUREN WALFORD PROOFREADING SERVICE

1/02/2026

To whom it may concern

This is to certify that I have proofread the thesis by Siyabonga Desmond Shadrack Khanyeza (Student Number: 218086350) titled: "Exploring the Lack of Entrepreneurial Undertaking among Geomatics Graduates of Mangosuthu University of Technology from 2018 to 2024."

I have made any corrections to grammar, sentence structure and spelling which I felt necessary.

Regards,



Lauren Walford
+27734131111 (WhatsApp only)
0734131111



8.8. TURNITIN REPORT



Digital Receipt

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