The role of digital technology in SME funding by Commercial Banks in South Africa

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ABSTRACT

SMEs are the backbone of developing economies, playing an integral role in GDP growth and job creation. South Africa, inclusive of an informal sector, presents a wider SME market, which through adequate support, can contribute significantly to the economy.

With the future growth of the economy and improved employment prospects majorly dependent on the contributions of the SME sector as avowed by the South African Government, the success of these constrained businesses is most important. SMEs in South Africa have an average age of five years, with lack of access to financing noted as one of the key inhibiting factors. Although the advent of technology has introduced new financial intermediation players, offering innovative products necessary to drive accessibility to financial services, optimising traditional banks' larger resources could yield mass benefit. Unlocking the full funding potential of banks through modern technology is therefore critical to support the survive and thrive prospects of SMEs.

This study endeavoured to understand existing relationships and the extent to which digital technology can be exploited to improve accessibility to bank funding by SMEs, using literature insights pertaining to information opacity and innovation challenges which stifle progressive SME lending. The study was underpinned by the Disruption Innovation Theory and Information Asymmetry Theory. Following a quantitative approach, structured survey questionnaire data collected from SMEs in South Africa was statistically analysed. SMEs that attempted (whether successfully or not) to obtain funding from traditional banks were of particular interest.

Although innovation and technology adoption seemed to drive accessibility to bank funding whilst lack of engagement with innovation activities hindered it, both showed weak correlations and had no statistical significance. Intriguingly, 'age of business' showed a statistically significant correlation with accessibility to bank funding, a result that is pertinent to the survival factors of SMEs and warrants further exploration.

Whilst SMEs provide a reliable proxy to improved SME lending by banks, it is imperative that perspectives of the banks are included in such a study to make a meaningful contribution to academic research aimed at unearthing relationships that start to edge closer to an optimal SME lending model. In the meantime, the onus lies with SMEs to minimise information opacity and improve fundability through technology as they navigate a somewhat rigid traditional bank system.

Key words: SME; Commercial Banks; Technology; Innovation; Information Asymmetry; Funding

DECLARATION

I, Philani Chili, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Philani Chili Signature: 

Signed at Johannesburg

On the 24th day of February 2024

DEDICATION

I dedicate this work to my late grandmother Elizabeth Chili, whose passing came during this academic journey, her spirit carried me through. Her love and prayers continue to be my strength.

To my mother, Pinkie, whose support has been unwavering throughout the years, thank you for always challenging me to stretch myself and pursue academic achievement.

To my wife, Nomathemba - it was never going to be an easy journey, and at times it seemed insurmountable. Thank you for always believing in me and pushing me towards reaching my full potential. I appreciate the love, patience, and support through it all. Without your sacrifices and compromises, this would surely have not been possible, and for that, I am truly grateful.

To my sons, Khethelo and Motse, whilst this journey has sacrificed family time, I am thankful for your patience and understanding, and through this work I hope to inspire you to relentlessly strive for excellence in all your talents, passions, and aspirations.

Lastly, I express gratitude to my late grandfather, Dr Moses Ntshangase, who passed when I was young, but was still able to nurture my potential and leave a legacy that inspires academic excellence.

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This study would not have been possible without the SME businesses that took part in the survey. Having had the privilege to engage some of the owners in-person, I have gained a different perspective on the challenges experienced by SME businesses. Thank you for the valuable time taken to provide insights that contributed to this study.

To the 2023 MMDB part-time cohort, thank you to everyone I've had the opportunity of working with in syndicate groups. Our interactions contributed to my added perspectives, and the relationships forged were instrumental in my success throughout my research journey, I am grateful for the support.

Although bank participation was not possible, I want to acknowledge the bank executives that instantly gravitated to the study topic and made an earnest attempt to secure permission to conduct the survey within their organisations, your time and effort was greatly appreciated.

Lastly, I want to extend my gratitude to everyone who supported my study and assisted with the circulation of the survey questionnaire to SME business owners.

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GDP	-	Gross Domestic Product
Fintech	-	Financial Technology
P2P	-	Peer-to-peer
SMEs	-	Small and Medium-sized Enterprises

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CHAPTER 1. INTRODUCTION

1.1 Statement of Purpose

This research investigates the role of **digital technology** in **SME** business **funding** by **commercial banks** in **South Africa**.

1.2 Background of the Study

Although identified as a propellant of most economies, the extent to which the Small and Medium-sized Enterprise (SME) sector contributes to the growth varies across the various global regions. SME businesses in developing countries have a relatively greater opportunity to materially drive growth for an economy than similar businesses in a developed economy. Unlike developed economies, where SME contribution and opportunity to grow may be limited, most developing countries have a relatively larger informal market that widens its opportunity pool (Cataldo et al., 2020; Mendi & Mudida, 2018). Furthermore, midsize companies in Canada (a developed country) comprise 1.6% of all firms and contribute 12% to GDP, yet similar companies in Malaysia (a developing country) represent 2% of all firms and contribute approximately 40% to the country's GDP (Canada, 2015; Corporation, 2023). With the average life of most SMEs in South Africa rarely exceeding five years (Mulibana & Rena, 2020), a systematic literature review by Rao et al. (2021) reveals that access to finance is one of the largest, if not the largest, obstacle stifling growth of SMEs globally.

In keeping up with and exploiting the rapid growth of digital technology to access a larger market opportunity pool (Mazzarol, 2015), one should bear in mind the unique challenges that may hinder effective use of such technology in the South African context from both the SME and commercial banking perspectives. Whilst technology does a lot to bridge the information asymmetry gap that makes funding an SME less attractive (Nguimkeu & Okou, 2021), other domestic considerations such as digital and network readiness, government policies and support programmes, the energy crisis, and infrastructure support to name a few, can be possible inhibitors of intended outcomes. Though the success in SME performance and increased eligibility for financing in developed and other African countries is attributable to the adoption of new technology (Mushtaq et al., 2022), the same cannot automatically be assumed for South Africa.

1.3 Research Problem

SMEs are critical in any developing economy for job creation and gross domestic product (GDP) growth, with that of South Africa estimated to contribute 90% to job creation and comprise a significant share of GDP growth by 2030 (National Planning Commission, 2012).

According to their 2021-2022 financial year period annual report (Development, 2022), the South African Government's expectations of the SME sector, through the Department of Small Business Development, is for it to be contributing between 35% to 50% to total GDP growth, and to reduce unemployment rates. In an economy plagued with a high unemployment rate of 32.7% (SA, 2023), the success of the SME sector is thus understood as a key focus, requiring transformative support and intervention.

For businesses with limited resources and capital, funding becomes the oil that keeps the SME-engine running and can create growth opportunities, and although channels to access such funds are multiple, qualifying for them either comes at a shortfall or at a cost that stifles growth – if not to it shutting its doors. Research by Finweek (2019) shows that despite optionality in funding channels, many small businesses that do qualify for funding, obtain it at sub-optimal levels. Funding methods through commercial banks cannot sufficiently offer SMEs the funding they need to survive and thrive, as in most cases the standard requirements of proven trading and credit history, equity or collateral for secured funding make it challenging for the under-resourced business to either (i) qualify for a credit facility, or (ii) access the required level of funding (Erdogan, 2019). Alternatively, with unsecured funding, the available credit facility is offered at unfavourable interest rates.

The emergence of Financial Technology (Fintech) has given rise to a surge in digital banks and micro-lending start-ups, which has created alternative mechanisms through which businesses that are not eligible for traditional funding, can now access funds quicker and get to participate in the economy. Such borrowing channels can however be at exorbitant costs as this often takes the shape of unsecured lending with interest rates the same as those offered on personal borrowings. Commercial banks are the main relationship holders with SMEs, fully resourced with funding capital and multiple channels of reach, and thus having them to adopt new and innovative approaches through leveraging technology to assess credit worthiness of SMEs, can contribute materially to accelerating the growth of the sector, over and above the Fintech stimulation (Deluca et al., 2014). Although Fintech addresses the information asymmetry related pitfalls known to conspicuously exist among SME businesses (contrary to larger and more established businesses), making the sector less likely to secure external funding (Erdogan, 2019), the effectiveness of the introduction of such modern technologies in bridging the SME-funding gap requires further exploration.

An empirical study on the effect of innovation on South African small, micro and medium enterprises' (SMMEs) performance done by Matekanya and Moyo (2022), showed that there is a positive relationship between the performance of larger firms and Research and Development (R & D) expenditure, as well as the introduction of new products and services,

driving performance of smaller firms. Underpinning new products and services, can be assumed to be the democratisation of new technology - making it affordable and inclusive for SMEs to exploit the efficiencies it creates. However, supplementary to new products and services is R & D, which is more attainable for larger firms with sufficient financial resources, highlighting a gap that may still exist from a financing perspective to facilitate the leapfrogging of SMEs to heights great enough to contribute to the economy significantly and sustainably.

The evolution of technology has been instrumental in opening the financial services industry to new entrants, notable in the rise of Fintechs that have created more accessible lending solutions for SMEs. A study that supports the existence of this relationship uses the role of peer-to-peer (P2P) lending Fintechs, which sampled the Organisation for Economic Co-operation and Development (OECD) countries' SMEs and deduced that SMEs would be more inclined to use P2P lending options as a less difficult means to access finance when compared to commercial banks (Abbasi et al., 2021). However, Rao et al. (2021) found that sourcing external finance through commercial banks remains the most ideal for SMEs in both developed and developing countries.

In their study, Baloyi and Khanyile (2022) suggest closing the South African SME funding gap by proposing a derived blended SME funding model between private (commercial banks) and public sector, as well as an SME risk-reduction model that entails the support through necessary soft skills such as training, mentorship, and business incubation to assist SMEs in sustainability and growth that makes funding them more attractive. The study further acknowledges the cost reduction in assessing SME performance derived from technological advances; however, it does not draw any direct attributions on the role of technology improving accessibility to commercial bank funding by SMEs.

As global literature echoes the importance of the role of SMEs in making a meaningful contribution to economic development and job creation, South Africa, with its unique challenges of exorbitant unemployment rates and sluggish economic growth, is no different. The success of the SME sector in South Africa can thus be assumed to be of greater necessity, as the linchpin that gives the country hope of a competitive position on the global stage as a thriving and sustainable economy. Although digital technology may be acting as a conduit to realising that sustainability, the extent to which it is making a transformative impact for commercial SME funding, remains open for interpretation.

1.4 Research Objectives

The research objectives for this study were:

i. To investigate the extent of use of digital technology by South African commercial banks to drive SME funding;

ii. To determine the technology-based factors that make funding an SME easier for South African commercial banks;
iii. To identify the antecedents in the South African commercial banking industry that prohibit a progressive lending appetite towards SMEs, notwithstanding new technologies and systems implementation.

1.5 Significance of the Study

SMEs are a critical driver of South Africa's growth, bringing about meaningful social and economic change. Understanding the levers that potentially open the SME funding market may assist in elevating the "survive and thrive" prospects of the sector, supporting a growing economy and driving sustainable job creation. The significance of this study is therefore to:

i. Contribute to existing research that aims to understand the factors that influence improved accessibility in SME funding by banks, especially in the South African context;
ii. Contribute to the body of knowledge on the possibilities that digital technology can create for commercial banks in the area of SME funding in a developing country;
iii. Support the South African government's efforts at sustainable economic growth and job creation, through the SME sector as a key driver;
iv. Add to research aimed at improving the survival rate of SMEs in South Africa;
v. Drive financial inclusion of systematically disadvantaged SME businesses, in the context of generational inequality in South Africa.

1.6 Delimitations of the Study

Whilst cognisant to the various external SME funding mechanisms such as equity finance, venture capital, crowdfunding etc. (OECD, 2015), this study focuses only on SME funding in the form of credit facilities from commercial banks and Fintech in South Africa.

Although perspectives from commercial banking executives and subject matter experts would help in understanding the funding capabilities and the role of digital technology within these institutions, only views from SME owners, as recipients of funding, will be gathered to assess the real impact 'on-the-ground'.

1.7 Definitions of Terms

For ease of interpretation for this study, the following terms are defined to support context:

Commercial Banks – refers to traditional banks, formerly operating in brick and mortar (branches), but have since expanded channels to digital. These banks are financial service providers (but not limited to) business customers.

SME funding – refers to financing of SME businesses for start-up, operational and growth purposes. This type of funding constitutes borrowing of money, where capital repayments and interest rate charges are applicable (Parker, 2022).

Digital technology – refers to information and communication tools that facilitate the capturing, storing, accessing, and manipulation of information (Jones, 2013).

Asymmetric information – in the context of a financial services industry, refers to an instance where one party (lender) in a transaction does not have sufficient information about the other party (borrower) (Ruan, 2019).

1.8 Assumptions

This research assumes that although the evolution of technology has disrupted the financial services industry and helped narrow the information asymmetry gap for SME funding globally, the capabilities are more nuanced in relation to effective exploitation by commercial banks to shape the SME sector towards sustainable economic growth and job creation, especially in the South African context.

Additionally, this study makes the following assumptions:

- Commercial banks interacted with by SMEs have digital technology as core to the facilitation of lending decisions.
- Businesses identified have experience with bank credit facilities.
- Businesses identified explore multiple channels of funding.

CHAPER 2. LITERATURE REVIEW

2.1 Introduction

The aim of this literature review is to firstly understand and unpack the SME landscape in a global and domestic context, defining SMEs as understood in South Africa, followed by the lending environment within which it operates and relies upon for survival and growth. Secondly, the Financial Services industry is focused on through the lenses of Fintechs and Commercial Banks in serving firms of all sizes, and gathers perspectives from existing literature. Next, focus is drawn to technology adoption in the financial services industry, showing the various applications that enhance experience and delivery of services. Finally, the literature review shifts focus to the performance of SMEs in a developing economy and draws lessons from a local case study in effort to identify research gaps to address as contribution to existing literature. Figure 1 below summarises the flow of the literature review:

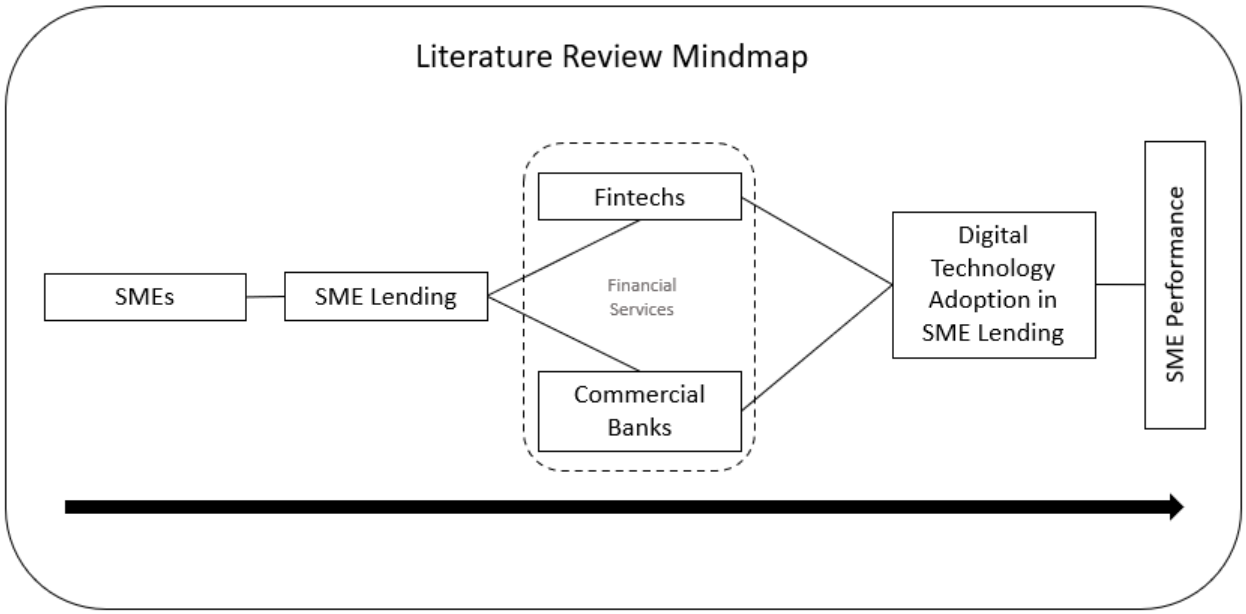

Figure 1: Literature Review mind map

2.2 Small and Medium-sized Enterprises (SME)

SMEs are the backbone of many developing economies, contributing largely to job creation and economic growth. Globally recognised as a strategic growth pillar, it is senseless to highlight the devastating impact a stunted SME sector can have on a developing economy.

SMEs comprise survivalist and emerging businesses, and whilst the formal definition differs globally, this study only considers the South African context. Interchangeably referred to as Small, Micro, and Medium Enterprises (SMMEs), Department of Small Business Development (2022) defines SMEs in accordance to the sectors they operate in, using number of employees

(maximum = 250) and annual turnover (maximum = R220 million) as proxies, categorised on a continuum-basis as Micro, Small, and Medium.

SMEs differ in their impact, survival factors and economic contribution between developing and developed countries. Research shows that because the SME market expands to the informal market in developing countries, there is more opportunity for the sector to make a meaningful contribution to job creation and economic growth (Mendi & Mudida, 2018). A study by Manzoor et al. (2021) testing the influence of SME growth and development on rural development in a developing country, anchored on access to finance as a key driver, confirms a positive relationship which affirms the pronounced call for banks to play an anchor-support role in uplifting developing economies through SMEs.

Amongst the many headwinds that batter the growth of SMEs in South Africa, the most prominent causes include financial literacy and access to finance (Msomi & Olarewaju, 2021). Identified as a key strategic source of the country's GDP growth and unemployment reduction by the South African government, the success of the SME sector requires unexpected intervention from all key players, most notably, the commercial banks from an 'access to finance' aspect. This is supported by the need to apply alternate, radical, approaches in assessing businesses of this nature for credit in a formal banking system (Visser, 2019).

Apposite as the matter of SME financing is, the availability of information, and transparency challenges present the major obstacle that hinders adequate financial support to the sector. Information necessary for the financiers to make funding decisions, is broken down into hard and soft information. Estrin et al. (2022) describes hard information as factual and verifiable information that is of general agreement and cannot be altered in the short-term. On the other hand, they describe soft information as more inclined to change, not confirmable, and is open to interpretation. Razak and Latif (2021) have developed a Creditworthiness Knowledge Model. In their identification of information as one of the key determinants establishing borrower creditworthiness that contributes to the development of an SME, they describe hard information as predominantly financial (quantitative) in nature, such as financial statements and payment history, and can be easily collected, processed, transmitted and stored. Furthermore, in the absence of sufficient hard information as a small business (SME), the authors describe soft information as relationship-based, and reflects on the reliability of the business owner.

2.3 SME Lending

Commercial banks' stringent processes and regulations make sufficient lending to SMEs difficult, and this is commonly a result of information asymmetry (Kammoun et al., 2019). Accepting the significance of a synergistic relationship between commercial banks and

Fintechs in driving competition in the financial services industry for the betterment of all consumers and businesses, Wang and Nor (2022) draw a distinction in roles of the two in participating in a revolutionised industry. They find Fintechs' role as that of a provider of technical support to commercial banks, whilst in turn, commercial banks provide funds and customer data to Fintechs and as such, careful consideration to fair profit distribution is emphasised. While the 2008 financial crisis made lending to individuals and businesses more difficult as regulations became tighter (Elsaid, 2021), collaboration between Fintechs and commercial banks may make navigating through such regulations easier, thus accelerating accessibility to SME finance.

Peer-to-peer (P2P) lending is widespread across much empirical research as a conspicuous digital technology solution to have emerged, addressing the challenges of accessibility to finance. From the interviews conducted in their study, Rosavina et al. (2019) find that whilst the reduced barriers through P2P lending promote its popularity amongst consumers, P2P lending is also attracting more interest as an alternative to SME financing. With more awareness and an ability to offer competitive rates and longer repayment periods, P2P lending has the potential to markedly contribute to the SME financing market.

While the finance gap for the Micro, Small and Medium Enterprises (MSMEs) sector in India is multi-faceted, Mittal and Raman (2022) aim to better explain it by way of classification, segmenting it as the Demand Gap, Supply Gap, Knowledge Gap, and Empathy Gap. Addressing the supply gap with the banks and financial institutions, they agree with Berger and Udell (2006) that information asymmetries that exist for this market may be bridged through relationship lending, collateral-based lending, accounting-based lending and credit scoring mechanisms. Apart from credit scoring, the feasibility of this proposal offers access points when considering limitations in resources (i.e. with no collateral to provide) of SMEs, and how they can be start-up in nature (i.e. with no established relationships). Additionally, given the rapid pace of technology advancement with a digital economy, where banks as well as other traditional financial institutions have new competition from Fintechs, the suggested response methods might be obsolete. The research does, however, go on to acknowledge the key role of technology in improving lending quality and addressing information asymmetries. The authors note about the limitation of high competition in domestic markets and small businesses operating in an emerging economy, that consideration of their business nature is critical in improving accessibility to finance by formal institutions; this resonates with South Africa as an emerging economy.

In their paper that addresses the collateral conundrum with SMEs previously highlighted, Wang et al. (2019) propose a blockchain-based credit system as a means to improve access to finance, by information distribution and eliminating the need for collateral.

In the Italian context, Fasano and Cappa (2022) find that although Fintech lenders outstrip banks in processing hard information to improve SME funding, soft information which banks excel at through nurtured relationships remains prevalent, as Fintech capabilities do not necessarily reduce information asymmetry as expected. Fasano and Cappa (2022) also observed that Italian SMEs would struggle to secure funding from banks that relied on hard information as an assessment criterion, suggesting that Fintech and commercial bank capabilities used in unison, as a favourable option to unlock the highest potential in SME lending.

