

Title

The effects of coronavirus on SMEs business performance, technology adaptation,
financial innovation, and sustainability

By

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**A dissertation turned in to the University of the Witwatersrand's School of
Business Sciences (SBS) to satisfy the requirements for the Master of
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ABSTRACT

Businesses have been severely impacted by the COVID-19 pandemic, which has resulted in significant economic hardship. An analysis of COVID-19's impact on Small Medium Sized enterprises (SMEs) shows that these businesses' and their employees' financial outcomes are probably going to get worse before getting better. The main issue is that small and medium-sized business owners have restricted access to capital and innovative strategies, which has made it challenging for them to deal with the tight constraints. As a result, many SMEs have had to adopt innovative financial and technological strategies to promote sustainability and prevent closure (Puddister & Small, 2020). This study examines the impact on business performance, technology adaptation, financial innovation, sustainability, and lockdown restrictions of SMEs during the pandemic. An online questionnaire with 30 closed-ended questions was administered to entrepreneurs in the retail sector across Gauteng. The following inquiries are addressed in the study: What impact has the coronavirus had on SMEs' ability to do business? How has technology adoption improved small and medium-sized enterprises' performance during the coronavirus lockdowns? Is there a chance that financial innovation may sustain SMEs throughout the pandemic? Has the coronavirus epidemic affected SMEs' ability to survive? Using non-parametric tests, the researcher examined the correlations between the independent and dependent variables for each of the four hypotheses using IBM SPSS. The associations between the variables were examined using inferential statistics such as Spearman's rho correlation function, multinomial logistic regression, generalized linear model, and ordinal linear regression. All four of the hypothesis' correlations were determined to be significant. This study suggests that fostering financial inclusion, promoting technology adoption through training and grants, and encouraging innovative financial approaches can empower SMEs to navigate pandemic challenges and build resilience. Proactive policy interventions and support systems tailored to SMEs are crucial to mitigating the pandemic's economic consequences and promoting long-term sustainability.

Keywords: SMEs, COVID-19, technology adaptation, business performance, financial innovation, sustainability, lockdown restrictions, economic consequences, retail sector, pandemic, Gauteng, South Africa.

DECLARATION

This dissertation, except for the material mentioned in the references and acknowledgements, is the original work of myself, Benjamin Kolobe. It is presented to fulfil the criteria for the University of the Witwatersrand, Johannesburg, Master of Commerce (Research) in Business Sciences/Management degree. It has never been turned in for a test or degree at this university or any other.



Signed at Pretoria

On the 31st day of January 2024

DEDICATION

My mother, who has always been a source of warmth, encouragement, and inspiration for me, is the recipient of my dissertation. Your unwavering encouragement, understanding, and patience have been the cornerstone of my journey towards academic and personal success.

This dissertation is also dedicated to my future self. In the face of hardship and uncertainty, I hope that my work will act as a continual reminder of my ability, bravery, and persistence. And may it encourage and enable me to keep developing, learning, and making significant contributions to society.

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"Education is the most powerful weapon which you can use to change the world"

- Nelson Mandela.

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ACRONYMS AND ABBREVIATIONS

Abbreviations	Definition
ATM	Automatic Teller Machine
BPM	Business Performance Measurement
COVID-19	Coronavirus disease of 2019
DV	Dependant Variable
ESG	Environmental, Social, and Governance issues
GLM	Generalized Linear Model
IT	Information Technology
IV	Independent Variable
OECD	Organisation for Economic Co-operation and Development
OLR	Ordinal Linear Regression
POPI	Protection of Personal Information Act
ROI	Return On Investment
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SAS	Statistical Analysis System
SMEs	Small and Medium-sized Enterprises
SPSS	Statistical Package for the Social Sciences
TIPS	Trade and Industry Policy Strategies
TOE	Technology-Organisation-Environment Framework

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CHAPTER 1. INTRODUCTION

This research study's introduction provides a thorough summary of the research problem, explaining the subject, goal, and importance of carrying out this project. Furthermore, the problem statement is succinctly articulated to furnish contextual information on the imperative nature of completing this project in the current setting. The extant literature aids this chapter by furnishing the researcher with a robust framework upon which to build this inquiry.

1.1 Purpose of the study

The aim of this research is to present an in-depth evaluation of the organisational resources of Small, Medium Sized Enterprises (SMEs), including financial innovation, sustainability, technological adaptation, and business performance, during the COVID-19 pandemic. Additionally, this research aims to shed light on the impact of lockdown restrictions on SMEs during this crisis.

The global outbreak of the coronavirus has precipitated a pervasive economic crisis, prompting numerous nations to impose stringent measures such as "lockdowns" to contain the virus's rapid transmission. This study provides a comprehensive investigation into the challenges faced by numerous small firms in sustaining their operations during difficult economic times. The research highlights the lack of industry-specific skills, financial innovation, business performance, and adaptive technology as key factors contributing to the inability of small firms to remain viable under economic constraints (Beglaryan & Shakhmuradyan, 2020). The extant literature suggests that Small and Medium Sized business, SMEs are facing significant challenges in achieving sustainability, and the COVID-19 pandemic has further exacerbated this issue. Consequently, the sustainability of SMEs in the aftermath of the pandemic is at risk. However, as access to financial services has improved SMEs' chances and development worldwide, financial innovation and technological adaption have proven to provide a considerable beneficial impact on SMEs (Pu et al., 2021). This research adds to the body of literature by examining an alternative method—that is, hearing from entrepreneurs operating in Gauteng, South Africa's SMEs retail sector.

1.2 Context of the study

Small and Medium-sized Enterprises (SMEs) make up more than 98% of all businesses in South Africa. They also employ between 50 and 60 percent of the workforce overall and create 25 percent of new jobs in the private sector (Kalidas et al., 2020). Based on the contributions SMEs contribute to the South African economy, the researcher has decided to highlight how COVID-19 is affecting SMEs in the retail sector. There is no doubting that SMEs are a significant economic engine, even though their GDP (Gross Domestic Product) contribution to South Africa is lower than that of other areas (39% vs. 57% throughout the European Union “EU” (Kalidas et al., 2020)

Figure 1: SMEs vital importance in the South African economy

SMEs are a vital component of economies, creating jobs and enabling inclusive growth				
	 Majority of businesses	 Create private sector jobs	 Meaningful share of the GDP	 Enable inclusive growth
EU	99.8%	68%	57%	30%
G2	99%	65%	46%	25%
SA	98.5%	25.8%	39%	38%
	SMEs' share of total no. of businesses	SMEs' share of private sector workforce	SMEs' share of national GDP	SMEs owned by women

Source: Eurostat, Individual SME Authorities, Institute of Regional & Global Studies; European Commission - SME Performance Review (2015-16), IMF GDP Rankings (2015); Annual report on European SMEs; Small Business Institute South Africa

(Kalidas et al., 2020)

Before the COVID-19 crisis, small companies across the country were already facing significant issues (Kalidas et al., 2020). For this reason, the resource-based theory of entrepreneurship has been selected by the researcher as the theoretical framework for the investigation of retail SMEs' resources both during and after COVID-19.

Many SMEs have already seen a sharp decline in their market (Kalidas et al., 2020). Over 80% of respondents to a McKinsey Consumer Pulse Survey performed at the end of March 2020 said they would like to cut down on their general retail spending, and over 70% said they would like to cut back on their travel and transportation costs (Kalidas et al., 2020). Thus, aiding the researcher to undertake a study in the retail sector. This gives the researcher context as to how the retail industry was affected by

COVID-19 (Kalidas et al., 2020). With many people opting to reduce their retail spending, this will only lead to the retail industry seeing a decline in sales. Among the sectors most adversely affected are the services sector (including private accounting and legal firms), retail, tourism, and leisure (Kalidas et al., 2020).

The present study is contextualized by the resource-based theory of entrepreneurship, which emphasizes the unique personal resources that entrepreneurs possess, which facilitate the identification of novel opportunities and the acquisition of resources for entrepreneurial ventures (Alvarez & Busenitz, 2001). A solid basis for comprehending the technological adaptability, business performance, financial innovation, and sustainability of retail SMEs both during and after the COVID-19 pandemic is provided by the resource-based theory of entrepreneurship (Amolo & Migiro, 2014). The management problem that presents itself is that some entrepreneurs in the retail SMEs do not apply the resource-based theory in their businesses which has unsurprisingly led to SMEs' income and earnings drastically declining because of business disruptions (Kalidas et al., 2020). Likewise, business trust has declined (Kalidas et al., 2020). According to a McKinsey poll back in 2020 more than 30 percent SMEs expected a decline in revenue of between five and fifty percent which gives the researcher an indication of the profitability and sustainability trends of the SMEs retail industry (Kalidas et al., 2020).

The SMEs' establishments will host the research investigations for this study. The target audience for this research study will be SMEs in Gauteng, South Africa's retail sector. With a focus on business performance, technology adoption, financial innovation, and the sustainability of SMEs, the main goal of this research study was to gather the perspectives of SMEs entrepreneurs regarding the various factors that facilitate the impact of the coronavirus on SMEs. This research also highlights the impact of lockdown regulations on the long-term viability of small and medium-sized enterprises. In addition to trying to make a difference, the researcher hopes to provide entrepreneurs—especially those in the SMEs sector—with the innovative skills and pertinent market knowledge they need to enable their businesses continue both during and after the outbreak.

This dissertation looks at how the coronavirus affects SMEs in Gauteng's retail sector in terms of their business performance. The research specifically investigates SMEs'

financial innovation and sustainability practices, as well as how successfully they have adjusted to the pandemic's effects on technology.

The study employs a quantitative research design with a sample size of retail SMEs operating in Gauteng. A survey questionnaire was distributed utilised and distributed online to gather data. The survey explores key performance indicators, including revenue trends, profitability, and cash flow. It also examines the technology adaptation, financial innovation, and sustainability practices of the SMEs. Regression analysis and descriptive statistics are used in the study to analyse the data and make inferences on how the coronavirus affects SMEs in Gauteng's retail industry.

The study's conclusions will be very beneficial to anyone involved in the retail sector, such as investors, legislators, and owners of SMEs. The findings shed light on the actions that SMEs might take to lessen the pandemic's consequences. The results can also be used by policymakers to create measures that encourage the expansion of SMEs in the retail industry, especially during recessionary periods.

All things considered; this study adds to the body of information already available about the effects of coronavirus on SMEs in Gauteng's retail sector. It is envisaged that the study's conclusions will guide the creation of plans that will enable SMEs to get through the current crisis and put themselves in a successful long-term position.

1.3 Research questions

1. To what extent has the business performance of SMEs been affected by the coronavirus pandemic, given the constraint that Covid-19 occurred during a specific timeframe?
2. How did the adaptation of technology enhance the performance of SMEs during the coronavirus lockdowns?
3. Will financial innovation be sufficient to sustain SMEs throughout the pandemic?
4. Have SMEs remained sustainable in the climate of the coronavirus pandemic?

1.4 Aim of the study

The primary objective of this study is to conduct a thorough assessment of the effects of the COVID-19 pandemic on the business performance of Small and Medium Enterprises (SMEs) within a specified period. It specifically emphasizes the significance of financial innovation in determining the survival and long-term viability of SMEs during this global crisis. Furthermore, the study seeks to investigate the impact of newly adopted technologies on the performance of SMEs and evaluate the overall sustainability of these enterprises in overcoming the challenges presented by the coronavirus pandemic, particularly in relation to lockdown restrictions and economic disruptions.