2.4 SME Lending by Banks and Fintechs

2.4.1 Fintechs

Yao and Song (2021) studied the impact of Fintech on the economic capital of commercial banks, and found that Fintechs not only stimulate the banking industry as a competitor introducing optionality, driving costs down for customers, but they also aid commercial banks in reducing economic capital by addressing information asymmetries, enhancing transparency in the market. Armstrong and Lee (2021) state that when organisations can adapt to new technologies faster than most individuals can adopt it, it gives such organisations an opportunity to shape the market, and this could not be more evident with the impact that Fintechs have had on the financial services industry. Fintech influences the way financial services are designed, delivered, and consumed, and with the recent Covid-19 pandemic-induced lockdown, organisational adaptation and adoption of this technology distinctly accelerated (Bhatt et al., 2022). Aside from promoting digital innovation, Fintech propels the financial inclusion agenda and improves access to credit (Wójcik, 2020). Although they restrict mediate with banks, Fintechs also complement them by adding to, and delivering, financial services in non-conventional ways that enhance the financial system and create value for the customer (Manser Payne et al., 2021; Wang et al., 2021; Wójcik, 2020).

In a quest to drive inclusion and make financial services more accessible, Fuster et al. (2019) note a critical impact of Fintechs in mortgage lending, entailing a 20% faster application processing speed than other traditional lenders as well as the reduction in bottlenecks. However, they also found that Fintechs may still be on the back foot insofar as lending is concerned, showing patterns of targeting customers with high access to traditional bank funding rather than distributing credit to a new, previously excluded, market. This implies that

considerable conservatism still applies in the risk-assessment approach towards Fintech lending.

Although promoting accessibility and faster lending solutions, Wang et al. (2021) acknowledge that Fintech borrowing comes at a higher cost when compared to traditional banks, which for the customer, is more attractive. Despite modern capabilities and extensive competition from Fintechs, with enhanced technology-based solutions, research suggests that traditional banks remain in a strong position to retain their customer base.

2.4.2 Commercial Banks

With the innovation in products, services and inclusivity that Fintechs offer the financial services market, traditional commercial banks cannot afford to be laissez-faire as the risk of losing a market share is a reality (Camarate & Brinckmann, 2017). Several papers (Anagnostopoulos, 2018; Elsaid, 2021; Phan et al., 2020) describe the effects of Fintech on the traditional banks using consumer theory and disruptive innovation theory; this means while Fintechs will not necessarily replace traditional banks, they will most certainly shape their mediation role in a changing societal environment. The review paper further adds that more reliance on emerging technologies will enhance this new way of banking. Navaretti et al. (2017) agree with this view.

There is credibility and a rich history that gives commercial banks an advantage over Fintechs. Though lagging in technological advancements and innovative solutions that Fintechs benefit from for better service delivery, trust and banking security are intrinsic factors that place commercial banks ahead of Fintechs (Thakor, 2020). In further understanding the intricate performance of the banking sector, Begley and Srinivasan (2021) found that small traditional banks' market resilience is attributed to less stringent regulatory requirements applicable to them, compared to their larger counterparts. This is in spite of an emerging non-bank lenders market created by the 2007-2008 financial crisis that negatively affected the trust of customers in the formal (traditional) financial system, specifically in the case of the mortgage lending sector in the United States of America, and ultimately saw the large traditional banks contracting in market share due to tighter regulations affecting them. Wille et al. (2017) found similar patterns for nonformal-banks in relation to small business-lending when compared to traditional commercial banks, since the financial crisis. The advent of new technology strengthens the position of Fintechs in the financial services industry, and to remain competitive, traditional commercial banks need to focus on exploiting these modern technologies in enhancing relationship lending and addressing changing customer needs (Anagnostopoulos, 2018; Jakšič & Marinč, 2019).

The nature of the SME lending environment is unpacked analysing the changes from the commercial banks and Fintechs driven by innovation and technology and information availability or transparency factors. Figure 2 assumes the following:

i. Today (t_0), in the current landscape, supported by a legacy customer base and resources, banks hold a larger SME lending market regardless of the services or lack of services they provide to this base. This is not only a result of the age of the traditional industry and banks, but also because of trust that they have stood the test of time, and perhaps entrenchment from other product-holdings (e.g. transactional account and merchant devices). Restricted legacy systems, a slower innovation and technological implementation process and information consumption for decision-making, are still predominantly judgmental and heavily reliant on a relationship-based model that focuses on soft information.

ii. Fintechs, although relatively new as a disruptor in the banking industry leveraging new technology to offer more flexible and innovative SME lending solutions, have a relatively smaller market share today (t_0) as their model (unsecured smaller, faster loans) limits scalability. With a changing society there is a growing need for flexibility in banking, entailing remote banking, thus the ability to process hard and alternative information more dynamically, enables Fintechs to reduce the information collection challenges to some degree.

iii. As traditional commercial banks pursue their ideal future state (t_1) fending off competition from Fintechs and shadow (digital) banks, technology adoption will be crucial in accelerating the maturity of the banks' SME lending model to be more inclusive by addressing information asymmetry challenges. However, technology alone, without innovative thinking and consequent solutions will limit effective results. There is an opportunity to expand lending to a wider SME market through such capabilities.

iv. Consistent with the Disruptive Innovation Theory, through continuous improvement in quality and product performance from market learnings, Fintechs exploit newer innovative capabilities to further reduce information asymmetries and gradually progress to a state where they can compete equally with current banks for a previously unattainable market (t_1) in SME lending.

v. Enhanced abilities to lend to a broader SME market inherently fosters market competitiveness on a commercial bank operating in a digital economy, and influences its market share relative to its competitors.

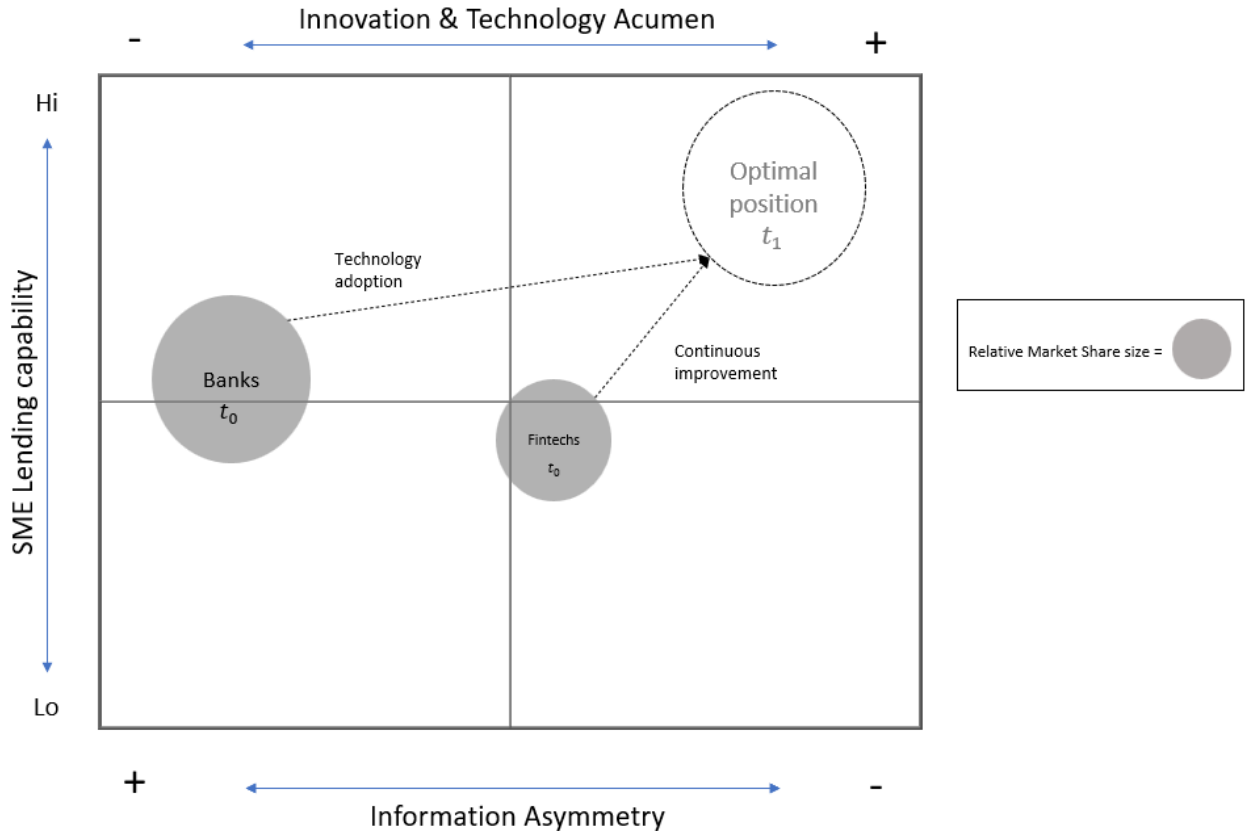

Figure 2: Concept building on a competitive landscape

2.5 Digital Technology adoption in SME lending

Blockchain technology has grown in popularity across many industries due to its enhanced security benefits and multiple use capabilities. Javaid et al. (2022) find that Blockchain contributes to risk reduction from transactional data hacking and cost saving through operational efficiencies it creates in the financial services industry. In banking, Blockchain can facilitate transaction-tracking and promote data accuracy and security. Stifled by limited knowledge and skills in the field, Blockchain technology is still expensive to adopt, with its desirability more low-key for smaller financial institutions. Challenges regarding interoperability and scalability also get in the way of the adoption of the technology (Ali et al., 2020; Javaid et al., 2022). Furthermore, Chen and Bellavitis (2020) find that Blockchain fosters innovation and promotes decentralisation of financial services. With the many uses it offers, Blockchain appears to be a leading technology innovation across multiple disciplines worldwide. With a raised interest in Financial Services as an industry, and primarily the banking sector, various authors (Davradakis & Santos, 2019; Wan et al., 2020; Wang et al., 2019) present key features and opportunities that can enhance visibility and sharing of data within the banks-and-SMEs ecosystem. However, the immaturity of open banking as a

concept in South Africa magnifies the interoperability challenges, which threatens successful implementation.

Technology has afforded consumers and businesses flexibility in how they transact, more so in the context of digital payments, where the use of near-field communication technology has given birth to contactless mobile payments. Although it has provided great convenience, the emergence of these new technologies has also given rise to criminal activity. Though machine learning is pivotal in credit card fraud detection, adoption has been restrained by privacy concerns, backed by strict regulations (Cherif et al., 2023). Bhatt et. al (2022) argue that though regulation of technology firms and Fintechs is crucial for the stability of the financial services industry, an exhaustive and rigid approach risks stifling innovation. They further add that, interoperability between organisations can assist with real-time fraud detection. Although technology has a key role to play in driving SME lending, careful consideration of the impacts of regulatory requirements should be given, as this could be a key obstacle to its effective adoption.

2.6 SME Performance in a developing economy

In their study, Khoase et al. (2020) seek to understand the inhibitors of growth and survival of SMEs by comparing South Africa and Lesotho. Focusing on two cities, namely Pietermaritzburg (South Africa) and Maseru (Lesotho), the study showed that the prominent barriers or contributors that challenge growth and survival of SMMEs are high borrowing interest rates, a lack of awareness and knowledge of institutional funding options, high rental costs as they attempt to scale-up the business, and higher tax with growing revenue. Although barriers of access to funding are more pronounced in Lesotho, barriers inhibiting sustainable growth are more prominent in South Africa - suggesting a gap still exists in sufficient funding that could assist SMEs through their business cycles.

Internationalisation entails the adoption of a geographical expansion strategy by businesses, through diversification and seeking growth in international markets (Lu & Beamish, 2001). Das et al. (2020) speak of the concept of internationalisation of businesses and the difficulty of achieving it as a small business relative to their larger counterparts, especially in the context of a developing country with various limitations in infrastructure support. The authors emphasise the adoption of technology as a driver of SMEs' sustainability in the adversity of local challenges inhibiting global-scale competition. As in many other studies, the focus consistently shifts to the capabilities that SMEs can exploit technologically to bolster their growth and economic value in the formal system. Even though there is a vast literature on the benefits that technology adoption can afford businesses (Gareeb & Naicker, 2015; Rosavina et al., 2019; Viswanathan & Telukdarie, 2021), not much research focuses on how traditional

institutions can leverage technology to facilitate the growth of SMEs with their current challenges, for the betterment of the economy.

Resonating perfectly with the adversity in diversity that defines an SME operating in a developing economy, this paper, in part, takes as its departure point the learnings of a case study examining the mechanics of an optimal lending relationship between small businesses and banks, focusing on Khayelitsha, a Western Cape township in South Africa (Langa & Govender, 2019). Langa and Govender's study recommended that banks be more intentional with the support they offer SMEs by being more agile and flexible to speed up access to finance, especially in developing countries. This, the study concludes, can be achieved by a heightened focus on engaged relationships between the two parties, helping bridge the information asymmetry gap. Apart from the study being conducted during a pre-pandemic context, where technology has since advanced, enabling new business models and the sprouting of Fintech financial services intermediation, it also only addresses soft information--relationship lending improving access to finance by banks, an aspect that is subjective and may be inconsistent in its application with unconscious bias (Ab Razak & Latif, 2021).

This paper aimed to introduce the technology element to the enhanced lending relationship between SMEs and commercial banks, with an emphasis on the banks' part, and explore the role of technology as a key lever accelerating the bank-financing cause for SMEs in a digital economy, post pandemic.

2.7 Theories underpinning the study

2.7.1 Theory Unpacking

This paper leans on two theories to form the basis of the research: namely the (i) Information Asymmetry Theory and (ii) Disruptive Innovation Theory.

(i) Through his paper titled 'The Market for Lemons: Quality Uncertainty and the Market Mechanism', Akerlof (1970) describes market failure as a consequence of information asymmetry, where the seller of a product or service would have had more information than the buyer, thus making it impossible to assess the quality of that product or service. As with conventional lending practices, where limitation in transparency and documented transactions negatively impacts the level and cost of borrowing, the same can be observed from the grounds of the Information Asymmetry Theory, wherein the buyer's (bank) increased knowledge of the bias from the seller's (SME) positioning of the product/service as of high-quality, drives prices down to an average quality market price. As a result, high quality product/services eventually leave the market, a phenomenon supported through Buchak et al.'s (2018) study, where they found the lowest risk and less

price-sensitive customers, avoiding onerous application processes, migrating to the less restrictive and agile shadow banks and Fintech lending market.

For this study, the seller is likened to SMEs who are the issuers of debt, with an information advantage over the commercial banks (buyer) in the SME lending context. The existence of asymmetric information typically deteriorates the risk profile of an SME, and in turn makes lending to this sector difficult for a traditional commercial bank governed by strict regulations.

(ii) "Disruption" occurs when a smaller business (entrants) with limited resources is able to successfully compete with larger incumbent businesses. This starts by targeting ignored customer segments by incumbents to a point of achieving a strong foothold, and with enhancements of services offered, at lower prices, the entrants eventually breakthrough to mainstream customer segments, and disruption occurs. Although the Disruptive Innovation Theory is widely adopted, it has also encountered much criticism created by misinterpretation in its application; here some researchers use the theory as a basis to infer that new market disruptors ultimately replace incumbents. The Disruptive Innovation Theory can be better explained as more of a continuous process of innovation by new market entrants, serving the overlooked, low-end market that banks neglect as they focus all their energy on larger customer offerings. With continuous improvement in quality and product performance, disruptive entrants eventually breakthrough to the high-end (mainstream) customer market, where profits are highest and contend for market dominance with incumbents (Christensen et al., 2015).

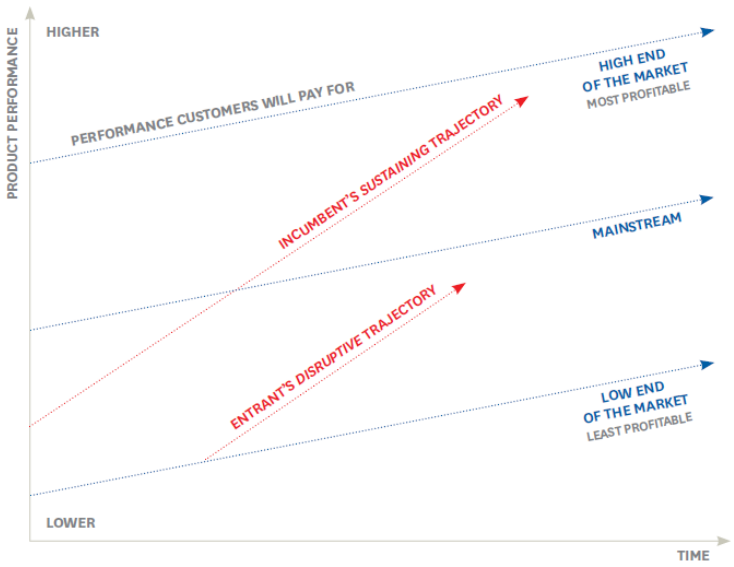

Figure 3: The Disruptive Innovation Model

Source: Christensen et al. (2015)

With the advent of technology giving rise to an influx in Fintechs offering financial intermediation services, commercial banks risk saturating their market position over time as these new disruptors cement their position with fit-for-purpose SME lending solutions that improve access to finance; this is in contrast to bank financing that has credit models geared for larger, more established businesses. The threat that Fintechs present to traditional banks is not to be underestimated as the innovative capabilities they hold enable faster, better, and innovative lending solutions that accelerate their market demand and growth far beyond that of traditional banks' reach. Disruptive innovation has clearly shaped the financial services industry, and this necessitates the need for banks to adapt to the societal changes by adopting advanced technology to maintain market competitiveness (Elsaid, 2021).

While regulators lag Fintech innovation, commercial banks remain largely constrained by stringent regulations--although not so much with shadow/digital banks--that hinder innovation, allowing Fintechs to grow at a relatively rapid pace (Anagnostopoulos, 2018; Buchak et al., 2018).

2.7.2 Relevance of theories to study

Table 1: The alignment of research objectives to theories of study

	Research Objective (RO)	Impact	Relevant Theories
RO1	To investigate the extent of use of digital technology by South African commercial banks to drive SME funding	• Technology adoption • SME funding • Innovation	• Disruptive Innovation Theory
RO2	To determine the technology-based factors that make funding an SME easier for South African commercial banks	• Digital innovation • Service excellence • Information availability	• Information Asymmetry Theory • Disruptive Innovation Theory
RO3	To identify the antecedents in the South African commercial banking industry that inhibit a progressive lending appetite towards SMEs, notwithstanding new technologies and systems implementation	• Industry norms • Unique institutional factors/practices • Behavioural habits (unconscious bias) • Credit framework alignment to a digital economy	• Information Asymmetry Theory • Disruptive Innovation Theory

2.8 Conceptual Framework

SMEs are the heart of any economy and as survivalists, careful attention is drawn to the factors that make them successful. This study focuses on the lending component as a means to address the challenge of accessibility to finance as one of the survival factors. Accessibility makes a key difference, unlocking the potential of commercial banks as an area of research that will add positive value to unlocking the SME sector's woes. Drawing knowledge from the relevant theories underpinning this study, Figure 4 shows a derived conceptual framework (CF) that aims to better understand the cause-and-effect relationships of the determinants of SME lending in a digital economy, ensuring market competitiveness as an incumbent – commercial -- bank. The CF also demonstrates how the theories address each of the ROs.

The independent variables (IV) consist of: the information aspect, split into hard (e.g., financial statements) and soft (relationship) information; innovation from new thinking and solutions that resonate with a changing society; and modern technology with capabilities that maximise opportunities.

Information is crucial to understand the lender's exposure to the SME and this is determined by the derived risk profile, which is identified as a mediating variable (MV). The risk profile ultimately determines the SMEs' accessibility to finance through the lenses of funding qualification, risk-based pricing, and level of funding.

SME lending, driven by the IVs, is the dependent variable (DV) that eventually determines the effectiveness of the commercial banks' role in sufficiently supporting the SME sector. These are banks that can master this concept stand in good stead to improve SME lending.

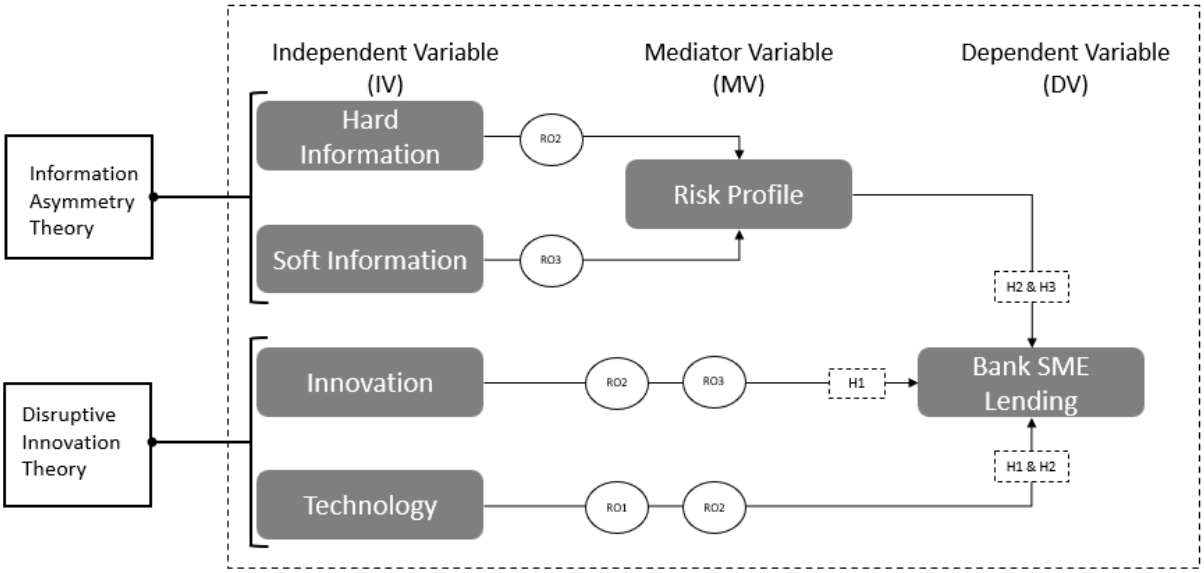

Figure 4: The Conceptual Framework for the study

2.9 Conclusion of the Literature Review

The literature review sets the scene through understanding firstly, the expected contribution of the SME in a developing economy, secondly, the existing funding models critical to the delivery of its mandate as well as technology underpinning them, and finally the translated performance. The relevant theories forming a base for the study were unpacked in detail to aid identifying the gap to be addressed. With the established shortcomings in SME funding from banks, considering the digital era and technology-induced innovation competitive capabilities, the review of literature and theories led the study to a conceptual framework that establishes key drivers in achieving an improved commercial bank lending to the SME sector; this is a key factor to its "survive and thrive" prospects. Furthermore, the literature indicates that this area of study is mature and not simply exploratory so supporting a research approach that endeavours to test the strength of the identified relationships captured in the following alternative hypotheses:

2.9.1 Hypothesis 1

- Null Hypothesis 1 ($H1_0$): digital technology adoption in commercial banks does not influence SME lending
- Alternative Hypothesis 1 ($H1_1$): Digital technology adoption in commercial banks has a strong positive influence on SME lending:

2.9.2 Hypothesis 2

- Null Hypothesis 2 ($H2_0$): digital technology adoption by commercial banks does not decrease information asymmetry
- Alternative Hypothesis 2 ($H2_1$): Information asymmetry in SME lending decreases with increased digital technology adoption by commercial banks

2.9.3 Hypothesis 3

- Null Hypothesis 3 ($H3_0$): reduced information asymmetry does not increase commercial bank lending to SMEs
- Alternative Hypothesis 3 ($H3_1$): reduced information asymmetry increases commercial bank lending to SMEs

CHAPTER 3. RESEARCH METHODS

This section will describe the methods that were applied to address the hypotheses derived from the literature review. These were aimed at best solutions for the research objectives. The contents of this section include research approach, population and sampling, research instruments, data collection methods and procedure, as well as data analysis and interpretation.

3.1 Research Approach

The literature review led the study to a conceptual framework which derived hypotheses that seek to test the assumed relationships driving SME lending by commercial banks. Considering the rise of the technology driven Fintechs playing a role in facilitating SME lending, extensive research covered in the literature review suggests a positive effect of technology on increased funding, thus supporting the quantitative method as the best approach for the study to confirm the relationships.

With traditional SME lending models being largely based on relationship lending due to information asymmetry challenges (Ab Razak & Latif, 2021), experiences and perspectives from SMEs across the industry may be broad, depending on unique backgrounds and nature of businesses; therefore, understanding the specific role of technology may be attained from a wider audience using a structured questionnaire to establish a clear causality from response trends. This further supports a quantitative method as most appropriate for the study.

3.2 Research Paradigm

The study builds upon a set of theories that support the generalised effects of technology on the financial services industry and commercial banks at large, as one that stimulates innovation, promotes service delivery and improves access to finance (Bhatt et al., 2022; Chen & Bellavitis, 2020; Yao & Song, 2021).

As a quantitative study testing the relationships of theories through a standardised approach, understanding more about the cause-and-effect of independent variables (information, innovation and technology) on commercial bank SME lending as the dependent variable, objectivity is ensured from the elimination of data manipulation, ambiguity, and multiple interpretations. This postulates the paradigm of the study as that of positivism.

Although the applicable paradigm includes benefits of objectivity, replicability, and generalisability of findings (Sanchez et al., 2023), the hidden realities of populations excluded from the study or whose experiences are contrary to the findings, are invalidated and can suggest bias in the study. As wide a population reach as possible was crucial to capture a

representative size that will be reflective of the broad population and ensure the applicability of the study.

The structured questionnaire was carefully administered to ensure SME demographic information was inclusive of all types of businesses, in alignment with the South African recognised definition as guided by the Department of Small Business Development (South African Government, 2022).

3.3 Population and Sampling

3.3.1 Population

The population for the study consisted of SME owners, who participated in the survey, shared their perspectives and experiences with accessibility to bank finance in relation to ease of access, digital experience, and sufficient lending.

The original intent of the study was to include both the banks and SMEs in the survey participation for a balanced view. However, challenges were encountered during the process which led to the omission of bank representation. Although bank participation could not be secured, it is noteworthy that data that was to be collected would have been from subject matter experts on SME lending. This group of participants was going to have a credit focus as a pivotal indicator of a bank's appetite to lend, perspectives from credit decisioning bodies was going to be instrumental in understanding the promoters and inhibitors to progressive SME lending as a traditional bank. Complementary to credit views, business experts, in their banker roles with vested interest or responsibility to the strategic facilitation of SME growth, were going to assist with insight on banks' standpoints on SME funding in the advent of Fintech lenders threatening market dominance in the sector. The most suitable sampling method for this group would have been Purposive Sampling.

In the interest of confidentiality and anonymity, the banks engaged with will be referred to by pseudonyms as the events and challenges that led to this point are outlined below:

- Being an employee of one of the big commercial banks in South Africa, with over ten years' experience in respective bank ('A'), there was confidence in most of the banks' participation coming from there through leveraging well-entrenched relationships. Unfortunately, almost a week before the research proposal was due for submission, there was evidence of the bank's new stance on participation with research studies, that it nor any of its employees were permitted to take part in any research whereby representation was being made on behalf of the bank. This new position was applicable across the group under which the bank was one of its subsidiaries – this made it more difficult to achieve exceptional permission, despite numerous attempts backed by motivations.

- The professionals' social media platform, LinkedIn, was used to reach out to all major commercial South African bank executives relevant to the SME lending topic departmentally. However, only one contacted person answered to assist with the facilitation to obtain permission (Appendix A) to conduct a study in bank 'B'.
- A network within bank 'A' assisted with a contact in bank 'C' that would be able to assist with the permission process; however, after multiple follow-up attempts, there was no feedback from the contact.
- With assistance from another close network, an employee of bank 'D', successfully referred to the relevant structures to assist with obtaining permission from the organisation. However, after learning that the researcher is employed by a competitor bank there was discomfort about the sensitivity of information that would be solicited through the survey questions and permission was denied.
- With more network assistance, an executive at bank 'E' responsible for the SME business was contacted, who took an interest in the study and committed to help with obtaining approval from the legal department of the bank. All necessary documentation (permission letter and draft of questions included in the questionnaire) was submitted, as well as an updated permission letter to disclose that the researcher is employed by a competitor bank as requested by the executive in a preceding telephonic meeting aimed at gaining clarity with the request. Following a rigorous review process, permission was granted by bank 'E'; however, with very stringent conditions of their non-disclosure agreement (NDA) which the school (Wits Business School) prohibits as guided by the ethical approval process, bank E was excluded from the study.
- Through peer networks, contacts from two other commercial banks were sourced, but relatively smaller in market share size. Bank 'F' did not respond, whilst bank 'G' had multiple referrals with shared correspondence, but this however eventually reached a dead-end where no feedback was obtained after these attempts.
- After six weeks (from communication inception) of continuous engagement with the executive representing bank 'B', a custodian of the SME business in the bank, and whose interest and support in the research study was overwhelming, reverted with feedback of a preliminary approval/expression of comfort for the organisation to take part in the study pending a review of the questionnaire by the legal department as a final phase. After consultation, three weeks later bank 'B' returned with a final decision to decline to participate in the study as the reviewing committee found some of the questions in the questionnaire to be exposing the organisation to the risk of sharing intellectual property. This was the last and only hope of obtaining some bank participation in the study.

With the population size solely now hinging on SME representation, extraordinary measures were required to ensure sufficient participation was obtained in that regard to still achieve a credible, and valuable contribution of the study. The SME businesses that participated were all-encompassing, ranging from those turning over less than one million rands up to a turnover range of '150 million-to-220 million' rands. The maximum age-band of the respective businesses was 15-to-25 years, with more than 60% of the SMEs being less than 6 years old.

3.3.2 Sample and Sampling

The study applied the non-probability sampling method which although subjective, endeavours to be representative of the wider population in its selection criteria.

For completeness purposes and to minimise bias with a one-sided view of the lending performance through the perspective of the SMEs, SARB lending data was considered to support the banks' perspective where SME lending is concerned. SMEs were randomly identified using an online search for incubation hubs and SME-related websites to source email contact lists. In efforts to ensure that the SME sector is adequately represented, considering business sub-groups identified through size, industry, and tenure, the appropriate sampling method used was Quota Sampling, which ensured representativeness of the study.

To support the objectivity of the study in the absence of primary bank representative data, aggregated secondary data of the South African banking industry was analysed to infer the extent to which technology played a role in minimising information asymmetry, thus promoting SME lending for the larger commercial bank population.

The intended total number of respondents that would strive towards a balanced view of the study was originally 200, comprised 150 SME and 50 bank respondents. This considered the sensitivity of bank intellectual property and limited subject matter experts with oversight specifically on SME portfolios, thus a lower and more attainable audience size from banks. In line with the expected challenges with bank participation, caution and conservatism were practised in deriving the anticipated sample. However, it could not be foreseen that there would be no participation at all. At the end of the data collection process, there were 136 total SME responses, which comprised the ideal sample size before screening for exclusions.

3.4 The research instrument

Distribution of two separate online-based research questionnaires was intended for both SME and bank populations as means to collect primary data, however only the former could be used. Along with the SME questionnaire attached as Appendix B, the bank questionnaire (Appendix C) is also attached for reference as it was circulated to some banks as part of screening during the approval process.

SMEs, as the borrowers, are prone to seek funding from multiple sources as they navigate the rigid formal financial system for quickest accessibility and sufficient funding level, and in some cases are willing to absorb a convenience premium cost to access such funds from alternative sources such as Fintechs (Wang et al., 2021). The research instrument was structured in such a way that feedback gathered from this population (SMEs) gave insight on the main obstacles encountered when pursuing private funding and how traditional methods fare against new and modern forms offered by Fintechs, with distinct requirements and ways around asymmetric information challenges. This, to a large extent, was to assist in addressing research objectives 2 and 3.

A structured questionnaire administered through the Qualtrics software constituted the SME research instrument, and was divided into sections as follows:

i) Once the link was opened by the participant, there was a landing page that consisted of the participation information sheet explaining the context of the study and the use of the data collected. A consent request (Appendix D) was included which enabled the participant to proceed to taking the survey should permission be granted through a Yes or No.
ii) Demographic information, consisting of nominal data fields presented as multiple-choice selections, was then requested. This entailed the age of business, industry classification, annual turnover, and the number of people the business employs. Such information was critical to analyse against the trends of funding patterns so to draw inferences as well as establish relationships between the organisational posture and accessibility to finance.
iii) Whilst the funding landscape could have somewhat changed since the Covid-19 pandemic, the lockdown effects linger after rampant business distress became apparent (Ramnanun et al., 2022), and coupled with accelerated rolling power blackouts followed by repo rate hikes in South Africa, the views on true funding performance could be skewed as the economy battles to settle into its new normal. In their paper, examining lending patterns in developing countries during the 2008-2009 financial crisis, Cull and Pería (2013) found that bank lending declined significantly during this period. Furthermore, Montoriol-Garriga and Wang (2011) established that during an economic downturn credit rationing by banks is prevalent, more obviously for small businesses. It is for these reasons that on the first part covering the funding experiences of SMEs, the questionnaire only focused on collecting responses pertaining to the period prior to the Covid-19 lockdown, as a normalised proxy.
iv) The second part of the questionnaire measured the innovation and technology aspects of the businesses, necessary to understand whether advancement on this front within the organisation itself played an instrumental role in securing financing from commercial

banks given the need for a bridge in the asymmetric information gap to be able to assess for possible credit extension.

The second instrument that was used consisted of financial and economic insights from secondary data sources which supplemented the observed behaviour of SME lending by banks in South Africa as a function of information transparency, presumably advanced by digital technology interventions.

3.5 Procedure for data collection

Primary data from SMEs was collected by use of structured questionnaires, administered via Qualtrics, an online tool. This primary data was further supplemented by secondary data consisting of third party aggregated data on bank industry lending to the SME sector pre-pandemic, and post-pandemic where technology has advanced exponentially and Fintech lending companies have mushroomed to give effect to the Disruptive Innovation Theory (Christensen et al., 2015), thus expected to have driven traditional bank lending upwards as a response to competition or catalysed service-offerings improvement through cross-pollination of expertise.

The gathering of SME data occurred in the following steps:

i) Leveraging various incubator and SME websites, email addresses of SMEs within the respective networks were compiled and a bulk distribution was of the survey was sent out with all addresses identified.
ii) A follow-up request was sent out to the same email population after 2 weeks.
iii) Due to an extremely low response rate after three weeks following the second attempt, an extra email was deemed necessary. The mail-merge option was explored, using only 23 contacts from the same list, to which there was a zero-response rate.
iv) Next steps entailed the sharing of the survey link to close networks through social media platforms, WhatsApp and LinkedIn.
v) Although the response numbers improved slightly, there was still a sizeable gap to reach the desired SME participation figure of 100 as total responses were at just 34 at that point.
vi) Radical intervention was required, and at that point a decision to physically source participation from business owners was made. Various markets in Johannesburg were visited where there was in-person engagement with stall owners and subsequent sharing of the survey links for participation in the study. Where owners were not present, the stall managers shared their contact details of suitable individuals to take the survey. This method proved very efficient, as the human element gave the participants reassurance that the link was not malicious, as well as created the ability to provide context to the study and stimulate the interest in participating.

vii) Facebook and LinkedIn SME groups were subsequently joined to cast the net wide from a participant-audience perspective, however there was limitation in the ability to distribute the survey as the posts could only be permitted by the group admins and some did not accept the posts.

viii) Further to social media targeting, of the SME groups identified on LinkedIn (SME South Africa Business Network) and Instagram (SME South Africa), direct messaging was used to target some of the businesses (≈ 250) that 'follow' the respective groups.

As discussed, below is the target audience summary:

Table 2: Email targeting

Incubator	# of Businesses	Website
SmartXchange	54	https://www.smartxchange.co.za/smme-directory/
The Innovation Hub	14	https://www.theinnovationhub.com/business-incubators
Climate Innovation Centre South Africa	7	https://www.theinnovationhub.com/business-incubators/climate-innovation-centre-south-africa-6/entrepeneurs_0
Biopark @ Gauteng	54	https://www.theinnovationhub.com/business-incubators/biopark-gauteng-7/entrepeneurs_0
Launch Lab	20	https://www.launchlab.co.za/portfolio
Savant	4	https://www.savant.co.za/portfolio/
TOTAL	**153**	

Table 3: In-person targeting

Market Name	# of contacted stalls
Fourways Farmers' Market	11
Prison Break Market	16
44 Stanley	7
27 Boxes	6
TOTAL	**40**

Table 4: Social media targeting

Platform	Group Name	Followers /Membership #	Posted Successfully
LinkedIn	SME South Africa Business Network	1 505	No
Facebook	Kasi Small Business Ideas	12 400	No
Facebook	Small Business and Entrepreneur in South Africa	124 100	Yes
Facebook	Small Business Ideas and Funding	138 500	No
Facebook	Business Owners Gauteng	425	Yes
Facebook	Small Businesses SA	3 100	No
Facebook	Business Networking SA	521	Yes
Facebook	Supporting Small Businesses	183	Yes
Facebook	Small Business Funding	62 100	No
Facebook	Small Business Network South Africa	59 000	No
Facebook	Small & Medium Enterprises (SME) South Africa	145 900	No
Facebook	South African Small Business Owners	27 100	Yes
Instagram	SME South Africa	8 285	No
		583 119	
	Total targeted audience (successful posts)	**152 329**	

Additionally, credit information sharing index of the South African banking industry supplemented this data set as a litmus test on the impact of technology advances. Credit information sharing index, also known as the Depth of Credit Information Index, is an important measurement to include in the study as it measures rules influencing the scope, accessibility and quality of credit information available to support lending decisions, which in turn is indicative of business' accessibility to finance (The World Bank, 2019). The measurement follows a scale of 0 to 8, where the higher the index is, the more credit information is available. This information, complemented by the South African Reserve Bank credit exposure data, gives an indication on how the two are related and whether there is merit in further exploring ways to promote visibility of SME information in efforts to accelerate progressive bank funding prospects.

Table 5: Summary of data collection procedure

Type of data	Audience	Approach	Source	Collection tool
Primary	SMEs	Online search for SME emails to distribute survey questionnaires. Expand respondents pool by extending survey to known (to the researcher) SMEs and peer networks.	i) Incubator websites and government sources ii) Direct correspondence	Online survey tool - Qualtrics
Secondary	SA Commercial Banking industry	Direct data extracts from source (publicly available) and collate in Excel for trend analysis	i) South African Reserve Bank (SARB) Credit Exposure data – BA200 (https://www.resbank.co.za/en/home/what-we-do/Prudentialregulation/Sector_data/banking-sector-data/BA-returns-of-total-banks-data) ii) The Global Economy website (https://www.theglobaleconomy.com/rankings/Credit_information_sharing/) – credit information sharing index OR The World Bank website (https://www.worldbank.org/en/businessready/doing-business-legacy) – depth of credit information index	i) Internet extraction 3rd party data extract

3.6 Data analysis and interpretation

This study is based on the literature that concerning digital technology and innovation as drivers of SME lending with commercial banks, with the intention of establishing the extent to which those relationships exist and are influenced by the factors underpinning them. Aligned with the derived conceptual framework, a multiple regression analysing the nature and strength of the relationships between the multiple independent variables and the dependent

variable (Cooper & Schindler, 2014), was deemed most suitable for the study. IBM's SPSS software, a platform for advanced statistical analysis (IBM, 2023), was used for statistical analysis of the data collected.

Data from SMEs provided critical insight on the impact of traditional bank lending to SMEs in a digital economy. An in-depth analysis of the factors that either accelerate or stifle SME lending by commercial banks was facilitated by appropriately structured questionnaire responses.

Additionally, aggregated secondary data in the form of commercial banks' credit exposure to SMEs was analysed to better understand the lending trend against the improvements of information asymmetry challenges in the industry, using the credit information index as proxy of technology evolution and its abilities to enhance service offerings. This analysis aimed to establish whether a positive relationship exists between the two data sets and inherently contributes to addressing RO1 and RO2. Although results are expected to generalise to some degree, the analysis will identify relationship behaviour that supports meeting the study objectives.

3.6.1 Descriptive statistics

The population that participated in the study was better understood through descriptive statistics, which assisted in screening whether the targeted audience fell within the intended market for reliable statistical analysis. Guided by the Department of Small Business Development in how South African SMEs are defined, it was critical to ensure the participants met the set guidelines and graphical representations assisted in quickly identifying the diversity of the population and whether it was indicative of the data providing a view free of any bias.

3.6.2 Correlation analysis

Before any statistical analysis, understanding whether the data collected is of sufficient quality is important. Testing correlation and consistency between variables helps with preliminary confirmation that the data at hand can generate results that seek to address the research questions. The Cronbach's alpha test for internal consistency and Pearson Correlation matrix were instrumental in establishing grounds for proceeding with statistical analysis to test the hypotheses. Although constructs to be tested were already established and questions grouped accordingly with the research questionnaire, it was important that factor analysis testing still be performed to confirm that all groupings were done correctly and organised in an orderly fashion for regression analysis.

3.6.3 Regression analysis

For a successful regression analysis, there a several regression assumptions that need to be adhered to. Regression assumptions performed, included linearity, mean error of estimated regression model to sum to zero, homoskedasticity, autocorrelation, and multicollinearity, which all but autocorrelation with a slight deviation from the benchmark, passed the test and allowed for multiple regression analysis to take place. Details of these tests and multiple regression results are all covered extensively under Chapter 4.

3.7 Limitations and challenges of the study

The study was carried out over a defined period which constrained the ability to collect as much needed data as possible to reach a sample size that allowed for deeper unpacking of the relationship between the variables, with the highest chance of significance. A mixed method, consisting of both quantitative and qualitative approaches from both the demand and supply sides, would have been an appropriate complement of objectivity and subjectivity that could support recommendations that were well-rounded and merges the realities on the ground with the high-level strategies of the banks as key stimulants of the SME sector. However, more time would have had to be afforded for such a research approach.

To summarise, the following limitations and challenges were noted as detractors to an ideal research process and outcome:

- As set out in Chapter 2, a complete study of this nature is one that includes perspectives of small businesses and commercial banks as key participants in this lending sector, thus an ideal sample would be representative of both parties. With the sensitivity of intellectual property and fears of being misrepresented, all major South African commercial banks were reluctant to take part in the study, which left the sample comprising just the SMEs.
- Participation from SMEs was more difficult to gain than anticipated. There was a very poor response rate initially which lengthened the final data collection period.
- Despite the data collection period spilling over to the festive season where most businesses had halted operations and were not available to take part in the research questionnaire, continuous follow ups and casting the net wider from a research perspective through various communication forms allowed for a reasonable number of participants. One insurmountable challenge not foreseen though, was the large number of businesses that did not borrow from banks and were therefore not able to provide insights consistent with the study's design. With the final analysed sample of 35 making up roughly 25% of the total 136 participants (which were close to the intended size needed for final analysis, i.e., 150), this implied a required participation four times what was

achieved, which would have required more time and risk not meeting the submission date of the research study.