1.5 Research objectives

1.5.1 *Primary objectives*

1. To assess the impact of the coronavirus pandemic on the business performance of SMEs within a specific timeframe.
2. To find out if SMEs can survive the global crisis with financial innovation.

1.5.2 *Secondary objectives*

1. To look at how much the recently adopted technology affected SMEs' performance during the coronavirus lockdowns.
2. To investigate the sustainability of SMEs during the coronavirus pandemic.

1.6 Problem statement

Economic limitations brought forth by the continuing COVID-19 may have had a detrimental effect on Small and Medium-sized Enterprise, SMEs worldwide (Beglaryan & Shakhmuradyan, 2020). To comprehend the problem that our ignorance of these implications brings, research may be done. This will aid in the production of scientific data that will assist SMEs in making future for pandemics of this kind and guaranteeing the survival of their enterprises in the wake of the present pandemic.

The problem emerges when company owners in the small and medium-sized enterprise (SME) sector are compelled to modify their current operating models to adapt new technological techniques to keep their businesses running despite the enforced lockdown restrictions, improve their business performance, and employ innovative financial strategies to keep their businesses afloat during the pandemic. The issue of adapting to new technologies affects small businesses negatively as much as big corporations. Many small and medium-sized enterprises (SMEs) were compelled to improve their current business operating models to adapt to the world of the fourth industrial revolution. During the great lockdown, they did this by implementing services like Zoom meetings, Microsoft team meetings, and other tools that allowed them to work from home (Webster, 2020; Akpan, Soopramanien, et al., 2020). In an unpredictable global economic environment, SMEs are nonetheless able to sustain their operations through the adaptation of these technology instruments.

To advocate sustainability and prevent complete closure, many small and medium-sized businesses have been forced to adopt innovative financial technological techniques and new business strategies due to the limited innovation techniques that entrepreneurs in the SMEs sector have when it comes to financial resources (Puddister & Small, 2020). The challenge is that government help is typically required to embrace the financial innovation needed to keep SMEs viable during a pandemic, but this is not always possible in many economies throughout the world.

Another problem that presents itself in the study is that finding crucial data such as financial records on SMEs can be difficult, which restricts the scope of the sustainability problem (Pu et al., 2021). Sustainability becomes an issue in SMEs as it not really understood by many entrepreneurs in the sector. Sustainability in SMEs is an issue as it is aided by various technology adaptation and business performance during the coronavirus (Pu et al., 2021). Resolving the issue of sustainability will allow many SMEs to enhance their resources which in return will boost their sustainability.

If the research problem for the research project is solved, the study will shed light on the emergence of new technology adaptation techniques, the enhancement of SMEs' business performance, and the improvement of the financial innovation SMEs adopt during and after the pandemic, all while focusing on the sustainability of SMEs. More study on how the new coronavirus outbreak is still affecting the entrepreneurs in the

SMEs sector will be conducted after this research problem is resolved. Our understanding of how to promote young entrepreneurship is becoming more thorough as more research is done. In addition to introducing several elements that investigate maintaining SMEs' sustainability in the future, the research will assist in preparing SMEs for life after the pandemic. But if this research issue is not solved, many SMEs worldwide—especially those in developing nations—will see a downturn in their business models as they won't have the technology capability and knowledgeable management required to handle such pandemics in the future.

Through this study, the researcher hopes to find out whether SMEs can survive and thrive by adjusting their technological methods of operation. Additionally, the researcher wants to know if the perceptions of SMEs' entrepreneurs regarding the various factors that the coronavirus presents to affect SMEs' financial innovation, sustainability, and business performance are favourable or unfavourable to the researcher's overall goal of helping retail SMEs grow their businesses. The results will enable the researcher to draw conclusions on how an entrepreneur's ability to endure the COVID-19 pandemic is influenced by firm success, sustainability, business performance, financial innovation, and technology adaptation.

1.7 Significance of the study

The goal of this study is to add to the body of knowledge already available about how the coronavirus disease of 2019 pandemic affects Small and Medium-sized Enterprises, SMEs in global economies. The study aims to contribute to the business performance of SMEs by enhancing different business strategies that exist in SMEs to meet customer demands and adapt new technological advancements. Financial innovation will be improved by introducing E-commerce, such as mobile banking and corporate adaptability in retail SMEs & overall accessibility to financial services also helps boost financial innovation in SMEs. The ability to compile financial statements, manage debt and market knowledge on how lending companies operate are some of the contributing factors to the financial innovation of retail SMEs in this study. The use of digital artifacts as well as the abilities to adopt organisational digital models will have a huge contribution in terms of the technology adaptation of SMEs. The introduction

of the use of digital technology systems, change of market coverage, and use of digital supply chain will help contribute to the sustainability of SMEs.

The resource-based theory of entrepreneurship, which addresses performance differences among organisations, provides the foundation for this research study (Conner & Prahalad, 1996). This theory was used in the research because it provides SMEs' organisational resources with a solid foundation (Amolo & Migiro, 2014). Business performance, technological adaptability, financial innovation, and sustainability are some of the organisational resources that the researcher is researching and contributing to. Since this study informs entrepreneurs about certain resources required for enterprises to succeed, the researcher has decided to expand on it.

This research study made use of a cross-sectional survey across Gauteng, South Africa which is the hub of SMEs in the country. As a result, the research is probably going to offer detailed insights into how coronavirus on SMEs business performance, technology adaptation, financial innovation, and sustainability. See table below.