- From in-person engagements with some business owners, a common reluctance that surfaced with taking the survey was the fear of being exposed to phishing scams through a suspected bogus survey link. This appeared to be a deterrent, and it is not known how many potential participants were lost because of this.
- Where there was an opportunity to indulge business owners on the research topic and its intended contribution, the insights were nuanced to a point that signalled that a qualitative approach to this study would have enriched its outcomes as interpretation would be objectively reflected with minimum generalisation (Kumar, 2014), rather than implied, based on data. The downside, however, was that business owners walked away from the initial conversation having committed to taking the survey at a later time, which compromised the chances of follow-through as the monitored feedback summary was then not possible.
- Although multiple regression analysis is robust and objective in its consideration of various independent variables influencing a single dependent variable the analysis is only as successful as its input wherein limitations to data availability weaken the outcome of the results. This exposes the study to inconclusive results and multiple versions of interpretation. Given a one-sided sample representation and reliance on only one questionnaire, the questions may be inadequate in quantity; if this was the case, it would have compromised the strength of the regression model.
- SME representation ranged from start-ups to well-established business enterprises, who, through the nature of their business lifecycle, have fundamental differences in borrowing needs and challenges that define their resilience (Cowling et al., 2018), and through polarised responses, may have compromised the quality in the overall consistency of the feedback.

3.8 Quality Assurance

3.8.1 External validity

Over and above the regulations that govern and supposedly standardise commercial banks in regard to lending (Basel Committee on Banking Supervision, 2018), the credit frameworks and strategies employed are unique across the various banks, and although this study posits a generalisable research outcome, application in context of commercial banks in a South African market ensured that relevance is achieved.

The research instrument made sure to clearly articulate the banking sector within which SMEs had first-hand experience in their interactions with digital technology capabilities as means to accessing funding, representative of at least all major banks in South Africa.

3.8.2 Internal validity

i) As this study originally intended to establish the extent to which digital technology and innovation played a role in facilitating SME lending through the lens of traditional banks, evidence collected from bank representatives alone would have been skewed in interpretation of questions in relation to their own bank environment, therefore as a moderator, contrasting views from borrowing recipients (SMEs) was necessary to uphold the veracity of the empirical study results.

ii) Questions posed may be open to various interpretations thus producing inconsistent responses that lack pattern and weaken the evidence. This was hedged by ensuring the questions on the questionnaire were clear, concise, and required distinct responses.

3.8.3 Reliability

This study is based on a South African context and as such expected to yield research results that consider the obstacles and propellants that make participating in it desirable or undesirable. Contrary to developed countries, SME opportunities in developing countries are wider, including relatively larger informal markets – mainly in African countries (Mendi & Mudida, 2018). As emerging economy-based research, this study offers reliability to other studies considering environments and economies of similar context as the method (quantitative) not only guarantees objectivity thus consistency, but variables used in the research questionnaire are reflective of developing economies in general and should therefore yield similar results even when applied on a different sample group.

3.9 Ethical considerations

This study ensured ethical consideration through application of the following guidelines:

- Data was only collected once research proposal was approved and ethical approval (Appendix E) was obtained from the university.
- Questionnaire participation was on a voluntary basis only, and consent embedded within the questionnaire as a prerequisite to proceed with taking the survey.
- There was no coercion of participants to take part in the study who felt conflicted or uncomfortable with the principle and objectives of the study in relation to their occupation capacity.
- There was no direct influence on the participants as they provided their responses to the questionnaire – clarity was provided in need where questions seemed ambiguous, otherwise taking an individual interpretation approach was advised.

- There was not any non-disclosure agreement signed but participant anonymity was preserved.
- The study topic did not relate to the researcher's current occupation and the study carried out was independent of the employer.
- No outsourcing of tasks and knowledge that compromise the study was done.
- As this is an organisation-based study, demographic--in personal capacity--and other personal information was not requested from the respondents.
- Participants' identity from collected responses was kept confidential, respondents took the questionnaire on an anonymity basis.
- Individual responses were treated as confidential and reported on an aggregated basis through statistical analysis.
- Data is stored in a password-protected file on a personal computer only accessible using a password.
- With participants' consent, data might be retained for any future analysis linked to the current study.
- To achieve maximum objectivity, the questionnaire minimised opportunity for opinion-based responses through use of structured questions and statements.

CHAPTER 4. PRESENTATION OF RESULTS

This chapter covers the results of the analysis of data collected. It gives an overview of the participants, details the data cleaning process, and summarises the remaining qualifying sample size before testing for reliability and validity of the data. Careful analysis of the individual variables was carried out for consistency and correlation that was necessary to determine the grouping of each into common constructs for regression analysis. Multiple regression was tested against the hypotheses last, and conclusions were drawn on whether the study's objectives were addressed based on the analysed data results.

4.1 Data screening

After collecting responses through the Qualtrics software, data was exported to excel for preliminary screening before exporting to SPSS. Upon extraction, the total responses were identified to not all be valid for analysis and exclusions were required. The data points noted for exclusion included 'preview' responses which were ran to test and ensure the quality of the survey prior to opening it up for public participation, as well as incomplete surveys. An investigation on the incomplete surveys led to the following inferences being drawn because of that status:

- Respondent initiated the survey to browse it, gave consent but did not have availability to start responding (i.e., did not even capture demographic responses) with the intention that they would complete it later, however, did not get around to it or forgot about it.
- The respondent started the survey, responded to all demographic inputs required, then dropped off before responding to the first survey question.
- The respondent was in the middle of the survey and seemingly got distracted along the process and did not complete, with some noted to being just one question/section from completion.

The below summarises the sample size screening procedure:

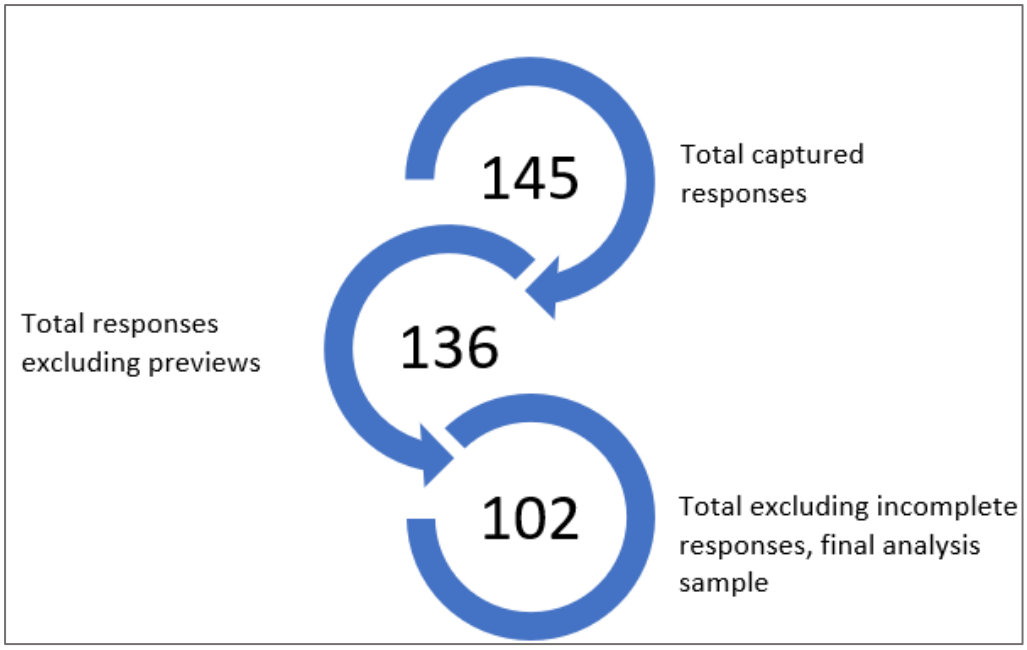

Figure 5: Screening steps summary

The incomplete responses were identified as data missing completely at random (MCAR) and warranted the listwise deletion method (Cooper & Schindler, 2014; Woods et al., 2021) to avoid any bias in the subsequent analysis. The removal of the data did not also have any impact on the statistical analysis and bearing on the results.

4.2 Missing values

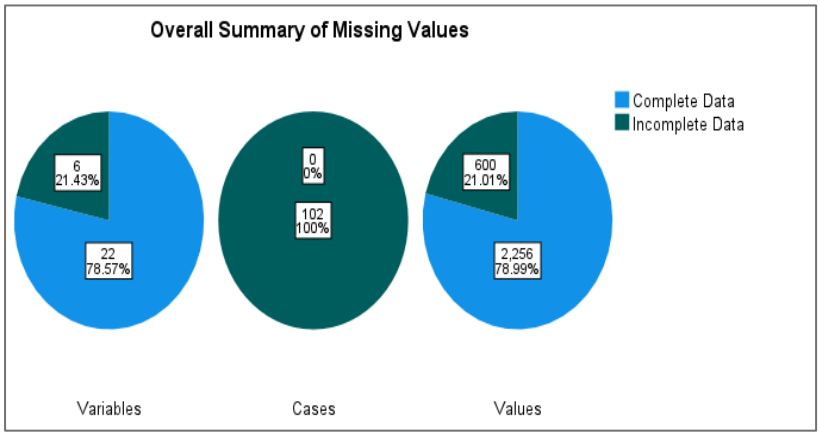

Figure 6: Missing Values Summary

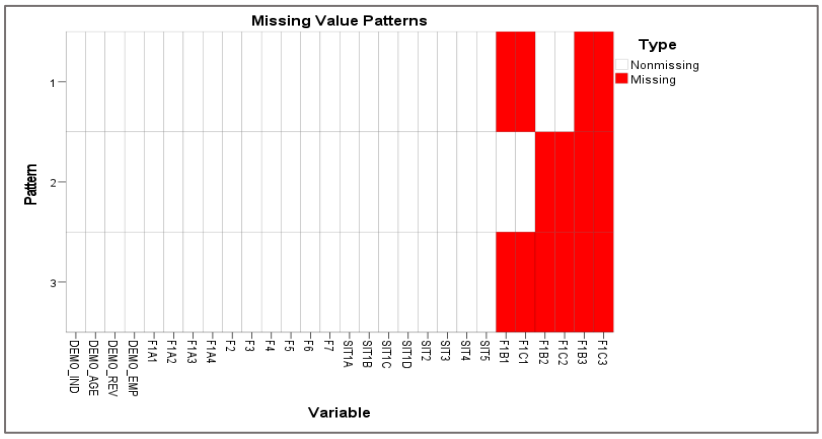

Figure 7: Missing Value Patterns

In addition to the highlighted missing responses from the screening process, there were more that stemmed from dependency on other responses that were observed and where a skip logic was applied – these missing values comprised 21% of all possible values and were from only six variables where applicability rules played a role (Figure 6). This omission was valid, and the values showed a systematic pattern which was not random in how they are missing, as seen in Figure 7, thus maintaining the values as missing did not present any risk for bias in the analysis. Given a negligible number of responses in the six variables noted to have missing values, it is deduced that they are of no statistical significance in the study and analysis excluded the variables.

4.3 Data transformation

The questionnaire consisted of four sections comprised of 24 variables, where the first two sections pertained to the accessibility to bank funding construct, and the last two relating to the innovation and technology constructs. The first section, F1, asked respondents whether

they had attempted to get various types of funding for their business, of which one of the options was from commercial banks (F1A). The variables relating to the different forms of funding are paraphrased as follows (see Appendix B attached):

- F1A1 – did the business try to obtain commercial bank funding before the Covid-19 pandemic?
- F1A2 – did the business try to obtain equity funding before the Covid-19 pandemic?
- F1A3 – did the business try to obtain alternative funding such as fintech or digital bank funding before the Covid-19 pandemic?
- F1A4 – did the business self-fund, i.e. did not obtain any external funding?

The responses could either be captured as “Yes, successfully obtained funding of this type” (1), “Tried, but not successfully” (2), or “No” (3). Given that the question only referred to the attempt to obtain funding and not whether funding was granted, it was prudent that responses from ‘1’ and ‘2’ be combined to read as “Yes”, and ‘3’ left as “No”. Transformation of this data was done through recoding the responses to be binary, with Yes being equivalent to ‘1’ and No being ‘2’. The variables changed from “F1A1 – F1A4” with three possible responses, to the new transformed variables “F1A11 – F1A44” with only two possible responses.

4.4 Eliminations

4.2.1 Insufficient data for use

The engaged literature facilitated the study in understanding the challenges experienced by SMEs when navigating the formal banking system for funds necessary to not only sustain businesses, but to help grow them. Challenges included the inability to secure full funding as well as stringent requirements by banks such as the need to provide collateral, an expectation that can be rather unrealistic for a business that is perhaps still renting its operating premises or worst case, a start-up.

Although responses in this regard from SMEs on the ground would have enriched the study with multi-dimensional insights, only four responses providing this information were captured – a number too low to make any conclusive observation from the targeted population. These questions were also noted as missing values which were discarded from the analysis, they were denoted as the following variables on SPSS:

- F1B1 – F1B3: was full funding received for the respective external finance obtained?
- F1C1 – F1B3: was collateral requested to be provided for the respective external finance received?

4.4.2 Participant relevancy

This study focuses on commercial bank funding of SMEs and although other forms of funding were given to the respondents as options for insight

purposes and possible future studies, the responses relating to bank funding were the only ones useful to assist achieve the study's research objectives.

To the misfortune of the inability to confirm bank-engagement levels of participating SMEs prior to collecting data, the population was mixed between those that had experience with trying to obtain funding from banks and those that had not, which necessitated further trimming of the sample size as responses that were received could not be deemed as coming from a credible target – this was also confirmed through inconsistencies in responses to similar Likert-scale questions from the screening process. The sample of interest was therefore that which were recoded to having responded "Yes" (1) to the new "F1A11 – tried to obtain commercial bank funding" variable – this constituted a final sample size of 35. Figure 8 summarises the responses.

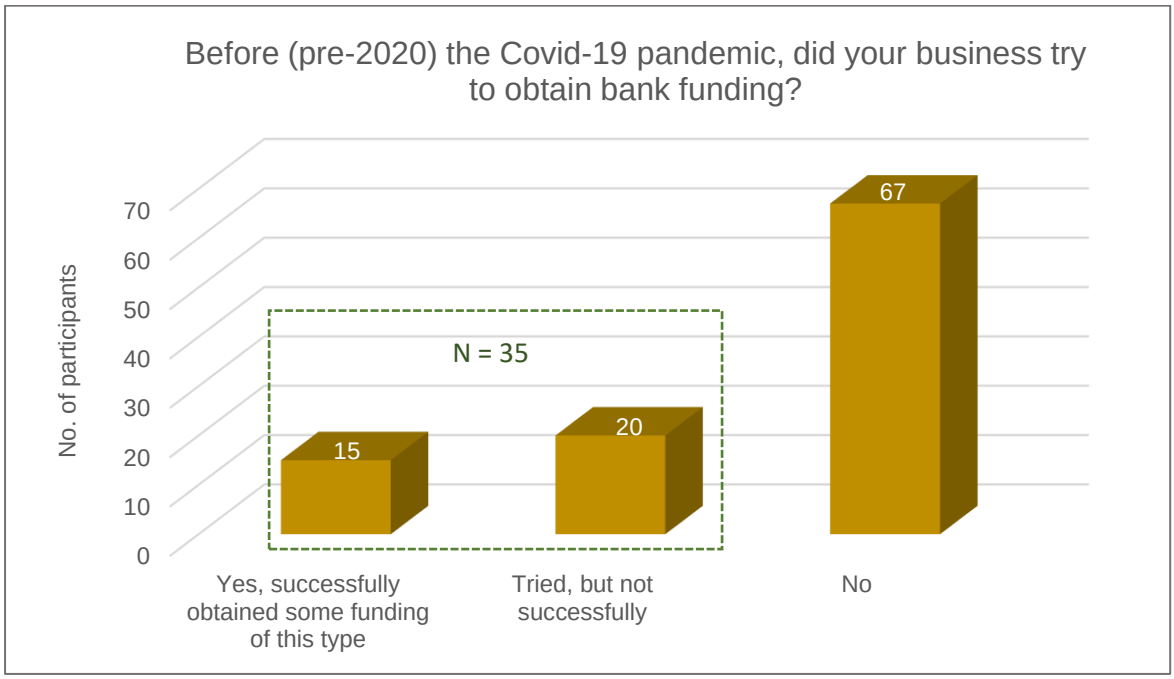

Figure 8: Summary of bank engagement by sampled SMEs

4.5 Descriptive Statistics

To better understand the audience whose data was collected for analysis, demographic information is graphically presented for interpretation. This is done to ensure that the data is representative of the correct and relevant population as intended by the study.

4.5.1 Demographics

The industry classification appears to be evenly distributed, with no industry showing dominance. Concentration of industry would present a risk in skewing the data as funding needs of businesses are relative per industry thus can create bias in analysis. With the industry categorisation being at a high level, the limitation resulting from the absence of sub-level industry description could have driven the highest weighting of businesses classified under “Other service activities”. The top four industries comprised approximately 54% of total valid survey responses - Manufacturing, Wholesale and retail trade, and Accommodation and food service being the other industries showing prominence in participation to the research study.

Table 6: Industry classification summary of final sample

Industry Classification

	N	%
Agriculture, forestry & fishing	1	2.9%
Mining & quarrying	1	2.9%
Manufacturing	3	8.6%
Electricity, gas, steam & air conditioning supply	1	2.9%
Construction	5	14.3%
Wholesale and retail trade; repair of motor vehicles and motor cycles	5	14.3%
Transport and storage	2	5.7%
Accommodation and food service activities	1	2.9%
Financial and insurance activities	1	2.9%
Real estate activities	3	8.6%
Professional, scientific and technical activities	2	5.7%
Administrative and support service activities	1	2.9%
Human health and social work activities	1	2.9%
Arts, entertainment and recreation	1	2.9%
Other service activities	7	20.0%

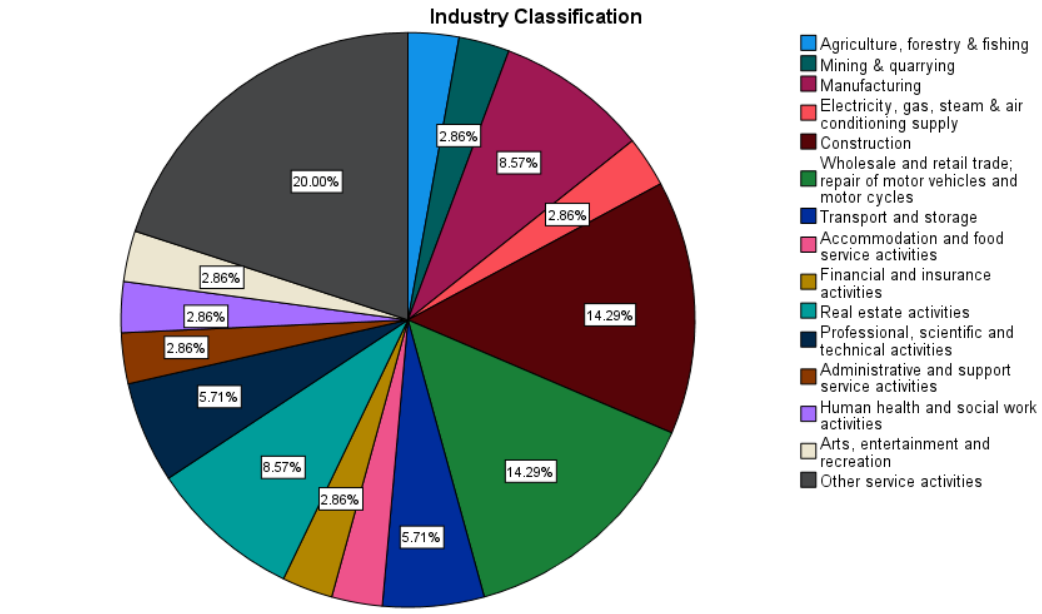

Figure 9: Industry classification of final sample businesses (35)

The final analysis sample of 35 shows a contrasting spread to the total population. Apart from the "Other service activities" industry, Manufacturing, Wholesale and retail trade, and Construction are capital intensive industries whose need for external funding is expected, therefore it is not surprising that they comprise most of the sample.

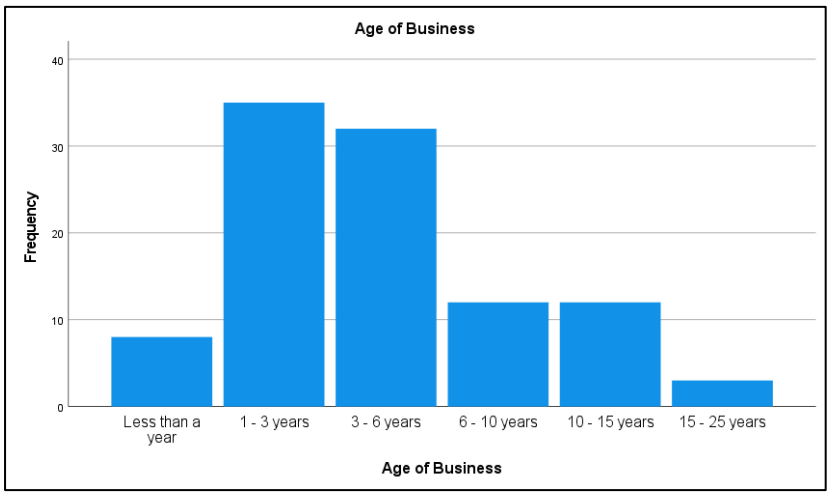

Figure 10: Age distribution of businesses sampled after screening (102)

Consistent with Mulibana and Rena's (2021) findings that the average life of most SMEs in South Africa rarely exceeds five years, so did the trend shown (Figure 10) by the sampled population, with 73% of the businesses falling below six years in age.

The final and relevant sample depicts an interesting pattern in age distribution, one that suggests that this cluster of businesses is more resilient than the average SME business.

Although Figure 11 is still consistent with most (60%) businesses falling below six years, there is a considerable proportion that are older than six years, which begs the question whether this is because of bank funding as they are more experienced in engaging banks for assistance.

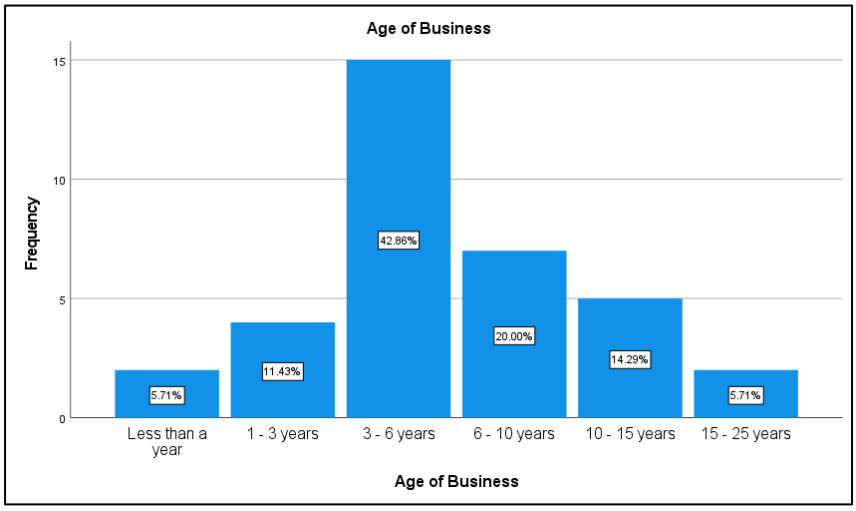

Figure 11: Age distribution of final sample businesses (35)

The Department of Small Business Development defines SMEs in South Africa according to their turnover levels as well as the number of people it employs. It was critical to collect these data fields as it assisted in identifying whether the population that participated in the study met the criteria, where necessary elimination process would need to follow should any participant fall outside of the defining parameters. Only one participant exceeded 200 in number of employed people, however this was not a concern as the maximum number is 250 (South African Government, 2022).

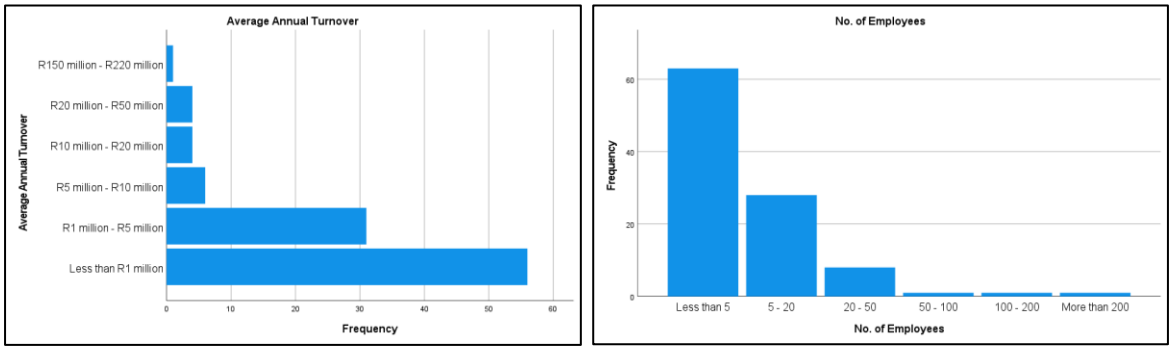

Figure 12: Turnover and Workforce distribution of businesses sampled after screening (102)

Gathering data on the workforce of SMEs was important for the study as this is a sector that has been touted across multiple publications as well as the South African government as instrumental for job creation and GDP growth. Figure 13 shows the impact of accessibility to

bank funding on SMEs' ability to expand its workforce, inferring that with financial assistance, SMEs could do more to support the cause of reducing unemployment.

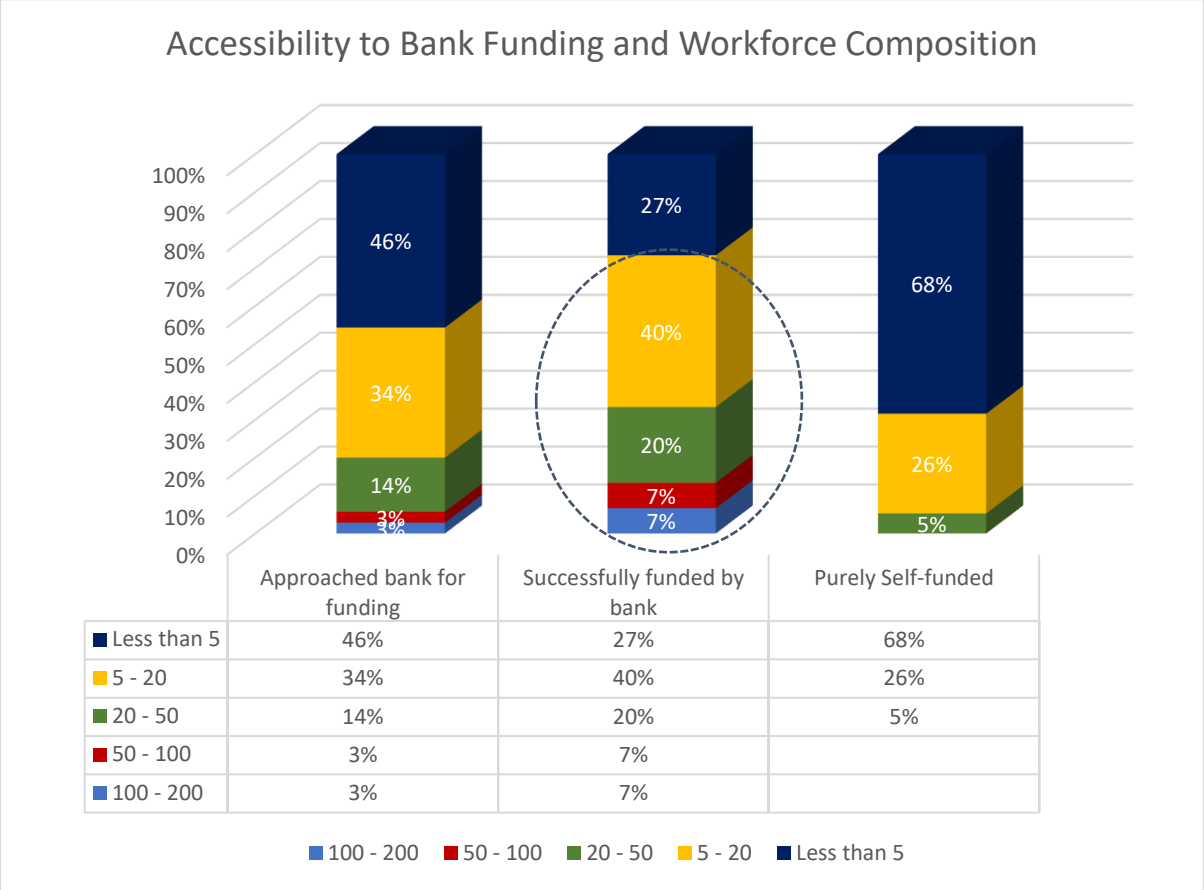

Figure 13: The impact of Accessibility to Bank Funding on SME Workforce

The final sample is consistent with the larger sampled population after screening, shown for turnover level and number of people employed by the businesses, they are both on the low end.

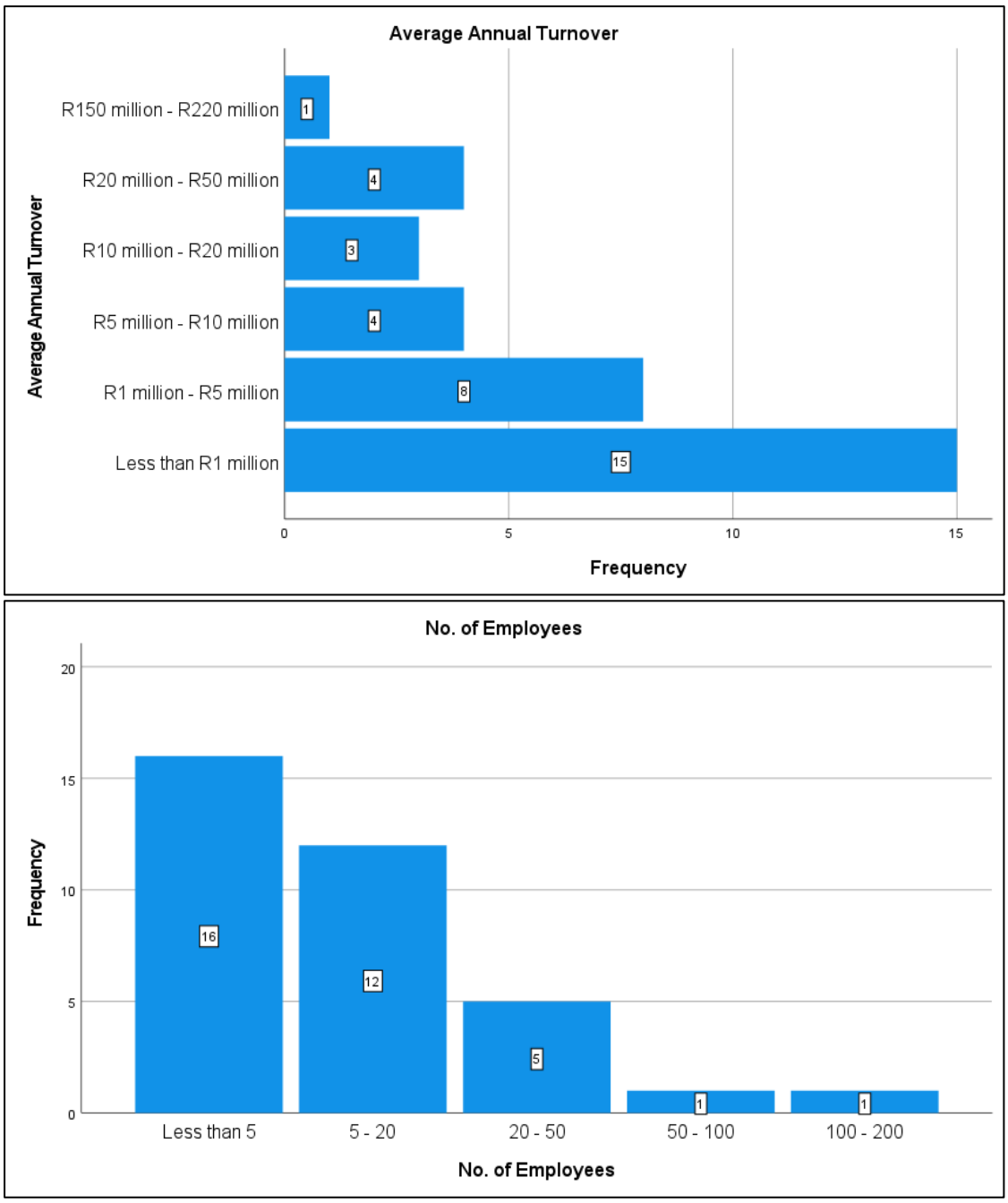

Figure 14: Turnover and Workforce distribution of final sample businesses (35)

4.5.2 Data normality

Testing for normality is important to determine whether the gathered data suggests a normal distribution or not. While many tests that can be used to confirm this, research shows that the most recommended method is the Shapiro-Wilk test (Farrell & Rogers-Stewart, 2006; Mendes & Pala, 2003; Öztuna et al., 2006; Razali & Wah, 2011; Ruxton et al., 2015) for its superior performance over the other statistical tests, and allows for use of small sample sizes, generally defined as less than 50 (Souza et al., 2023). To determine the normality, a hypothesis test is required to guide the outcome and interpretation of the results, which universally is as follows:

- Null Hypothesis (H_0): the sampled population is normally distributed
- Alternative Hypothesis (H_1): the sampled population is not normally distributed

In support of their simulated results, Ruxton et al. (2015) cites other researchers (Romão et al., 2010; Yazici & Yolacan, 2007) that found that the Shapiro-Wilk test yields the highest power and is most ideal when there are no constraints to the alternative hypothesis, which is seen in the adopted general hypotheses used above for this study. The Shapiro-Wilk test was therefore the preferred test of choice to determine normality of this study's final sampled data. According to Shapiro and Wilk (1965), the definition of assumed normality is based on the *W* statistic, where normal distribution is implied the closer the *W* value is to 1 and the contrary is assumed for a value closer to 0. The p-value is however the superseding determinant of normal distribution, where $p < 0.05$ indicates that the null hypothesis is rejected, and the data significantly deviates from normal distribution – whilst a significance value from a Shapiro-Wilk test that is greater than 0.05, would confirm normal distribution. In the instance of this research study, table 7 shows that all variables returned a p-value that is less than 0.05, meaning the data was normally distributed.

Case Processing Summary

	Cases		
	Valid N	Missing N	Total N
F2 - Access to Bank Finance	35	0	35
F3 - Cost of Bank Finance	35	0	35
F4 - Bank Finance App Experience	35	0	35
F5 - Bank Finance App Process	35	0	35
F6 - Alternative Finance Sourcing	35	0	35
F7 - Fintech vs Bank Financing Experience	35	0	35
SIT1A - Innovation Obstacle (Internal Finance)	35	0	35
SIT1B - Innovation Obstacle (Bank and Private Finance)	35	0	35
SIT1C - Innovation Obstacle (Cost)	35	0	35
SIT1D - Innovation Obstacle (Priority)	35	0	35
SIT2 - InnoTech Use (Efficiencies)	35	0	35
SIT3 - InnoTech Use (Digital Capturing)	35	0	35
SIT4 - InnoTech Use (Manual Capturing)	35	0	35
SIT5 - InnoTech Use (Integration Challenge)	35	0	35

Table 7: Data normal distribution

Measured Construct	Variable	Mean	Median	Variance	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis	Shapiro-Wilk	p-value
Bank Finance Accessibility	F2 - Access to Bank Finance	2.09	2.00	1.963	1.401	1	6	1.540	2.012	.761	<.001
	F3 - Cost of Bank Finance	4.23	4.00	2.711	1.646	1	6	-.724	-.458	.867	<.001
	F4 - Bank Finance App Experience	2.49	2.00	1.728	1.314	1	6	.733	.221	.885	.002
	F5 - Bank Finance App Process	3.94	4.00	1.761	1.327	1	6	-.290	-.639	.931	.030
	F6 - Alternative Finance Sourcing	4.80	5.00	1.753	1.324	1	6	-1.384	1.516	.794	<.001
	F7 - Fintech vs Bank Financing Experience	4.03	4.00	1.087	1.043	2	6	.105	-.424	.917	.012
Innovation Challenges	SIT1A - Innovation Obstacle (Internal Finance)	3.37	3.00	.417	.646	2	4	-.531	-.574	.759	<.001
	SIT1B - Innovation Obstacle (Bank and Private Finance)	3.26	3.00	.667	.817	1	4	-.864	.135	.797	<.001
	SIT1C - Innovation Obstacle (Cost)	3.46	4.00	.432	.657	2	4	-.822	-.323	.733	<.001
	SIT1D - Innovation Obstacle (Priority)	2.89	3.00	.810	.900	1	4	-.792	.212	.813	<.001
Inovation and Technology Use	SIT2 - InnoTech Use (Efficiencies)	3.94	4.00	2.526	1.589	1	6	-.274	-.885	.914	.010
	SIT3 - InnoTech Use (Digital Capturing)	4.37	5.00	2.534	1.592	1	6	-.795	-.313	.864	<.001
	SIT4 - InnoTech Use (Manual Capturing)	3.31	3.00	3.045	1.745	1	6	.013	-1.353	.898	.003
	SIT5 - InnoTech Use (Integration Challenge)	2.51	2.00	1.669	1.292	1	5	.401	-1.161	.860	<.001

4.6 Reliability and Validity Analysis

4..6.1 Correlation Analysis

A correlation test was performed to measure the degree of association between variables of the same construct. This analysis was done to test whether there was consistency between the variables for effective measurement of the underlying constructs. It was therefore imperative that a strong positive relationship between variables was achieved. Using the SPSS software, a two-tailed test of significance using the Pearson Correlation Coefficient assisted with the identification of significant correlations which were flagged where the system identified strong consistency between variables.

		F2 - Access to Bank Finance	F3 - Cost of Bank Finance	F4 - Bank Finance App Experience	F5 - Bank Finance App Process	F6 - Alternative Finance Sourcing	F7 - Fintech vs Bank Financing Experience
F2 - Access to Bank Finance	Pearson Correlation	1					
	Sig. (2-tailed)						
F3 - Cost of Bank Finance	Pearson Correlation	-.276	1				
	Sig. (2-tailed)	.108					
F4 - Bank Finance App Experience	Pearson Correlation	-.199	-.121	1			
	Sig. (2-tailed)	.252	.490				
F5 - Bank Finance App Process	Pearson Correlation	-.076	.518**	-.152	1		
	Sig. (2-tailed)	.663	.001	.383			
F6 - Alternative Finance Sourcing	Pearson Correlation	.073	.345*	-.128	.412*	1	
	Sig. (2-tailed)	.677	.042	.462	.014		
F7 - Fintech vs Bank Financing Experience	Pearson Correlation	-.062	.133	-.053	.235	.068	1
	Sig. (2-tailed)	.723	.446	.761	.174	.697	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

		SIT1A - Innovation Obstacle (Internal Finance)	SIT1B - Innovation Obstacle (Bank and Private Finance)	SIT1C - Innovation Obstacle (Cost)	SIT1D - Innovation Obstacle (Priority)
SIT1A - Innovation Obstacle (Internal Finance)	Pearson Correlation	1			
	Sig. (2-tailed)				
SIT1B - Innovation Obstacle (Bank and Private Finance)	Pearson Correlation	.594**	1		
	Sig. (2-tailed)	<.001			
SIT1C - Innovation Obstacle (Cost)	Pearson Correlation	.281	.432**	1	
	Sig. (2-tailed)	.102	.010		
SIT1D - Innovation Obstacle (Priority)	Pearson Correlation	-.178	.081	.290	1
	Sig. (2-tailed)	.307	.643	.091	

** Correlation is significant at the 0.01 level (2-tailed).

		SIT2 - InnoTech Use (Efficiencies)	SIT3 - InnoTech Use (Digital Capturing)	SIT4 - InnoTech Use (Manual Capturing)	SIT5 - InnoTech Use (Integration Challenge)
SIT2 - InnoTech Use (Efficiencies)	Pearson Correlation	1			
	Sig. (2-tailed)				
SIT3 - InnoTech Use (Digital Capturing)	Pearson Correlation	.543**	1		
	Sig. (2-tailed)	<.001			
SIT4 - InnoTech Use (Manual Capturing)	Pearson Correlation	-.216	-.657**	1	
	Sig. (2-tailed)	.213	<.001		
SIT5 - InnoTech Use (Integration Challenge)	Pearson Correlation	-.358*	-.510**	.422*	1
	Sig. (2-tailed)	.035	.002	.012	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

To test the correlation of two variables using the correlation coefficient, significance levels (p-values) of 0.01 and 0.05 were used. In correlation testing, the null hypothesis states that there is no correlation between two measured variables. When the p-value associated to the

correlation coefficient is equal to or less than the defined significance level, the null hypothesis is rejected. The figure above shows that the variables did not all correlate within a given construct, but the highlighted where the p-value was noted as being below the levels of significance, the corresponding correlation coefficients were flagged as this meant that there was a significant correlation between the two variables (i.e. we reject the null hypothesis). It was important to highlight these to be able to establish commonality between variables and identify those that may be independent of each other for further analysis – this, in conjunction with the reliability analysis was critical in decision-making pertaining to variables to retain and those to discard.

In addition to the correlation analysis, and probably a more fool-proof analysis for consistency in a research instrument (questionnaire), is a reliability analysis test. The Cronbach's alpha (α) is a measure of internal consistency of a test or scale, represented as a value between 0 and 1, where the widely accepted benchmark as a pass for reliability is 0.7 (Bujang et al., 2018; Tavakol & Dennick, 2011). Cronbach's alpha measures the inter-relatedness of variables or questions within a test and validates whether they measure the same construct.

4.6.2 Reliability: Accessibility to Bank Funding

The first construct that was measured for reliability was Accessibility to Bank Funding, which comprised six items that were analysed for internal consistency and inter-relatedness in as far as testing the same construct, using Cronbach's alpha. The six measured items used to test the accessibility to bank funding construct constituted the following statements, tested on a 6-point Likert scale from 1, representing "strongly disagree" to 6 which represented "strongly agree":

- F2 – I find accessing financing from banks quick and easy.
- F3 – I find bank financing too expensive.
- F4 – The credit application process with banks is seamless.
- F5 – I find the credit application process with banks too manual.
- F6 – I sometimes need to look for financing from alternative sources to my bank.
- F7 – It is easier to get finance from Fintech lenders than traditional banks.

Table 8: Construct 1 (Accessibility to Bank Funding) – Original Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.234	6

At α = 0.234 the scale did not pass the reliability test as it was significantly below the 0.7 threshold. This was indicative of the inconsistency in the items' measurement of the construct and suggested revision to identify those that were not inter-related. An assessment of the changes in α given the deletion of each item presented improvement opportunities but not of significant movement as shown in table 9.

Table 9: Construct 1 – Scale if Item Deleted (Before)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
F2 - Access to Bank Finance	19.49	13.904	-.211	.437
F3 - Cost of Bank Finance	17.34	8.526	.252	.034
F4 - Bank Finance App Experience	19.09	14.316	-.239	.440
F5 - Bank Finance App Process	17.63	8.358	.462	-.132[a]
F6 - Alternative Finance Sourcing	16.77	8.946	.374	-.043[a]
F7 - Fintech vs Bank Financing Experience	17.54	11.608	.136	.182

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

As this construct was designed to measure the respondents' attitude towards accessibility to bank funding, four of the items were noted to be negative sentiments and required reverse coding which was also going to be helpful later in the interpretation of linear relationships that may exist. The following reverse coding was implemented to reflect positive sentiment that better and consistently explained accessibility to bank funding:

- F3 → F3_R
- F5 → F5_R
- F6 → F6_R

- F7 → F7_R

The reversed variables were used in the analysis going forward. Taking the new combination of items through the reliability analysis yielded much better results, returning α = 0.536. This was however, still below the minimum threshold.