Table 1: Summary of possible benefits from the research

Stakeholders	Possible benefits from the research
The South African economy	The heart of South Africa's industry is its SMEs. There can never be enough scholarly study on SMEs because they are the main economic drivers in South Africa. For businesses and entrepreneurs to be well-prepared for upcoming pandemics and to reinforce their resources, this research seeks to share knowledge on SMEs from the viewpoint of the entire world during a pandemic. With SMEs being prepared for such pandemics, the South African economy can continue to rely on them.
Entrepreneurs in the informal sector	With the research study being done in Gauteng, many SMEs in the informal retail sector will find this dissertation significant as it highlights different business strategies and mechanisms one can adopt to survive outbreaks. Many informal SMEs can use the same strategies to improve their organisational

	resources and consider going the formal route depending on their capabilities as guided by this study.
Industry Associations	Industry associations that advocate for the concerns and welfare SMEs can also serve as significant stakeholders in this research endeavour. These associations frequently offer guidance and assistance to SMEs, in addition to engaging in advocacy efforts with governmental bodies on their behalf.
Students in universities	This research study provided in-depth information on various ideas and organisational resources that SMEs need to improve to be viable, which will greatly benefit university students who are interested in pursuing entrepreneurship.

1.8 Delimitations of the study

The study investigated on the variables that make up the resources of an organisation. Studies have revealed that the coronavirus's pandemic lockdown limitations have seriously hampered corporate operations (Ipsos, 2020). Businesses are seeking to create new business models by implementing new technology in response to the current surge to prevent a complete economic collapse. (Ting et al., 2020). Additionally innovative finance has shown to be a great resource for Small and Medium-sized Enterprises (SMEs) to adopt during the pandemic to be sustainable during and post the pandemic (Pu et al., 2021).

In this research study, pertinent constructs from the body of scientific literature were covered. However, this section of the study will emphasise and talk about some of the structures and elements that were left out for a variety of reasons:

- Government support: During the pandemic, it became clear that government assistance came at a cost to the viability of SMEs. But eventually, government support will be highly appreciated for the expansion of SMEs worldwide (Pu et al., 2021). Since many SMEs in South Africa did not receive government support

during the pandemic, the researcher has excluded the variable as a mediating variable from a study by Pu et al. (2021) from this study. Additionally, it would have become inconsequential to investigate on this construct because the results would have likely been the same for retail SMEs throughout Gauteng.

- Psychological effects on entrepreneurs- One cannot rule out the consequences that the Coronavirus disease of 2019 (COVID-19) related closure of numerous fledgling enterprises may have had on the affected entrepreneurs' willingness to restart their businesses. This component was purposefully left out of the research study by the researcher since many respondents could have felt awkward disclosing their own experiences. Additionally, the researcher did not wish to cause any discomfort to the individuals while gathering data.
- Consumer behaviour during COVID-19- The way people consume things has changed significantly over the world. For example, the demand for cleaning products has increased, and more people are learning new skills like baking and cooking (Donthu & Gustafsson, 2020). As a result, retail SMEs have a fresh chance to diversify both their market and their product offering. This variable was left out of the study because it would have required the researcher to recruit volunteers from the retail industry, which would have added time to the project's submission process.
- Political factors- Due to its continual change and difficulty in measurement, the political climate of South Africa was not included in this study.
- Cyber security- The privacy of the information held will be compromised because of SMEs adopting new technology. Since many SMEs, especially those operating in the informal sector, are not accustomed to doing business using technology, the concept of cyber security becomes crucial to consider while implementing new technologies. The element was omitted since it's possible that many SMEs don't know about it and may not adapt to technologies that endanger their security.
- Geographical Scope- The present study is delimited to a specific region or country, additionally, its conclusions might not apply to other areas or countries with distinct economic, social, and political contexts.
- Sectorial Scope- The study's sectoral scope is restricted to SMEs enterprises, and its conclusions may not be transferable to other types of businesses.

- Timeframe- The study's timeframe is confined to the pandemic period, and its results may not accurately reflect SMEs' long-term performance before and after the pandemic.
- Casualty- Because the study uses a cross-sectional research approach, it may be more difficult to determine if the many factors under consideration are causally related to one another.
- Secondary data analysis- The inherent biases in data derived from secondary data sources may also arise from the data kinds, procedures, data gathering tools, and analytic techniques employed by the organisations that recorded the data.

1.9 Definition of terms

<u>Term</u>	<u>Definition:</u>
<i>Business performance</i>	"The operational capability to meet the needs of the firm's key stakeholders" is the definition of business performance (Smith & Reece, 1999, p. 153).
<i>Convenience Sampling</i>	is a non-probability sampling method in which research participants are chosen according to their availability and desire to take part in the study.
<i>Coronavirus</i>	The infectious agent that causes coronavirus illness (COVID-19) is the SARS-CoV-2 virus (World Health Organisation, 2021).
<i>Crisis management</i>	Crisis management is defined as a set of organised efforts for anticipating, recognising, evaluating, addressing, and averting business crises via the use of management techniques so that a company may carry on with its regular operations and perhaps even gain from the difficult times (Heller & Darling, 2011; Singhal, 2021; Wang, 2009).

***Cross-sectional
Research Design***

is a type of study design where data is gathered at a certain moment in time to give an overview of a particular occurrence.

Financial innovation

According to Tahir et al. (2018), financial innovation is the summary of new financial instruments that innovative technology has brought to financial markets and institutions.

Lockdown restrictions

Lockdown restrictions are a set of necessary COVID-19 spreading mitigation techniques that are routinely applied throughout the general population and impose specific constraints on the usual flow of social and economic activities, according to Haider et al. (2020).

SMEs

SMEs are independent, non-subsidary firms with less than a specific number of workers, as defined by the OECD Statistics Directorate in 2005. Examples of SMEs include convenience stores, spaza shops, apparel stores, and merchants with a tourism theme.