Table 10: Construct 1 – Reliability Statistics after recoding reverse variables.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.536	.522	6

Using SPSS to analyse reliability, changes in α were assessed when certain items were deleted, which resulted in items F4, F2, and F7_R respectively being removed and excluded from further analysis as this yielded a higher α. The results shown in the previous correlation analysis for this construct also supported the decision made as low correlation was noted amongst these same items. The final α achieved was 0.684, which although is marginally lower than 0.7, is still within acceptable range (Taber, 2018). Table 13 shows the updated correlation analysis that considered reversed items – also confirming the deletion decisions as significant correlations were only noted against the remaining items.

Table 11: Construct 1 – New Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.684	3

Table 12: Construct 1 – Scale if item Deleted (After)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
F3_R	5.26	4.961	.514	.289	.583
F5_R	4.97	5.970	.572	.330	.505
F6_R	5.83	6.734	.430	.193	.672

Table 13: Correlation analysis

Correlations

		F2 - Access to Bank Finance	F3_R	F4 - Bank Finance App Experience	F5_R	F6_R	F7_R
F2 - Access to Bank Finance	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	35					
F3_R	Pearson Correlation	.276	1				
	Sig. (2-tailed)	.108					
	N	35	35				
F4 - Bank Finance App Experience	Pearson Correlation	-.199	.121	1			
	Sig. (2-tailed)	.252	.490				
	N	35	35	35			
F5_R	Pearson Correlation	.076	.518**	.152	1		
	Sig. (2-tailed)	.663	.001	.383			
	N	35	35	35	35		
F6_R	Pearson Correlation	-.073	.345*	.128	.412*	1	
	Sig. (2-tailed)	.677	.042	.462	.014		
	N	35	35	35	35	35	
F7_R	Pearson Correlation	.062	.133	.053	.235	.068	1
	Sig. (2-tailed)	.723	.446	.761	.174	.697	
	N	35	35	35	35	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.6.3 Reliability Innovation Challenges

Internal innovation obstacles of an SME were then tested by understanding the degree of importance of four items in preventing them from engaging in innovation activities. The construct was measured through a 4-point Likert scale ranging from 1 (“not a constraint”) to 4 (“high”). Analysis for reliability assessed the four items for internal consistency against the measured construct using Cronbach’s alpha, which were as follows:

- SIT1A – Lack of internal finance for innovation
- SIT1B – Lack of credit or private equity
- SIT1C – Costs too high
- SIT1D – Different priorities in your business

Table 14: Construct 2 (Innovation Challenges) – Original Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.540	4

As seen in table 14, at α = 0.54 the construct does not meet the reliability test, necessitating deletion of unrelated items. In further scaling α to determine changes that would yield a better performance, it was concluded that removing only item SIT1D resulted in Cronbach’s alpha, at 0.701, falling within acceptable range. Further analysis excluded this item.

Table 15: Construct 2 - Scale if Item Deleted (Before)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SIT1A - Innovation Obstacle (Internal Finance)	9.60	2.835	.303	.490
SIT1B - Innovation Obstacle (Bank and Private Finance)	9.71	2.034	.519	.276
SIT1C - Innovation Obstacle (Cost)	9.51	2.434	.510	.333
SIT1D - Innovation Obstacle (Priority)	10.09	2.845	.084	.701

Table 16: Construct 2 – New Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.701	3

Table 17: Construct 2 - Scale if Item Deleted (After)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SIT1A - Innovation Obstacle (Internal Finance)	6.71	1.563	.536	.594
SIT1B - Innovation Obstacle (Bank and Private Finance)	6.83	1.087	.640	.439
SIT1C - Innovation Obstacle (Cost)	6.63	1.711	.409	.733

Although the reliability analysis of the second construct after removing one item presented an opportunity to remove another item, SIT1C to further improve α, the threshold of 0.7 was

already met and the improvement (benefit) was marginal against the cost of losing more data points with an already significantly trimmed sample size, therefore the decision to retain the item was reached. The correlation analysis performed earlier also confirms that the least positively correlated item within the construct was SIT1D, thus its sole exclusion was warranted.

4.6.4 Reliability Innovation and Technology Use

As an extension to the innovation construct, the use of technology coupled with innovation was measured under the third construct. This construct sought to gather insight on whether SMEs' innovation and technological advancement had any bearing to its ability to access bank funding as minimisation of the asymmetric information challenge would be inferred. Four items were used to measure the construct, and just like the first construct, made use of the same 6-point Likert scale. The items consisted of the following statements:

- SIT2 – My business relies on innovation and technology to create efficiencies.
- SIT3 – My business uses technological means to capture and store transactions.
- SIT4 – My business still uses manual capturing and storage for its transactions.
- SIT5 – It is difficult to integrate technology into my type of business.

Table 18: Construct 3 (Innovation and Technology Use) – Original Reliability Statistics

Reliability Statistics

Cronbach's Alpha[a]	N of Items
-.836	4

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

With a negative α, the elimination process was going to prove difficult as all items did not present a swing-about of the value into positive territory when deleted. Although removing SIT3 yielded the best performing α as a first step, the result remained negative and there were no prospects beyond that which got the data closer to a Cronbach's alpha of 0.7 – items SIT4 and SIT5 resulted in α = 0.575. Guided by the correlation analysis performed that showed relatively stronger correlation between items SIT2 and SIT3 with a more stringent p-value (0.01), contrary to that of items SIT4 and SIT5 (p-value = 0.05), the reliability analysis was re-ran using only the former items which returned a Cronbach's alpha of 0.704. Although these items met the minimum threshold, using only two items to derive a conclusion on a construct posed a risk of weakening the study's findings.

Table 19: Construct 3 - Scale if Item Deleted (Before)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SIT2 - InnoTech Use (Efficiencies)	10.20	3.400	.014	-1.698[a]
SIT3 - InnoTech Use (Digital Capturing)	9.77	6.476	-.370	-.177[a]
SIT4 - InnoTech Use (Manual Capturing)	10.83	5.911	-.347	-.208[a]
SIT5 - InnoTech Use (Integration Challenge)	11.63	6.005	-.263	-.525[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Table 20: Construct 3 – New Reliability Statistics

Reliability Statistics

Cronbach's Alpha	N of Items
.704	2

Table 21: Construct 3 - Scale if Item Deleted (After)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SIT2 - InnoTech Use (Efficiencies)	4.37	2.534	.543	.
SIT3 - InnoTech Use (Digital Capturing)	3.94	2.526	.543	.

Concerned with having just two items to measure a construct, further investigation was necessary through exploring options that could increase the chances of some of the items being retained. After meticulous inspection in the research instrument and careful consideration, it was established that since construct 3 intended to measure positive sentiment towards the use of innovation and technology within SMEs, two questions (items) were identified to be contrary (negative) to that effect and warranted reverse coding. Items SIT4 and SIT5 were recoded to SIT4_R and SIT5_R respectively. Correlation was re-run to

determine whether there was an improvement in the inter-relatedness of the items before re-running the reliability analysis once more.

Table 22: Construct 3 - Correlation analysis with reverse coded items

Correlations

		SIT2 - InnoTech Use (Efficiencies)	SIT3 - InnoTech Use (Digital Capturing)	SIT4_R	SIT5_R
SIT2 - InnoTech Use (Efficiencies)	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	35			
SIT3 - InnoTech Use (Digital Capturing)	Pearson Correlation	.543	1		
	Sig. (2-tailed)	<.001			
	N	35	35		
SIT4_R	Pearson Correlation	.216	.657	1	
	Sig. (2-tailed)	.213	<.001		
	N	35	35	35	
SIT5_R	Pearson Correlation	.358	.510	.422	1
	Sig. (2-tailed)	.035	.002	.012	
	N	35	35	35	35

The correlation matrix, following the reverse coding of negative item responses, showed a significant improvement, where all items were positively correlated. This was indicative of good inter-relatedness of the items measuring the construct and set an optimistic basis for reliability testing outcomes.

Table 23: Construct 3 – Reliability Statistics (Post Reverse Coding)

Reliability Statistics

Cronbach's Alpha	N of Items
.763	4

Table 24: Construct 3 – Scale if Item Deleted (Post Reverse Coding)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SIT2 - InnoTech Use (Efficiencies)	12.54	14.903	.441	.770
SIT3 - InnoTech Use (Digital Capturing)	12.11	11.810	.777	.580
SIT4_R - InnoTech Use (Manual Capturing)	12.80	13.047	.536	.726
SIT5_R - InnoTech Use (Integration Challenge)	12.00	15.706	.534	.726

Evidently, the reverse coding resulted in superior results of the Cronbach's alpha of 0.763, as show in table 23 – one that was higher than that in the event where two of the items measuring the third construct were discarded. Scaling α if items were deleted confirmed the reliability strength of the refreshed items as three of the four yielded α greater than the threshold of 0.7. Removing item SIT2 would have improved α, but only marginally, therefore without forgoing any items, it was sufficient to use all four items in further analysis as they passed the reliability test. Going forward, items SIT4 and SIT5 were replaced with SIT4_R and SIT5_R.

4.6.5 Validity: Factor Analysis Testing

Factor analysis is a statistical analysis technique used to establish the common underlying factors across independent variables (items) which exhibit similar construct-traits. The measurement assumes that all variables are correlated to some degree and works well with a large sample size (Shrestha, 2021). In addition to the reliability analysis already performed, exploratory factor analysis was used to further validate the inter-relatedness of the chosen variables. Prior to performing factor analysis, the Kaiser-Meyer-Olkin (KMO) test, a measure of sampling adequacy, must be satisfied. The KMO test basically tests the suitability of sample size for factor analysis, measured against each variable – where a KMO value great than 0.5 at the bare minimum is deemed acceptable (Field, 2013; Kaiser & Rice, 1974).

Although the reliability test had already been passed with decisions to delete some variables to achieve the minimum acceptable Cronbach's alpha, and the decisions were congruent with the correlation analysis results, it was prudent that the KMO test also be performed to test final sample adequacy. With a minimum threshold of 0.5 in KMO value, that some researchers (Shrestha, 2021; Yousef & Dashash, 2023) argue should be set at 0.8, the very low result of

0.452 as seen in table 25 disqualifies factor analysis from taking place as it is indicative of inadequacy in the sample size.

Table 25: Sample adequacy test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.452
Bartlett's Test of Sphericity	Approx. Chi-Square	125.784
	df	45
	Sig.	<.001

As already mentioned under limitations of the study, the sample size was predominantly affected by the unforeseen lack of engagement with banks by most of the SMEs which made their responses unreliable and had to be discarded. The remaining responses (35) did however follow a pattern of consistency with the three measured constructs, more especially with the final variables used after exclusions. Suppressed at 0.5, all values had convergent validity as all variables loaded under the same factor, as well as had discriminant validity as the variables did not load on any other factor (Ab Hamid et al., 2017).

Table 26: Rotated Component Matrix – Prior to Variable Exclusions

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
F2 - Access to Bank Finance				.744	
F3_R - Cost of Bank Finance		.826			
F4 - Bank Finance App Experience			.519	-.536	
F5_R - Bank Finance App Process		.768			
F6_R - Alternative Finance Sourcing		.660			
F7_R - Fintech vs Bank Financing Experience					.893
SIT1A - Innovation Obstacle (Internal Finance)			.747		
SIT1B - Innovation Obstacle (Bank and Private Finance)			.838		
SIT1C - Innovation Obstacle (Cost)			.693		
SIT1D - Innovation Obstacle (Priority)				.599	
SIT2 - InnoTech Use (Efficiencies)	.705				
SIT3 - InnoTech Use (Digital Capturing)	.845				
SIT4_R - InnoTech Use (Manual Capturing)	.613				
SIT5_R - InnoTech Use (Integration Challenge)	.790				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Table 27: Rotated Component Matrix – After Item Exclusions

Rotated Component Matrix[a]

	Component		
	1	2	3
F3_R - Cost of Bank Finance		.828	
F5_R - Bank Finance App Process		.808	
F6_R - Alternative Finance Sourcing		.629	
SIT1A - Innovation Obstacle (Internal Finance)			.769
SIT1B - Innovation Obstacle (Bank and Private Finance)			.886
SIT1C - Innovation Obstacle (Cost)			.664
SIT2 - InnoTech Use (Efficiencies)	.629		
SIT3 - InnoTech Use (Digital Capturing)	.845		
SIT4_R - InnoTech Use (Manual Capturing)	.706		
SIT5_R - InnoTech Use (Integration Challenge)	.814		

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Given the results shown in table 27, confirmation of the variables belonging to a single construct as originally positioned meant it was plausible that they be combined on SPSS for further analysis. Consistent with the identified factors, the newly, combined variables (constructs) were as follows:

1. Factor 1 (Innovation and Technology Use) – INNTECH_Use [SIT2 + SIT3 + SIT4_R + SIT5_R]
2. Factor 2 (Accessibility to Bank Funding) – BF_Access [F3_R + F5_R + F6_R]
3. Factor 3 (Innovation Challenges) – INN_Challenges [SIT1A + SIT1B + SIT1C]

4.7 Regression Assumptions

In this section, an examination of five assumptions were done as a prerequisite to linear regression, namely, linearity; multivariate normality; multicollinearity; auto-correlation; and homoscedasticity.

4.7.1 Linearity

Demographic information could sometimes create underlying conditions that favour or disadvantage an SME, therefore these variables, along with the combined variables representing single constructs, were necessary to be analysed together. To test the relationship amongst the variables, a matrix scatter plot was used which confirmed linearity for most of the data as linear curves were seen. It is therefore safe to say that the linearity assumption is met.

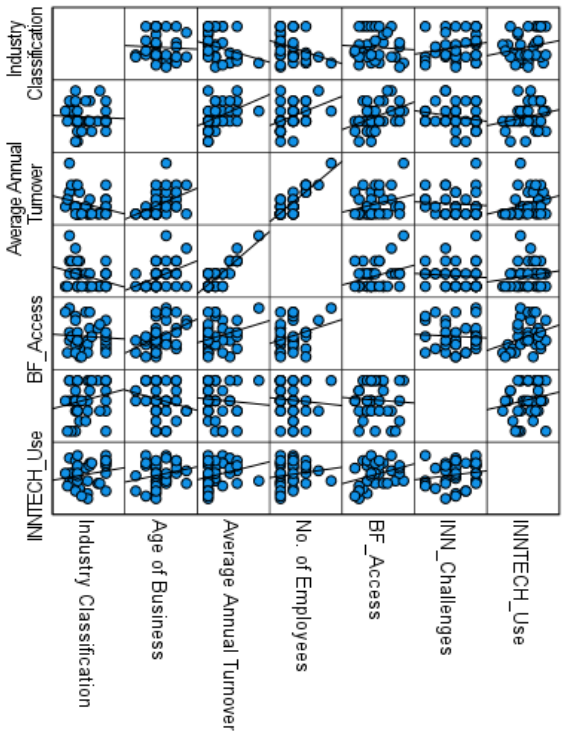

Figure 15: Matrix scatter plot diagram

4.7.2 Mean error of estimated regression model to be zero

The requirement that the expected mean error of the estimated regression model is zero, is an important assumption to ensure there is no bias in the model. This assumption was tested using SPSS, where *BF_Access* was made the dependent variable and *INN_Challenges, INNTECH_Use,* as well as the demographic characteristics (except for *No. of Employees* as this was seen to be a function of the dependent variable more so than the inverse) of SMEs were all made independent variables. From estimating the regression model on SPSS, the predictor (independent variables) and residual (dependent) error values were derived, where

the latter would be the focus for analysis once exported to excel. When the sum of the calculated residual error (RES_1) values across all observations equals to zero, then the mean error assumption is met, which was the case from the exported data as demonstrated on table 28.

Table 28: Sum of Mean Error

Item	BF_Access	PRE_1	RES_1
1	12	9,59	2,41
2	13	7,44	5,56
3	12	11,21	0,79
4	7	10,16	-3,16
5	15	8,86	6,14
6	5	10,23	-5,23
7	7	7,05	-0,05
8	10	10,26	-0,26
9	6	6,16	-0,16
10	7	8,49	-1,49
11	9	10,03	-1,03
12	8	8,55	-0,55
13	4	5,84	-1,84
14	5	6,73	-1,73
15	6	8,23	-2,23
16	10	6,59	3,41
17	6	6,75	-0,75
18	7	5,65	1,35
19	7	8,05	-1,05
20	11	9,53	1,47
21	3	8,29	-5,29
22	14	9,05	4,95
23	14	10,00	4,00
24	14	7,97	6,03
25	6	10,67	-4,67
26	4	7,34	-3,34
27	9	8,62	0,38
28	8	7,19	0,81
29	7	7,94	-0,94
30	8	7,13	0,87
31	7	7,70	-0,70
32	9	8,04	0,96
33	4	5,93	-1,93
34	4	4,62	-0,62
35	3	5,14	-2,14
Sum of mean error			**0,00**

4.7.3 Homoskedasticity

Homoskedasticity assumes that the variance of random error for all observations are constant and equal with increasing independent variables. The Breusch-Pagan test was used to determine whether there was homoskedasticity. The null hypothesis for the test states that there is homoskedasticity, while the alternative hypothesis assumes the opposite, that there is heteroskedasticity (Breusch & Pagan, 1979; Zeileis & Hothorn, 2002). Using SPSS to perform the analysis, the residual values were squared for standardisation and made the dependent variable that was regressed on by the independent variables. The ANOVA test was then subsequently run to test for the p-value, where if a p-value < 0.05, means the null hypothesis is rejected.

Table 29: ANOVA test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	631.857	5	126.371	.930	.476[b]
	Residual	3939.689	29	135.851		
	Total	4571.546	34			

a. Dependent Variable: SQR_RES

b. Predictors: (Constant), INNTECH_Use, INN_Challenges, Industry Classification, Age of Business, Average Annual Turnover

Seeing that the p-value returned is greater than 0.05, it is concluded that the null hypothesis cannot be rejected, meaning there is homoskedasticity and this assumption has been met.

4.7.4 Autocorrelation

Autocorrelation measures used to identify randomness in the data through analysing the relationship across all observations at different points. Although this analysis is only applicable to time-series data and the data used for this study being cross-sectional, it was still of interest to analyse how the data fared in this assumption test. The Durbin-Watson statistic was used to test for autocorrelation, where a value of 2 represented zero autocorrelation, less than 2 indicating positive autocorrelation and above 2 indicating negative autocorrelation.

Table 30: Autocorrelation test results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.491[a]	.241	.110	3.190	2.273

a. Predictors: (Constant), INNTECH_Use, INN_Challenges, Industry Classification, Age of Business, Average Annual Turnover

b. Dependent Variable: BF_Access

Table 30 shows that although the data seems to have slight negative autocorrelation, the Durbin Watson value is above but quite close to 2.

4.7.5 Multicollinearity

Multicollinearity refers to the relationship between independent variables, where a positive outcome of the test would be one where the correlation between two independent variables is not strong. A strong correlation is generally one that has a correlation coefficient that is greater than 0.7 (Mindrila & Balentyne, 2017). The Pearson correlation matrix was used to measure the correlations between the independent variables, and the results in table 31 showed that there are no strong inter-variable correlations. Furthermore, another statistical method to test for multicollinearity, called variance inflation factor (VIF) was used. A VIF below 5 implies there is moderate to zero correlation (at VIF = 1) between the variables, and above 5 means there is high correlation and essentially an issue of multicollinearity (Hayes, 2023). Table 32 shows that all VIF values fell well below the 5-mark, thus implying a very weak correlation between the independent variables. Both test results confidently conclude that there is no problem of multicollinearity between the independent variables.

Table 31: Independent variables correlation matrix

Correlations

		Industry Classification	Age of Business	Average Annual Turnover	INN_Challenges
Industry Classification	Pearson Correlation				
Age of Business	Pearson Correlation	-0,047			
Average Annual Turnover	Pearson Correlation	-0,268	.432		
INN_Challenges	Pearson Correlation	0,208	-0,204	-0,073	
INNTECH_Use	Pearson Correlation	0,191	0,216	0,252	0,173

Table 32: Variance Inflation Factor (VIF)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Industry Classification	.831	1.203
	Age of Business	.756	1.322
	Average Annual Turnover	.703	1.422
	INN_Challenges	.884	1.132
	INNTECH_Use	.827	1.209

a. Dependent Variable: BF_Access

4.8 Hypothesis Testing using Multiple Regression Analysis

4.8.1 Null Hypotheses Revision

Multiple regression was used to test the hypotheses. The three hypotheses were derived from a conceptual framework that posited that information asymmetry, innovation and technology all have an influence on the SME lending performance by commercial banks. In the absence of primary data from banks, the bank SME lending performance was measured through the SMEs' experiences regarding accessibility to bank funding. Innovation and technology advancement could unfortunately only be measured from the perspective of the SME organisations themselves, excluding the banks. With survey questions of the SMEs that measured the accessibility to the bank funding construct including experiences relating to ease of the banks' application process, perception on this can also imply the banking industry's innovation and technology advancement levels. Considering the challenges from working with limited data, the below original null hypotheses had to be carefully reviewed to achieve corresponding data analysis and logical interpretation:

- Null Hypothesis 1 ($H1_0$): digital technology adoption by commercial banks does not influence SME lending
- Null Hypothesis 2 ($H2_0$): digital technology adoption by commercial banks does not decrease information asymmetry

If banks are digitally and technologically inclined, one can assume that the way they accept information would be one that is compatible with its systems. In saying that, SMEs that are innovative and technologically inclined would have no challenges meeting the expectations of such banks, therefore where there is a positive relationship between innovation and technology adoption (*INNTECH_Use*) by SMEs, and accessibility to bank funding (*BF_Access*), it can be inferred that information asymmetry was addressed through

technological means on both parties and subsequently reduced. With this approach, both $H1_0$ and $H2_0$ are tested.

- Null Hypothesis 3 ($H3_0$): reduced information asymmetry does not increase commercial bank lending to SME

Two measures can be used to test this hypothesis. In addition to the relationship analysis performed for $H2_0$ where a relationship between innovation and technology adoption with accessibility to bank funding was implicit of an information asymmetry impact, a relationship analysis of innovation challenges against bank-funding access addresses the same issue. An SME that is seen to struggle with engaging in innovation activities (*INN_Challenges*) would be assumed to be more prone to having high information asymmetries and would most likely struggle to get access to bank funding (*BF_Access)*.

4.8.2 Regression Analysis

To conduct a regression analysis, the *BF_Access* variable was used as the dependent variable since it tested the accessibility to bank funding according to the SMEs' actual experiences, whilst *INN_Challenges* and *INNTECH_Use* variables were identified as the core independent variables (predictors) aiming to address the study's research objectives.

Table 33: Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.334[a]	.111	.056	3.287	2.174

a. Predictors: (Constant), INNTECH_Use, INN_Challenges

b. Dependent Variable: BF_Access

The model returned an R-square value of 0.111, which is interpreted as the two predictors, *INN_Challenges* and *INNTECH_Use* accounting for 11.1% of the variation in accessibility to bank funding (*BF_Access*). As this is a measurement of the goodness of fit of the model, this result indicates that the model is poor as Cooper (2014) states that for predictive accuracy, an R-square value greater than 0.8 (80%) is ideal.

Table 34: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	43.308	2	21.654	2.005	.151[b]
	Residual	345.664	32	10.802		
	Total	388.971	34			

a. Dependent Variable: BF_Access

b. Predictors: (Constant), INNTECH_Use, INN_Challenges

Table 35: Regression Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	6.573	3.684		1.784	.084	-.931	14.077		
	INN_Challenges	-.241	.339	-.120	-.709	.483	-.932	.450	.970	1.031
	INNTECH_Use	.236	.120	.333	1.967	.058	-.008	.479	.970	1.031

a. Dependent Variable: BF_Access

The ANOVA table (34) shows the F-statistic which tests whether there is a significant difference in a particular variable across different scales, where the null hypothesis states that there is no difference between groups. In this instance, the corresponding p-value (0.151) was greater than 0.05, which meant the result was statistically insignificant and the null hypothesis cannot be rejected as there was not enough evidence that supported that there was no difference between the scales.

Table 35 shows the regression coefficients of the model, where it can be interpreted that a one standard deviation increase in innovation challenges faced by SMEs, leads to a 12% decrease in its ability to access bank-funding ($H3_0$). The second independent variable shows a positive effect, where a one standard-deviation increase in the adoption of innovation and technology by SMEs, increase accessibility to bank funding by 33.3% ($H1_0$ and $H2_0$). These results are however statistically insignificant as both p-values are greater than 0.05, and therefore cannot reject the null hypothesis, and it can be concluded that there is no innovation and technology influence on the accessibility to bank funding by SMEs, as well as an effect noted that may suggest that information asymmetry challenges are addressed.

Table 36: Summary of Multiple Regression results on Hypotheses

H#	**Null Hypothesis**	**Result**
$H1_0$	Digital technology adoption by commercial banks does not influence SME lending	Cannot reject null hypothesis
$H2_0$	Digital technology adoption by commercial banks does not decrease information asymmetry	Cannot reject null hypothesis
$H3_0$	Reduced information asymmetry does not increase commercial bank lending to SME	Cannot reject null hypothesis

4.8.3 Correlation using Control Variables

Although all hypotheses were not supported (as the model failed to depict statistically significant relationships between the predictor variables and the dependent variables), additional analysis including control variables was of interest to establish whether there is opportunity for further exploration in future studies related to similar research.

Table 37 shows a correlation matrix which included demographic information of the SMEs against accessibility to bank funding, and two correlations are noteworthy. The first correlation that is significant is one that is between control variables, with a correlation coefficient of 0.432 and implies that the older the business is, the more turnover they make – this could also be true in the case where higher turnover drives resilience and longevity of SMEs. The second correlation consists of the dependent variable, accessibility to bank funding, and once again the age of the business. This correlation was noted to be statistically significant ($p<0.05$) at a correlation coefficient of 0.425, where SME age is seen to have a positive influence on accessibility to bank funding. The last correlation finding is rather interesting given one of the major challenges stifling SME growth is accessibility to bank funding – for this reason, it would make better sense to assume bank-funding accessibility as the independent variable and tenure (age of business) as the dependent variable. This finding suggests that accessibility to bank funding is critical to an SME's survival prospects, where funding can be seen to improve SME resilience through the different economic cycles.

Table 37: Control Variables Correlation Matrix

Correlations

		Industry Classification	Age of Business	Average Annual Turnover	BF_Access
Industry Classification	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	35			
Age of Business	Pearson Correlation	-.047	1		
	Sig. (2-tailed)	.789			
	N	35	35		
Average Annual Turnover	Pearson Correlation	-.268	.432**	1	
	Sig. (2-tailed)	.119	.010		
	N	35	35	35	
BF_Access	Pearson Correlation	-.064	.425*	.274	1
	Sig. (2-tailed)	.717	.011	.111	
	N	35	35	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.9 Banking industry lending behaviour with technology evolution

The SME credit exposure trend in South Africa, specifically from commercial banks, gives a sense of the activity regarding the supply effect, where growth implies not just economic activity and assistance needed by SMEs, but that banks are also coming to the party as a facilitator of that activity. Although regulatory guidelines and restrictions play a material role in inhibiting sufficient lending to SMEs by banks, Kammoun et al. (2019) argue that information asymmetry is an integral part of that resulting factor. In saying that, critical to understanding the credit exposure trend, overlaying information availability starts to close the gap in understanding the key drivers.

Figure 16 shows how lending to SMEs by South African banks has steadily grown over the years, throughout periods of downcycles (2008 global financial crisis and 2019/2020 Covid-19 pandemic), currently just over R700bn as of November 2023, from just around R400bn in 2008. The depth of credit information index, measuring information availability, also shows consistent growth and an upward trend using data points over the period 2005 – 2020. The depth of credit information index is reported at an annual figure; however, it is assumed to be

at constant level throughout a 12-month period for alignment purposes with credit exposure measurement. The trends suggest that with the evolution of technology, innovation that addresses information asymmetry is enabled, which in turn has made lending to the SMEs more possible for banks in South Africa.

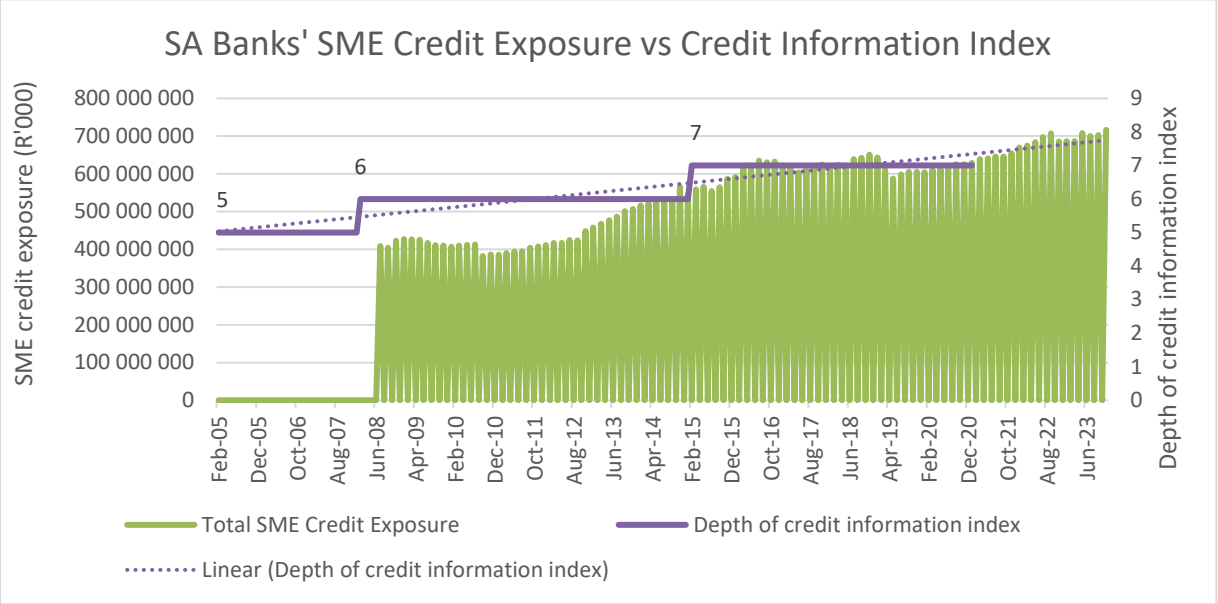

Figure 16: Bank Credit Exposure and Credit Information Index Trend Analysis

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

The study endeavoured to understand and establish the relationship between the role of digital technology and innovation towards progressive SME lending by commercial banks, where it managed to get SME participation through a structured survey questionnaire.

Participation reach spanned across South African borders, through the facilitation of incubation networks, social media platforms, peer networks and in-person contact. Access to finance has been one of the common barriers to sustainable growth of SMEs (Khoase et al., 2020; Langa & Govender, 2019; Manzoor et al., 2021; Msomi & Olarewaju, 2021; Rao et al., 2021), and the responses from the sampled SMEs in this study were consistent with that outlook. It was interesting to note that most SMEs did not avail of any bank funding to assist with their operations, suggesting that there still existed a sizeable portion of asymmetric information and a credit assessment approach in need of addressing, with relevance to this specific sector.

This chapter discusses the results of the research in relation to the literature that guided the research in Chapter 2.

5.2 Demographic profile of respondents

There were initially 136 SME participants in the study, of which only 102 were considered for analysis following the discovery that not all participants fully completed the survey. Respondents came from diverse backgrounds, sizes and industries. From the demographic information captured, the results were reflective of the population consisting of survivalists and emerging businesses, since although the spread of the turnovers and age of business categories were concentrated on the lower bands, there was still a decent number of those that were seemingly thriving.

Consistent with research that found that developing countries have a larger SME base due to the informal market that does not exist in developed countries (Cataldo et al., 2020; Mendi & Mudida, 2018), the targeted audience engaged for this study spanned thriving, high revenue-generating emerging businesses, to moderate growth mom-and-pop shops, to survivalist stalls at markets, to start-ups from incubation hubs. The results affirmed that the participants were reflective of the intended target population, as the diverse composition supported the makeup of SMEs as defined by the Department of Small Business Development (South African Government, 2022).

Currently contributing 55% to employment, South African SMEs are expected to be the biggest driver of job creation, comprising 90% of the labour market by 2030 (National Planning Commission, 2012). Responses from the surveyed SMEs depicted a pattern that suggested that accessibility to bank funding had a crucial role to play in the successful realisation of this expectation. SMEs that had access to bank funding had relatively more employees than those that were purely self-funded, mostly having fewer than five employees. Bank funding in this instance, showed to be necessary for businesses to scale up and have a meaningful contribution to the labour market.

A resounding statistic that corroborates the problem that is the lack of participation of SMEs in the formal financing market, is the fact that 66 (65%) of the 102 SMEs that fully participated in the survey were self-funding their businesses, of which 11 of those had access to partial funding from banks. With such insight, the success of the study could only rely on the data collected from a residual sample size of 35 participants who had had engagement with banks regarding obtaining bank funding and were best placed to provide quality feedback that ensured data integrity and reliability in addressing the study's research objectives. To no surprise, most of the respondents that had experience in the banks' credit application process belonged to industries that are capital intensive such as Manufacturing and Construction (Maverick, 2023).

Having had the opportunity to interact with some of the business owners on the ground, there was an anecdotal sense of frustration with banks, especially the survivalist stall owners at the markets, as they felt they did not have any support from these institutions - with which some relationships were long-standing. This pushed many of the business owners in the direction of Fintechs, specifically payments service providers where apart from the ability to facilitate transactions quicker and cheaper, the businesses could also secure loans which despite the exorbitant interest rates, the owners were comfortable with paying a premium for convenience and quick access – a Fintech borrowing phenomenon. Wang et al. (2021) and Buchak et al. (2018) also noted in their studies, and something, perceptually these business owners' own banks were failing them on. Contrary to Razak and Latif's (2021) findings that relationship as soft information, is indicative of the reliability of the business owner, the phenomenon seemed untrue for these unfortunate survivalists. It was apparent from these sentiments that a study of this nature, using a qualitative approach, would yield far richer insight, necessary to the unearthing of core challenges with SME lending by banks.

5.3 Discussion pertaining to Hypothesis 1

Hypothesis 1: *Digital technology adoption in commercial banks has a strong positive influence on SME lending.*

Using the accessibility to bank funding by SMEs through the promotion of technology and innovation within the organisations as a proxy, technology adoption in commercial banks is assumed to be consistent with the alleviation of the same accessibility challenges. Although statistically insignificant, SMEs sampled for this study showed a weak positive correlation between innovation and technology use, and accessibility to bank funding which implies a similar relationship behaviour between digital technology adoption in commercial banks and their ability to lend to SMEs.

The weak correlation noted is indicative of the gap that still exists to an effective role of digital technology towards progressive SME lending. As the commercial banking industry is strictly regulated, the analysis results are suggestive of regulatory obstacles stifling innovation and rapid technology adoption – a challenge, evidently is not a reality for Fintechs who are, in contrast, able to lend to this same source of customers (Anagnostopoulos, 2018). Notwithstanding the lending capabilities of Fintechs coupled with a glaring independence from financial assistance as implied by sampled businesses, emerging technology is evidently instrumental in these signs of a new way of banking (Elsaid, 2021; Navaretti et al., 2017).

Whilst digital technology appears to have minimal influence on SME lending, businesses show more resilience with assistance from commercial banks, thus edging the sector closer to making an impactful contribution to economic growth if gotten right (Mendi & Mudida, 2018). Digital technology alone is clearly not enough to drive accessibility to bank funding. However, further exploration of the underlying elements that could enhance its role to a stronger correlational effect, could prove to be extremely beneficial. This, coupled with a more intentional approach from commercial banks to support small businesses (Langa & Govender, 2019), should begin to gear the South African SME lending industry favourably to unlock its full potential.

Agreeing with engaged literature from Chapter 2, the adoption of technology from the SME-side assists in not only making them more easily funded, but also contributes to sustainability and growth (Das et al., 2020; Gareeb & Naicker, 2015; Rosavina et al., 2019; Viswanathan & Telukdarie, 2021) – suggested by the positive relationship it has with the age of the business as well as accessibility to finance. However, with an equal focus on the exploitation of technological capabilities from the perspective of the banks, funding ability can be strengthened. Commercial bank participation in a study of this nature was therefore crucial for closing this loop.

5.4 Discussion pertaining to Hypothesis 2

Hypothesis 2: *Information asymmetry in SME lending decreases with increased digital technology adoption by commercial banks*

As a measure to test adoption of technology in SMEs, the research instrument included questions relating to ways in which transactions are captured and stored, suggesting that a digitised approach implied adequate integration of technology into the business.

A correlation analysis showed that SMEs' likelihood of accessing bank funding increased with technology use, which suggested that having businesses structured in a manner that makes collecting data from them easy and compatible for assessment was a probable mitigant for banks. This, however, did not appear to make a material difference in opening bank funding for SMEs as most were still self-funded. With some stall owners whose transactions were visibly captured through merchant devices (implying transactional visibility in bank accounts) having shared frustrations of limited to no access to funding from their banks, in spite long-term relationship holdings, suggested that the challenges in the stimulation of this sector transcended hard and soft information requirements. Despite the SME-bank relationship being one of an exchange of hard and soft information regarding lending principles (Estrin et al., 2022), extreme caution practised by banks is apparent as the payments solution Fintechs were able to offer more to these businesses. It surely is also indicative of the role regulation plays in the imbalance of lending abilities across the different financial services providers, through which Wille et. al (2017) support this observation through their finding that non-banks have less stringent regulatory requirements compared to the current commercial banks, and thus positioned favourably to lend relatively more aggressively to small businesses.

Considering the age-distribution of engaged SMEs where most were under six years in operation and some being start-ups, there is high likelihood that there is limited hard information that can be used for robust credit assessment. Although Razak and Latif's (2021) paper postulates that this can be overcome by a reliance on relationship-oriented soft information, this however seems difficult to achieve as the SME businesses would not have established well entrenched relationships over a short period, sufficient to mitigate the absence of hard information. The study results agree with this view as a positive relationship was noted between age of business and accessibility to bank funding.

5.5 Discussion pertaining to Hypothesis 3

Hypothesis 3: *Reduced information asymmetry improves the risk profile of SMEs, which in turn increases commercial bank lending to the sector.*

From the research instruments, two constructs, namely innovation and technology use/adoption, and innovation challenges were used as proxies to determine the extent to

which information asymmetry existed, mainly assessed against interventions (or lack thereof) from the SME-side. The more technologically inclined businesses were, the higher the likelihood that information availability was promoted. On the other hand, SMEs that experienced challenges with engaging in innovation activities were seen as more susceptible to barriers to information availability, and thus exacerbated information asymmetry between themselves and banks from a lending relationship perspective. Some researchers (Berger & Udell, 2006; Mittal & Raman, 2022) find that financial institutions such as banks can advance funding of SMEs even through the adversity of asymmetric information by leaning on, amongst other things, relationship lending. The effects of this theory did not appear to resonate with this study's findings.

Although the regression analysis did not present statistically significant results, the relationships between the independent variables and accessibility to bank finance were clearly established. With innovation and technology use seen to be positively driving access to bank funding, the opposite was noted regarding the influence of innovation challenges on accessibility. Assuming that innovation challenges were indicative of information asymmetry, it is suggestive that relationship lending (soft information) was of lesser impact than hard information was to the promotion of SME lending by banks as businesses that struggled to engage in innovation activities seemingly could not secure any bank funding.

Whilst in this study's findings, the competition created by the presence of payments solution Fintechs did not make funding cheaper for SMEs, the technological interventions surely benefited the bank lending industry. Through the seamless capturing of transactions, information transparency in the market is elevated, which sets a firm basis for a data asset upon which banks can rely in place of conventional risk mitigants such as collateral, to lend more to the SME businesses (Yao & Song, 2021). This cements the views of multiple researchers, that Fintechs behave as a complementary solution to enhanced bank lending of SMEs (Manser Payne et al., 2021; Wang et al., 2021; Wójcik, 2020). With a lacklustre response by commercial banks, further stifled by regulatory requirements, through continuous participation in this sector, learnings gained and scalability, Fintechs could in the future be well-positioned to surpass their larger counterparts (commercial banks) in SME funding (Christensen et al., 2015) – a gap they have already identified and started exploiting.

Akerlof (1970) theorised that where there is a perceived information advantage of the seller (SME) over the buyer (bank), information asymmetry exists - which in turn reduces the price (increases cost of borrowing) of a product/service (debt) due to perceived low quality (high risk profile). Following on from that theory, what is essentially expected to end up happening in the context of SME lending, is that good quality SMEs exit the formal bank lending market

to alternative markets where they seek to get better interest rates. One thing that is certain from the analysis is that innovation and technology influenced accessibility to bank funding; however, the effects of such intervention on information asymmetry is inferred in line with literature, suggesting that there is limited access where information transparency is compromised. The ultimate impact of information asymmetry on the cost of borrowing can however not be definitively established as there could be more than one reason for a negative relationship between innovation challenges and accessibility to bank funding. Assuming information opacity (from innovation challenges) inhibits accessibility to bank funding, the underlying cause for seemingly constrained access could either be resulting from (i) a decline status in application, or (ii) stringent mitigating conditions from banks acting as deterrents; both of which consider the risk profile to the decision outcomes, however its impact on the cost of borrowing is unknown. Further research is required to better understand the underpinnings of this result.

Observing the interaction of SMEs with Fintechs and how they were inclined to take up the loans offered by them, did however suggest that Fasano and Cappa's (2022) finding that Fintech (technology) capabilities do not necessarily reduce information asymmetry, holds, as the high interest rates charged against the loans was indicative of compensation for an information-gap. This further highlighted the need for better synergies between banks and Fintechs as the device usage by SMEs ensured a rich data asset-holding by Fintech, which when merged with the banks' scalability and resources advantages, could provide these business customers with competitive interest rates for their funding requirements.

5.6 Conclusion

The research instrument was successful in its grouping of questions (items) into different constructs, as Factor Analysis testing agreed in its results once negative questions were reverse coded, where items of the same grouping statistically got categorised under the very same factors (constructs).

Although reliability tests and all regression assumptions of the sample data were met, with some statistically significant correlations noted between the predictor and dependent variables, the sample size restricted the regression analysis from establishing relationships between variables with statistical significance. The interpretation of the analysis results suggests that the notion that innovation and technology use helps address the information asymmetry challenges in SME lending by banks which in turn improves accessibility to funding, is not conclusively demonstrated.

With the inclination of digital technology and innovation seemingly not having a differentiating factor in the success of an SMEs' ability to access bank funding, age appears to play a

significant role. A correlation analysis between accessibility to bank funding and the control variables showed with statistical significance that the longer businesses are in operation the more likely they will be successful in obtaining bank funding, which in the context of the study, the reverse would be most applicable. This is an area beyond the scope of this study, worthwhile to explore whether one drives the other or whether there are underlying factors that make the relationship between the two exist.