Sustainability

According to Murphy (2013), sustainability in small and medium-sized enterprises (SMEs) refers to a philosophy and practice that focuses on conducting business in an ethical manner in response to social, ecological, and economic concerns that are local, national, and worldwide.

Technology adaptation

Technology adaptation is defined as SMEs' ability to use information technology to minimise operational costs, enhance client service, boost responses among manufacturers and consumers, manufacturers, and input providers, deepening trade connections and increasing market knowledge (Pu et al., 2021).

***The Resource-Based
Theory of
Entrepreneurship***

is a viewpoint that emphasizes how important a company's assets, skills, and talents are to creating and maintaining a competitive edge, especially in times of crisis.

1.10 Assumptions

When researching how the coronavirus affects Small and Medium-sized Enterprises, SMEs, it is considered that the sample is typical of the SMEs. To ensure diversity, researchers may aim to include a mix of businesses based on their size, sectors of operation, geographical locations, and other relevant demographics. Additionally, it is expected that respondents provide accurate information, and that social desirability bias is not a problem.

The study's measurements, including surrogates, were found to be valid and reliable applied to reflect smaller and larger organisational level organisational performance, as well as the dependability of secondary data sources, are also assumed. During the epidemic, the researcher can presume that the results can be applied to other SMEs in other areas or nations. It is also assumed that there are no spurious correlations or assuming causality when none exists between the variables investigated. The data gathered from the survey is assumed to be complete, accurate, and relevant to the subject, and there were no unauthorized access or alteration to the data gathered. Finally, the researcher may assume that the data they collect reflect the current situation in then SMEs community regarding the effects of the pandemic.

CHAPTER 2. LITERATURE REVIEW

This chapter of the report covers the research variables of the study, namely business performance, technology adaptation, financial innovation, lockdown restrictions, and sustainability. The literature listed below provides a rigorous evaluation and discussion of how each of these factors contributes to Small and Medium-sized Enterprises (SMEs). Additionally, the research underscores the magnitude of having a firm with dependable resources in this regard. To benefit policymakers, practitioners, and academics, this literature study aims to investigate and appraise the current research on the implications of the coronavirus on these critical components of SMEs.

2.1 Introduction

Prior to exploring the primary studies, it is imperative to acknowledge that the worldwide coronavirus outbreak has led to an increasing number of cases of discomfort. Most people agree that the coronavirus is one of the worst public health emergencies of the contemporary age (Liu et al., 2020). It is possible to provide the following data in relation to the above statement: in addition to causing pain to people, the novel coronavirus may have a wide variety of effects on businesses, especially SMEs (Sun et al., 2021). A July 2020 study of 659 small businesses in South Africa revealed that 96% of small business owners had already seen a decline in revenue (Writer, 2020). The degree of confidence inside the company, the erratic business environment considering market turbulence, and fundamental economic instability, among other elements, determine the potential (Gong et al., 2020).

Therefore, the main objective of this research is to contribute to the understanding of the effects of the coronavirus on small and medium-sized enterprises (SMEs) by highlighting the main entry barriers in the ongoing pandemic, as well as the impact on profitability, financial implications, consequences, and owner goals. Additionally, the study aims to clarify how SMEs can enhance their business performance by incorporating new technologies. The literature study for this dissertation is structured in a way that comprises of four independent variables namely, business performance, technology adaptation, financial innovation, as well as lockdown restrictions as well as the dependant variable: sustainability. This research study's literature review is structured in this manner as it will allow the researcher to build a foundation of this research grounded on the chosen theoretical review that is the resource-based theory

of entrepreneurship, which gives foundation to the constructs that the researcher is investigating. Additionally, this literature review structure allows the researcher to get a more rigor engagement from the population of study which is retail SMEs as the constructs relate to the organisational resources of such firms. This literature study will allow the researcher to holistically engage SMEs on the five variables adopted for this study and ultimately compile a study that is conducive.

2.2 Theoretical review

Numerous perspectives on the phenomenon of entrepreneurship have been explored in entrepreneurship research (Amolo & Migiro, 2014). The resource-based theory of entrepreneurship, which provides a solid basis for the organisational resources of Small and Medium-sized Enterprises (SMEs), is what the researcher has chosen for this study (Amolo & Migiro, 2014). The research variables in this study, which include the organisational resources of SMEs, will be subjected to the concept.

The resource-based theory of entrepreneurship highlights the unique personal resources that entrepreneurs possess, which facilitate the identification of new business opportunities and the acquisition of capital for ventures. (Alvarez & Busenitz, 2001). The resource-based theory of the company argues that the organisational structure in which people work together affects how well humans use their skills to commercial activities (Conner & Prahalad, 1996). The resource-based viewpoint addresses performance differences between organisations by leveraging differences in knowledge (Conner & Prahalad, 1996). Accordingly, Conner and Prahalad (1996) make it evident that a resource-based firm theory implies a knowledge-based standpoint when the researcher analyses the resource-based theory from the perspective of a business. According to the literature currently in publication, a firm theory should address the following two main questions: why companies exist and what variables affect their size and breadth (Holmstrom & Tirole, 1989). Because of this, it is crucial that the researcher analyse the resource-based theory from the standpoint of resource heterogeneity. This will assist in identifying the factors and developing the case from an enterprise's entrepreneurial viewpoint.

The organisation's resources are divided into four categories by the resource-based theory of entrepreneurship: financial, physical, human, and organisational. These classifications are connected to the concepts the researcher is examining in the

present investigation (Pu et al., 2021). Financial innovation, business performance, sustainability, lockdown restrictions, and technology adaptation are the constructs for this study. The researcher will build upon these sources of information and lay the groundwork for this investigation.

According to the resource-based approach, small and medium-sized businesses must deal with resource limitations, but they may create and acquire special resources to provide them and their customers a competitive edge. Examining the association amongst the resources of SMEs and their performance during the pandemic might offer valuable perspectives on how SMEs utilise their resources to innovate and adjust to the novel circumstances.

The hypothesis, for example, helps clarify how SMEs' technological infrastructure influences their capacity to adjust to the epidemic. SMEs may be more robust to the economic effects of the pandemic if they have made investments in digital technologies like cloud computing, e-commerce platforms, and digital payment methods. These expenditures have made it possible for these businesses to grow their consumer base outside their local area and switch from the conventional brick and mortar business model to an online one.

In terms of financial innovation, SMEs may be better prepared to handle the financial shocks of the pandemic than others if they have created alternate funding sources or a strategy for managing financial risk.

In summary, via the adoption of the resource-based theory of entrepreneurship in academic research, distinct resources that set SMEs apart from one another in terms of financial innovation, innovation, and pandemic adaptability may be found. This information can help small and medium-sized businesses create plans that maximise their resources to keep or improve their competitiveness in times of crisis.

The resource-based theory of entrepreneurship provides information to business owners about certain resources required for their ventures to succeed. Nevertheless, given that the theory ignores company strategy and innovation tactics, we have seen several drawbacks to the theory. Nonetheless, by emphasizing the resources that business owners must use both during and after a pandemic, the theory provides the groundwork for our investigation. To have a more critical study, a more extensive

investigation on the same research issue might be carried out while considering the current theories of entrepreneurship. The resource-based theory of entrepreneurship gives the researcher the theory required for creating an investigation for the goals of this master's level program.

2.3 IV1: Business performance¹

In this study, the researcher examined business performance as the initial independent variable. Due to its impact on Small and Medium-sized Enterprises (SMEs) total performance, business performance was chosen as a construct for this study.

"The operational capability to meet the needs of the firm's key stakeholders" is the definition of business performance (Smith & Reece, 1999, p. 153). According to Zulkiffli and Perera (2011), an organisation's success must be assessed based on its business performance. Common measures used to assess business performance include profits, ROI, turnover, and clientele (Wood, 2006). However, as the business performance measurement (BPM) system is a helpful tool for many academic subjects, particularly business and social science, Mann and Kehoe (1994) and Franco-Santos et al. (2007) suggest utilising it to assess company performance.

Utilising valid and dependable scales from Guo et al. (2020), which have demonstrated composite reliability and are pertinent and acceptable for application in SMEs research within the South African framework, the study assesses the impacts of SMEs business performance. According to Guo et al. (2020), the scales have a composite reliability of 0.70 and a Likert scale with five points, ranging from strongly disagree to strongly agree. The researcher intends to investigate the company performance research topic

¹ In the framework of this research, the term "business performance" refers to SMEs' capacity in Gauteng's retail sector to sustain or enhance their operational and financial performance during the COVID-19. This would include factors such as revenue growth, profitability, cash flow, and productivity as well as their ability to adapt to the technological and financial challenges brought on by the pandemic. The study would investigate the strategies used by SMEs to maintain business performance, including the adoption of new technologies, financial innovations, and sustainability practices during the pandemic. Overall, the goal of the research would be to understand the impact of the COVID-19 pandemic on SMEs in the retail sector and to identify best practices for sustaining and growing business performance in the face of unprecedented challenges.

by analysing and contextualising firms' operational duties such as manufacturing and operational costs, and meeting customer demands.

This variable has the impact of significantly disrupting business performance due to the worldwide quarantine limitations that accompanied the coronavirus (Ipsos, 2020). This has inspired several SMEs in South Africa to look for innovative methods to improve operations when the country was under lockdown (Ipsos, 2020). Both large and small businesses are impacted by the lockdown limitations, although SMEs have the worst disruptions to their production (Ipsos, 2020). Concerning the topic at hand, it is believed that every crisis, regardless of its cause (man-made or otherwise), has the potential to seriously impair the capacity of an organisation to do trade by lowering the degree of trust that the latter has with its distinct clientele (Donthu & Gustafsson, 2020). The nefarious goal of COVID-19 is to put pressure on SMEs' leaders, who are thought to have less ability to promptly communicate any changes to their employees (Sun et al., 2021). When combined with the previous assertion, it can be argued that these factors lead to business failure since they make them unable to provide any goods or services to their respective clientele (Ratnasingam et al., 2020). Lockdown limitations were put in place as a moderating element to assist mitigate some of the consequences the global outbreak has created, given the impact that COVID-19 has on SMEs (Sun et al., 2021). Due to decreased sales volume, this has caused SMEs to incur financial losses (Lu et al., 2020). According to the previous sentence, small and medium-sized enterprises in South Africa and throughout the world are facing cash flow problems that have an impact on their day-to-day operations and business performance due to decreasing sales volumes and monetary losses (Omar et al., 2020).

To get more specific about how the lockdown limitations affected SMEs, the travel and tourism and transportation sectors were within those who suffered greatly (Hao et al., 2020). The researcher is highlighting the tourism industry as there are retail SMEs which operate in the tourism sector i.e., stores that sell tourist themed souvenirs which have been affected by the coronavirus lockouts which came about when travel was completely banned. Engaging such industries will contribute to the study by contributing knowledge from different retail SMEs. It is critical to recognise that the coronavirus has a detrimental impact on SMEs economic capacity and the methods

that these businesses employ on a regular basis for commercial operations (Sun et al., 2021). The coronavirus seriously damages the demand channel, which is the equivalent of a paralyzed supply pathway and assists in clarifying how it affects SMEs' channels of demand (Zhang et al., 2020). therefore, having an impact on business performance. Concerning the previously stated fact, it can be further demonstrated by stating that SMEs typically experience a major influence on the demand for their goods once the supply chain is also disrupted. This results in a loss in business revenue and a reduction in company performance (Pan et al., 2020). Adding to the problem, it should be noted that SMEs' consumer market's potential to disappear as their main source of revenue poses a serious obstacle to the concept of a demand channel (Nicola et al., 2020). Consequently, their ability to provide SMEs acquisitions is made ineffective (Sun et al., 2021).