As part of the initial questions, the research instrument sought to establish the various funding types that SMEs had tried to obtain, wherein the gained insight highlights the seemingly lacking confidence in the formal banking system in as far as SME lending is concerned. Most SMEs indicated that they did not even attempt to apply for bank funding as their failure to respond or the option that they tried with no success is suggestive of self-funding their businesses with no hope of obtaining bank funding. An alternative theory to this behaviour by SMEs, could be that they are debt-averse, especially if such funding is accessible under stringent conditions caused by a lack of information transparency or availability. In their study, Khoase et al. (2020) highlight the high cost of borrowing as one of the inhibiting factors of SME survival and growth; however, this did not seem to be the case where SMEs were noted to be quite comfortable borrowing from Fintechs at high interest rates for the convenience of quick and easy access.

CHAPTER 6. CONCLUSION & RECOMMENDATIONS

6.1 Introduction

This section concludes the research study in relation to the research objectives initially set out. Key findings are highlighted as well as areas identified as gaps in the bank financing of the SME sector. The chapter closes off with recommendations and suggestions for future studies pertaining to similar research topics based on the discoveries, successes, challenges experienced, and procedural insights gained from this study.

6.2 Conclusions of the study

An interest in this research area was stimulated by the steep ambition that is the demand of battling SMEs to contribute what seems unrealistically disproportional to job creation and GDP growth in South Africa. Given the headwinds of a developing country that is marred with increasing unemployment rates and extended stagnation in GDP, the study endeavoured to contribute to research on the use of digital technology and innovation elements as the base facilitators of accelerated commercial bank funding for the SME sector, which is an integral player in realising a progressive economy.

6.2.1 Conclusion pertaining to Research Objective 1

RO1: *To investigate the extent of use of digital technology by South African commercial banks to drive SME funding.*

Literature engaged with in Chapter 2 highlighted common restraints to sustainable growth of SME businesses, as related to lack of sufficient funding, where existing commercial banks have been identified as best placed to make the biggest impact. Whilst some research showed that information opacity between SMEs and traditional banks made it difficult to stimulate growth of this sector, other shared use cases of the leveraging of modern digital technology and innovation activities breeding a new financial intermediation approach that addressed a previously un-bankable and unattractive market. With the rise of Fintechs disrupting the retail market across the financial services industry and gradually evolving into a formidable player in the commercial banking segment, it is only a matter of time before they threaten the market share of the commercial banks in SME lending. This reality then became the basis of the study, where digital technology capabilities were identified as having the potential to improve SME lending. However, the extent of influence regarding the success of adoption against funding experiences, was a gap warranting closure. The study relied on two theories to guide its research, namely the Information Asymmetry Theory and the Disruptive Innovation Theory.

Statistical analysis confirmed a positive relationship between the use of innovation and technology in SMEs, against accessibility to bank funding. Using the technological posture of the SME businesses as a benchmark to the commercial banks' relative maturity, the results suggest that if the manner in which information is transferred between businesses and banks is technological, banks in South Africa use technology to support their SME funding prospects, but only as simply one of the many parts.

6.2.2 Conclusion pertaining to Research Objective 2

RO2: *To determine the technology-based factors that make funding an SME easier for South African commercial banks.*

Due to missing half the data, the role of the commercial bank cannot be definitively outlined in as far as the use of technology to drive SME lending is concerned. However, the benefits of technology adoption within the businesses appear to promote information transparency through digitised capturing and storing of transactional data. The payments solution Fintechs' ability to extend credit to SMEs based on the transactional flow insights, suggests that there is acceptable tolerance and reliability on the captured information to mitigate risk to a certain degree. The refinement and evolution of this phenomenon could, in the future, create opportunities that see commercial banks capitalising on this capability as a supplement to their journey towards improved SME lending.

With an increased emphasis in the way information is captured and stored, as well as the perception of technology as a tool to drive efficiency in the management of data in a business, the positive influence on accessibility from the study's results implies that the exchange of information between SMEs and commercial banks is at a mature stage where the role of digital technology as a facilitator cannot be underestimated.

6.2.3 Conclusion pertaining to Research Objective 3

RO3: *To identify the antecedents in the South African commercial banking industry that prohibit a progressive lending appetite towards SMEs, notwithstanding new technologies and systems implementation.*

Understanding that most SMEs are not adequately resourced to even start engaging in innovation activities and technology investments, the results showed that there were some businesses that still faced challenges with implementing technology and innovation activities, which statistical analysis showed impeded their accessibility to bank funding. On the contrary, SMEs that were technologically inclined appeared able to gain access to bank funding. Although the relationship of technology use to accessibility to bank funding is stronger than the effects of innovation challenges on the same dependent variable, statistical results from

the sampled businesses showed both to be weak relationships and not statistically significant. The relatively weaker relationship in innovation challenges, however, suggests that the role of relationship lending in driving accessibility to bank funding as some theory finds, may have been underestimated – and with the limitations in agile adaptation of commercial banks when compared to non-banks, an alternative solution may likely be one that steers reliance more towards soft information (relationships) for commercial banks.

Quick and easy, but expensive access to funding offered by Fintechs, points to regulatory gaps that still drive a wedge between these progressive lenders and traditional banks. Agreeing with most literature covering the topic, regulation remains a key focus area necessary to enable accelerated bank SME lending that is still within the ambit of responsible lending.

Although the need for SME funding is undoubtedly one of the interventions necessary for the sustainability and growth of the South African economy, it remains a mystery why most small businesses are self-funded, without even attempting to obtain bank funding. If anything, this emphasises the need for co-creation between SMEs and banks to build a reformed funding model specifically for SMEs, that considers the nature of such businesses, the industries they operate in, and macroeconomic factors contextualising current position and defining trajectory.

6.3 Recommendations

This study was motivated by the apparent need for radical intervention in the funding of SMEs and the gap that banks continue to fall short of filling. With most research focused on the corrective measures and changes that could give SMEs the edge that is necessary to improve their propensity for bank funding approval, while the consumer sector benefits most from the new financial intermediation entrants born from the advent of advanced technology (contrary to commercial customers), minimum focus was given to the traditional banks and exploring the exploitable elements of this modern technology in accelerating SME funding. Although originally posited, a research study anchored around the relationship between digital technology and commercial banks was not to be, as participation from banks proved impossible – it is no wonder this area of study seemingly remains uncharted territory.

Given the challenges and insights gained from this study, a few recommendations were noted:

- It is evident that there is apprehension by banks in participating in research studies because of fear of letting in on sensitive intellectual property that differentiates them from competitors, and less so because of fear of being misquoted or their stance being misconstrued as this study approach guaranteed anonymity and was quantitatively conducted with structured survey questions that did not solicit confidential information,

but still failed to secure any participation. There is a need for more partnership and cooperation between the academic institutions and corporates when it comes to collaboration in addressing research gaps that seek to assist the respective sectors.

- It is also noteworthy to confirm that one bank was willing to participate in the research study, however the conflict presented by the researcher being in the employ of a competitor bank became a worrisome obstacle. Having a researcher outside of the banking industry may improve the chances of success with getting bank participation.
- SME participation and response rate in a quantitative study can be underwhelmingly low, a challenge that certainly was the case with this study. Apart from creative methods of soliciting engagement and physically scouting participants, a lot more time (> 3 months) needs to be afforded for data collection of a study of this nature. The interesting discovery that most businesses did not borrow from banks, meant a population four times that which was reached needed to be targeted to meet the desired borrowing sample size for analysis as intended.
- A study of this nature is necessary to be all inclusive with SME participation being representative of all geographic locations and industries. However, this may dilute the results of the study. Having a more precise audience representing a specific sub-group of the SME sector and within a set geographic location (e.g., province) can yield more consistent and strongly correlated responses, as the constant environment evens the participation playing field and experiences. For example, a seasonally based agricultural business cannot be compared to a high volume, low input cost business in funding needs and technology benefits.
- Engaging in innovation and technology activities may seem daunting to some small business owners still just grappling with a hold on their finances. However, with the disintermediation problems with traditional banks and growing existence of Fintechs promoting accessibility, setting your business up for success has never been more easily attainable. One complementary relationship discovered was that of cheaper Fintech merchant devices whose transactions had to be settled in the business' transactional account held with a traditional bank which already ensures visibility of transactional activity and ability to lend into this base. The reality though was that these businesses failed to obtain funding from their own banks in spite of reduced information opacity, and at times opted for higher-cost loans from the Fintechs for quick and easy access. Working in isolation, Fintechs and commercial banks do not seem to ultimately grow the SME sector; leveraging each other's resources and capabilities, disruptive impact may, however, start to be realised.

- Although not described in this research study, owners are passionate about the journey and experiences with running their businesses and show an amplified interest in engaging by way of interview rather than a structured questionnaire. The sense was that it is restrictive and limits them from wholly articulating their perspective; hence a qualitative approach in such a study may achieve richer insights and do a lot more in efforts to get closer to the root-cause of stifled SME funding.

6.4 Suggestions for further research

While noting information asymmetry as a conspicuous obstacle to accessibility to bank funding, the study could not confidently support the existence of such an obstacle although inferences signalled that an existence of failed participation in digital technology and innovation activities led to bank funding exclusion. With most SMEs not borrowing from banks and instead borrowing from Fintechs at higher interest rates, it is worthwhile to further investigate (i) whether the cost-differential is a result of heightened information asymmetry, and (ii) what drives the businesses away from banks to Fintechs, whether it is a case of quick and easy access or it is underlying stringent requirements from banks being a deterrent, or both.

Accessibility to bank funding showed a significant positive correlation with the age of the business. It would be interesting to understand the factors influenced by bank funding in driving sustainability in a business, allowing owners to better optimise and have a more ambitious approach with the use of external funding in their businesses, which in turn would improve the current low survival rate of SMEs.

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APPENDIX A (Draft Letter requesting Permission)

University of the Witwatersrand,
Wits Business School, Master of Management in Digital Business
011 717 3544

[Insert addressee details]
[Contact person]
[Organisation name]
[Organisation address]

[Date]

Dear Sir/Madam,

Re: Permission to conduct research at [insert organization name].

My name is Philani Chili.

I have commercial banking experience of over 10 years at one of the big banks in South Africa, and currently expanding my experience within Deposits.
I am currently a part-time student, studying for a Masters degree in Digital Business at Wits Business School from the University of the Witwatersrand. I am seeking permission to do research at [insert organisation name].

I am conducting research on the role of technology in improving SME lending for commercial banks in South Africa, and as one of the traditional banks, your organization's input can create a balanced view that adds tremendous value to the success of the study. The title of my study is "The role of digital technology in SME funding by Commercial Banks in South Africa".

The research will entail collecting data from staff through participation in a structured online Questionnaire, carried out on a voluntary basis. Responses are strictly confidential and are anonymous. The targeted audience predominantly includes staff with credit and business exposure, including leadership. The respondents will be required to spend between 12 - 15 minutes on the questionnaire, which they will do outside of working hours.

Participants will be asked to give their written or verbal consent before the research begins.

The results will be communicated on the Research paper, which will be made publicly available through the Wits library.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study.

All research data will be safely stored in a password-protected file in cloud storage, and with the participants' consent, will be used for future studies related to this research.
I therefore request permission in writing to conduct my research at your organization. The permission letter should be on your organization's headed paper, signed and dated, and specifically referring to myself by name and the title of my study.

Please let me know if you require any further information. I look forward to your response as soon as is convenient.

Yours sincerely,

Philani Chili

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APPENDIX B (Questionnaire 1)

Company identification	Drop-down (example)
Years of trading	3 - 6 years
Industry classification	Manufacturing
Average annual gross revenue	R5m - R10m
How many people does your business employ?	5 - 20

Funding (Borrowing)

		A		Yes, successfully obtained some funding of this type	Tried, but not successfully	No	B		Yes	No	C		Yes	No
F1	Before (pre-2020) the Covid-19 pandemic, did your company try to obtain the following types of funding?	Traditional Bank Finance (e.g., finance from the big 5 five banks- Absa, FNB, Nedbank, Standard Bank, and Capitec)	1	☐	☐	☐	In the following instances where your business obtained funding, did it receive full funding? (i.e., finance received matches what was applied for)	1	☐	☐	Was collateral requested to be provided? (e.g., surety, debtors book, property, etc.)	1	☐	☐
		Equity Finance (e.g., finance provided in exchange for a share in the ownership of the company)	2	☐	☐	☐		2	☐	☐		2	☐	☐
		Alternative Finance (e.g., finance from Fintech financial service providers such as digital banks or digital micro-lenders that the company must repay)	3	☐	☐	☐		3	☐	☐		3	☐	☐
		Self-funded: Did not obtain any funding	4	☐	☐	☐								

	Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree; 6 = Strongly Agree Please indicate your level of agreement with the following statements regarding your experience with accessing credit for your business	1	2	3	4	5	6
F2	I find accessing financing from banks quick and easy	☐	☐	☐	☐	☐	☐
F3	I find bank financing too expensive	☐	☐	☐	☐	☐	☐
F4	The credit application process with banks is seamless	☐	☐	☐	☐	☐	☐
F5	I find the credit application process with banks too manual	☐	☐	☐	☐	☐	☐
F6	I sometimes need to look for financing from alternative sources to my bank	☐	☐	☐	☐	☐	☐
F7	It is easier to get finance from Fintech lenders than traditional banks	☐	☐	☐	☐	☐	☐

SME Innovation & Technology

	Innovation	Degree of importance		Not a constraint 1	Low 2	Medium 3	High 4
SIT1	How important have the following factors been in hampering your business' decision to start or execute innovation activities?	Lack of internal finance for innovation	A	☐	☐	☐	☐
		Lack of credit or private equity	B	☐	☐	☐	☐
		Costs too high	C	☐	☐	☐	☐
		Different priorities in your business?	D	☐	☐	☐	☐

	Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree; 6 = Strongly Agree Please indicate your level of agreement with the following statements regarding innovation and technology use in your business	1	2	3	4	5	6
SIT2	My business relies on innovation and technology to create efficiencies	☐	☐	☐	☐	☐	☐
SIT3	My business uses technological means to capture and store transactions	☐	☐	☐	☐	☐	☐
SIT4	My business still uses manual capturing and storage for its transactions	☐	☐	☐	☐	☐	☐
SIT5	It is difficult to integrate technology into my type of business	☐	☐	☐	☐	☐	☐

APPENDIX C (Questionnaire 2)

Respondent Information	Drop down (example)
Years experience in business banking	10 - 15 years
Current role classification	Credit Leaderdship
Years experience in current role	3 - 6 years

Information Asymmetry

	Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree; 6 = Strongly Agree	1	2	3	4	5	6
IA1	Financial information is critically important when lending to SMEs (e.g., financial statements)	☐	☐	☐	☐	☐	☐
IA2	Having a long-standing relationship with a bank makes an SME applicant more desirable to lend to	☐	☐	☐	☐	☐	☐
IA3	A proven track record is a good proxy for low-risk exposure	☐	☐	☐	☐	☐	☐
IA4	It is important that SMEs of all types have at least 1-year proven track record to be considered for financing	☐	☐	☐	☐	☐	☐
IA5	A relationship with a small business matters more than documented information in lending	☐	☐	☐	☐	☐	☐
IA6	Alternative data (contrary to financial statements and trading history) such as industry trends and intellectual property (IP) value is sufficient consideration for start-up financing	☐	☐	☐	☐	☐	☐
IA7	Fintech partnerships help close the information-gap between commercial banks and SMEs	☐	☐	☐	☐	☐	☐
IA8	Information is most important for business credit decisions to participate in markets vulnerable to economic shocks (good or bad)	☐	☐	☐	☐	☐	☐
IA9	Information built from a relationship with the SME owner is most important for credit lending decisions	☐	☐	☐	☐	☐	☐
IA10	Affordability information is most important for credit lending decisions	☐	☐	☐	☐	☐	☐

Innovation & Technology

IT1.1	Which of the following technology capabilities facilitate credit decisioning in your bank?	Credit Scoring system	☐
			☐
		Application Programming Interfaces (APIs) (software that allows connection between computer programs for exchange of data and services)	☐
		Digitised information-processing (capturing information such as financial data, transforming to a standardised and readable format, and process for meaningful use and decision-making)	☐
		Robotic Process Automation (RPA) (automated credit proposal process, i.e., digial application form, data pre-population, digital contracting etc.)	☐

		High	Medium	Low	Insignificant
	Degree of importance	3	2	1	0
IT1.2	In your opinion, how significant is/are the identified technology capability/ies in influencing credit lending?	☐	☐	☐	☐

IT2	From your own understanding of fourth industrial revolution (4IR) technologies, which one of the following technologies can improve SME lending for banks?	Big Data	☐
		Cloud computing	☐
		Artificial Intelligence	☐
		Blockchain	☐
		Peer-to-peer lending	☐
		This lending market is too nuanced for technology to make a meaningful impact	☐
		I am not familiar with 4IR technology	☐
IT3	In your opinion, which one of the five performance objectives would technology add the most value in traditional bank's SME lending?	Speed (fast decisions and overall TATs)	☐
		Quality (increased exposure with minimal risk - mutual benefit between customer and bank)	☐
		Cost (improve accuracy and reduce impairments)	☐
		Dependability (enable bank to provide sufficient financial support in alignment with organisational promise and commitment to facilitate growth of the economy)	☐
		Flexibility (bank's agility and ability to adapt to socio-economic shocks and changing customer needs)	☐

	Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree; 6 = Strongly Agree	1	2	3	4	5	6
IT4	Innovation is integral to the success of lending in business banking	☐	☐	☐	☐	☐	☐
IT5	A solution-based approach should supercede standard frameworks when facilitating financing for SMEs	☐	☐	☐	☐	☐	☐
IT6	Fintechs threaten the SME lending opportunity market for traditional banks	☐	☐	☐	☐	☐	☐
IT7	Fintechs are an integral enabler in the improvement of bank SME lending	☐	☐	☐	☐	☐	☐
IT8	Smaller businesses are more likely to be assessed digitally than larger businesses	☐	☐	☐	☐	☐	☐
IT9	Innovation and Technology is most important for business credit decisions to participate in markets vulnerable to economic shocks (good or bad)	☐	☐	☐	☐	☐	☐

		Yes	No
IT10	Binary feedback Does your organisation still have paper-based credit applications?	☐	☐

APPENDIX D (SME Participant Information Sheet 1)

Dear business owner,

My name is Philani Chili, a Masters student in Digital Business at the University of the Witwatersrand, Johannesburg and I am under the supervision of Dr. Manessah Alagbaoso. I am conducting a research study on the extent to which digital technology assists commercial banks in facilitating improved financing for Small and Medium-sized Enterprises (SMEs) in South Africa. The study title is 'The role of digital technology in SME funding by Commercial Banks in South Africa'.

According to the National Development Plan, approximately 90% contribution to job creation and between 35% - 50% contribution to the GDP is expected from SMEs in South Africa by 2030. Such high expectations cannot be met without support from commercial banks, who are identified as a primary source of funding for SMEs. Exploring ways in which SMEs can more easily access financing in a digital economy is therefore critical for economic progression.

Your perspective is important in understanding the challenges that SMEs face with borrowing from commercial banks and I would really appreciate it if you could participate in a questionnaire that will enrich the insights of this research study. The questionnaire should take between 3 – 5 minutes.

Please note that your responses will be treated as anonymous and will only be used for and over the course of the research study, analysed at an aggregated level. Only the researcher will have access to the data. With your permission, other researchers may use the data collected from this research study, however your name and personal information will be concealed.

Kindly note that the study is voluntary, and participation should take place for as long as you feel comfortable. There are no direct benefits in partaking in the study and you stand not to lose any

services, benefits or rights you would normally have if you decided not to participate. You will not be paid for being in this research study.

At the end of this research study, a report on the study will be written and made available on the university library website. Should you wish to receive a summary of this report, I will gladly share it with you.

If you have any questions during or after this research study, please feel free to contact me on 363681@students.wits.ac.za. You can also contact my supervisor on Obinali.Alagbaoso@wits.ac.za or Manessah.Alagbaoso@standardbank.co.za.

Please indicate your consent below to start the survey by clicking "Yes, I consent to partake in the study", alternatively click "No, I do not consent" to opt out of the study.

- ○ Yes, I consent to partake in the study
- ○ No, I do not consent

APPENDIX E (Ethics Approval Notification)

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School

Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/DB363681/641

This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below)

This certificate is only valid if accompanied by formal permission from the relevant stakeholder(s).

Project title	The role of digital technology in SME funding by commercial banks in South Africa
Investigator / Researcher	Mr Philani Chili
Nature of Project	MM (Digital Business)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed anonymity and confidentiality.
Issue Date of Certificate	25 08 2023
Expiry date	Date of submission of the project / research report
Chairperson	Dr Pius Oba ☎ +27 11 717 3976 +27 82 733 6587 pius.oba@wits.ac.za

Declaration by Researcher

One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

Signature

15/09/2023
Date:

APPENDIX F (Consistency Matrix)

Table 38: Consistency Matrix

RO #	Research Objective	Hyp #	Hypothesis	Data collection detail	Data analysis method
1	To investigate the extent of use of digital technology by South African commercial banks to drive SME funding	1	Digital technology adoption in commercial banks positively influences SME lending	Questionnaire 2: (F3_R, F5_R, and F6_R) & (SIT2, SIT3, SIT4_R, and SIT5_R)	Multiple regression analysis
2	To determine the technology-based factors that make funding an SME easier for South African commercial banks	2	Information asymmetry in SME lending decreases with increased digital technology adoption by commercial banks	Questionnaire 2: (F3_R, F5_R, and F6_R) & (SIT2, SIT3, SIT4_R, and SIT5_R)	Multiple regression analysis
3	To identify the antecedents in the South African commercial banking industry that prohibit a progressive lending appetite towards SMEs, notwithstanding new technologies and systems implementation	3	Reduced information asymmetry improves the risk profile of SMEs, which in turn increases commercial bank lending to the sector	Questionnaire 2: (F3_R, F5_R, and F6_R) & (SIT2, SIT3, SIT4_R, and SIT5_R) & (SIT1A, SIT1B, and SIT1C)	Multiple regression analysis