The research demonstrates how lockdown limitations affect SMEs' ability to do business. The studies show that the lockdown restrictions implemented by the coronavirus have had an adverse effect on the success of SMEs. As a result, aspiring entrepreneurs are negatively impacted by this, as the commercial earnings of current SMEs have been decreasing since the restrictions were put in place (Pan et al., 2020). Since the market for some services provided by SMEs has been significantly impacted, the researcher has decided to investigate business performance as a potential variable. The cyclical nature of business performance is something that entrepreneurs should be aware of while considering opportunities in the SMEs industry.

2.3.1 *Crisis Management of SMEs in the era of Covid-19.*

Crisis management is a set of organised efforts for anticipating, recognising, evaluating, addressing, and averting business crises via the use of management techniques so that a company may carry on with its regular operations and perhaps even gain from the difficult times (Heller & Darling, 2011; Singhal, 2021; Wang, 2009). In unpredictable and rapidly changing circumstances, crisis management is an open strategy to use (Kurniawan et al., 2023). It allows Small and Medium-sized Enterprises, SMEs to strategize and adopt business models and innovative strategies that will sustain them under any crisis they face. According to Csath (2020) we can determine that managerial behaviours must shift to cope with a crisis. Najib et al.

(2021) are of the opinion that organisations, particularly SMEs, must acquire entrepreneurial abilities and inventiveness to implement comprehensive crisis within the parameters of this research. Furthermore, SMEs need to improve partner relationships and partner trust (Csath, 2020). SMEs are more likely to prevail if they enhance their current business performance. There have been research studies being conducted on crisis management given the current climate of the world (Kurniawan et al., 2023).

A thoughtful choice must be taken soon to preserve the ongoing prosperity of SMEs since business decisions during the perilous COVID-19 are difficult and obviously under pressure (Fasth et al., 2021). According to published research, SMEs' capacity for manufacturing and marketing innovation is essential to their continued financial viability during the coronavirus pandemic (El Chaarani et al., 2021). Regardless of innovation SMEs might be able to maintain crisis management while improving their business performance. with technology adaptation and high durability (Charoennan et al., 2022). Based on the studies above the researcher can conclude on the basis that business performance and crisis management are positively correlated.

2.3.2 A summary of how coronavirus has had impact on the business performance of SMEs across various fields.

Table 2: Summarised factors that affect retail SMEs business performance.

1. Revenue and sales	Based on the evidence above from various studies, the loss in income and sales constitutes one of COVID-19's most direct and obvious impacts on SMEs. Consumption was curtailed, supply chains were disrupted, and the demand for non-essential products and services fell because of lockdowns, social distance-inducing policies, and consumer anxiety. According to this
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	study, several SMEs saw large declines in sales, which caused some of them to face financial difficulties and even close their doors (El Chaarani et al., 2021).
2. Operational Disruptions	Due to labour shortages, disturbances in the supply chain, and limitations on business activity, SMEs experienced operational difficulties. A lot of small businesses had to adjust to remote work arrangements, which presented difficulties with communication and technology (Ipsos, 2020). The effect of technology adaptation is then presented to many small businesses who did not have such issues prior to coronavirus. The researcher has noted a trend with how such technology adaptations tend to affect many small businesses, particularly those operating in the informal sector. Retail SMEs were particularly hard hit since many of them were unable to function during the shutdown. The availability of raw materials was also impacted by supply chain interruptions, which had an impact on production and delivery timetables.
3. Financial Health	The pandemic has put a pressure on SMEs' financial stability. Those with little cash on hand and little recourse to credit had trouble covering their obligations and paying their payments. To survive the crisis, some SMEs were forced to take on more debt, while

	others looked for grants or other forms of financial aid from the government. As a result, the study investigates how financial innovation affects SMEs' sustainability and how it improves their capacity to compete.
4. Adaptation to Digitalisation	The ability to conduct business amid lockdowns was greater for those who had previously embraced e-commerce, online marketing, and digital communication platforms. Retail SMEs in the informal market did not completely adopt or even make such a thing conceivable (Ipsos, 2020). This study clearly outlines how technology adaptation has a positive correlation with business performance to help enhance the sustainability of a firm.
5. Supply Chain Resilience	The pandemic revealed weaknesses in supply networks, particularly for SMEs wholly dependent on foreign suppliers. This prompted the researcher to look at how supply chain procedures affected business performance during the outbreak. Transport and logistics interruptions made it clear how crucial it is to create robust and diverse supply chains to reduce risks in the future. The business performance of many small business was halted by these supply chain issues as transportation and logistics was put on a halt for some time and many retail SMEs who were not

	considered essential were not allowed to operate during lockdown restrictions which led to a longer impact on businesses
6. Employee Well-being and Productivity	Throughout the pandemic, SMEs had to put employee well-being and security first. Maintaining a productive workforce has become dependent on the implementation of health guidelines, the provision of PPE, and the assurance of mental health care. Remote employment also necessitated changes to how management and measurement of employee productivity were conducted. The study found that the retail SMEs that have a smaller number of employees and operate in the informal sector did not really adopt remote working as compared to those that are formalised. Additionally, the well-being of employees positively influenced SMEs business performance.
7. Customer Engagement and Loyalty	Maintaining customer engagement and loyalty became challenging during lockdowns when physical stores were closed, and face-to-face interactions were limited. SMEs had to find innovative ways to engage with customers online, offer personalized experiences, and build trust to keep current clientele and attract new ones. Based on the studies above technology

	adaptations such as the use of online shopping techniques was adopted by retail SMEs.
8. Government Support and Policies	Government Support was crucial in reducing the pandemic's negative effects on SMEs. Many SMEs were able to survive the recession thanks to support in the form of financial aid, grants, tax relief, and lenient rules. Government Support can be researched on its own as a mediating factor for this study, however the researcher has chosen to omit it as there would be limited information from the retail SMEs. Government aid became apparent during the epidemic as a price for SMEs' sustainability (Pu et al., 2021) which leads to enhances business performance.
9. Competitive Landscape	The pandemic changed how SMEs competed in the marketplace. Offering necessary products and services helped some firms succeed, but others found it difficult to adjust to the shifting market conditions. For survival, it was essential to have the flexibility to innovate and change the business model. In the context of retailers, it was essential to find new markets, introduce new products as well as being innovative to boost the performance of the businesses (Pu et al., 2021)

10. Long-term Viability	The pandemic made many wonders if specific corporate strategies and sectors would endure in the long run. To place themselves for success after the pandemic, SMEs had to re-evaluate their business plans, value propositions, and target customers.
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Significant interruptions of business performance have resulted from the global lockdown restrictions imposed by the coronavirus (Ipsos, 2020). Both large and small businesses are impacted by the lockdown limitations, with the most disruptions to business productivity occurring in Small and Medium-sized Enterprises (Ipsos, 2020).

Given the literature, which implies that disruptions were made on the business performance of many SMEs, the first hypothesis of this dissertation was to research on the detrimental impacts that the present business performance of SMEs in the climate of COVID-19 have on the sustainability of SMEs.

In conclusion, the coronavirus has a wide range of and frequently difficult repercussions on the commercial performance of SMEs. While some SMEs showed strength and flexibility, others experienced major setbacks and even closure. To design strategies to increase SMEs' resilience and sustainability in the face of future crises, it is crucial to understand the dynamics of business performance during the pandemic, which introduces the concept of technological adaption.

2.3.3 *H₁: Business performance has a negative correlation with SMEs sustainability.*

H₁: This hypothesis suggests that there is a positive correlation between business performance and SME sustainability. This implies that SMEs that perform well in terms of profitability, growth, and overall success are more likely to be sustainable in the long term. However, the nature of this correlation and the specific indicators of business performance need to be further defined and analysed in empirical studies on a higher level than this master's degree. However, the data that the researcher gathered is sufficient for the purposes of this study.

2.4 IV 2: Technology adaptation²

The business climate has changed significantly because of the COVID-19 pandemic, with small and medium-sized firms (SMEs) being the most negatively hit sector. The outbreak has disrupted conventional business practices, necessitating SMEs to embrace new realities by incorporating technology. This portion of the article highlights several ways in which the coronavirus has influenced the embracement of new technology methods by SMEs.

Technology adaptation is the second independent variable that the researcher will look at. The researcher has decided to focus on technological adaption because the modern world is always changing and demands that SMEs be innovative and create new methods to work. The researcher saw it fit to investigate adaptive technologies which could be incorporated by SMEs during the COVID-19 pandemic. The degree to which people's behaviours and expectations in each setting line up to help them accomplish their goals is referred to as technology adaptation (Ashford & Taylor, 1990). The capacity of SMEs to use information technology to reduce operating costs, improve service to consumers, increase responsiveness amongst producers, factories, and vendors of inputs, broaden their understanding of the market, and forge trade connections is known as technology adaption (Pu et al., 2021). Through the process of adaptation, people pick up, negotiate, exhibit, and maintain the behaviours that are appropriate for a particular organisational environment (Bruque et al., 2008). Thus, the term "technology adaptation" refers to the modifications and adaptations that employees make when new technology is introduced into a particular firm (Tyre & Orlikowski, 1994). Conversely, technology adoption is defined by DeSanctis and Poole (1994) as the process by which an individual employs information and communications technology to accomplish activities.

² In the framework of this study, technology adaptation refers to the extent to which Gauteng-based SMEs in the retail business have adopted and utilised cutting-edge technologies in reaction to the COVID-19 epidemic. Specifically, SMEs may have had to modify their business processes and operations to incorporate digital technologies to continue providing remote services to their customers during the pandemic (Pu et al., 2021). This might include implementing online payment processors, virtual interaction tools, or e-commerce platforms. The purpose of the study is to find out how well Gauteng SMEs have adjusted to these technical shifts brought forth by the epidemic. Moreover, the study will also explore whether SMEs have integrated technology into their overall business strategy to ensure long-term sustainability.

The impacts of technological adaption on the sustainability of SMEs were assessed by the researcher using valid and dependable scales from Guo et al. (2020), which have been shown to have a composite reliability and are pertinent and acceptable for use in the study of SMEs in South Africa. According to Guo et al. (2020), the Likert scales on which responses range from strongly disagree to strongly agree have a composite reliability of 0.78. The ability to embrace digital artifacts, digital management, and digital business models are examples of organisational elements that will be examined to investigate the study subject of technology adaptation.

This variable has implications in this, because when the pandemic hit the entire globe, several nations-imposed lockdown restrictions. As a result, many SMEs were forced to adapt to new business practices because the restriction gauges negatively impacted their existing business operating models (Ipsos, 2020). To prevent a complete economic collapse, companies are trying to create new methods of conducting business by using new technologies in the recent surge (Ting et al., 2020). SMEs are adjusting to new technologies that were before seen as optional, including linked VR (Virtual Reality) technologies, which are now necessary to stay in business (Ting et al., 2020). Research by Ipsos (2020) contends that SMEs were forced to cease operations during the lockdown restriction, whereas studies by Ting et al. (2020) cast a favourable perspective on the effects of the coronavirus by demonstrating that the introduction of new technologies will allow businesses to operate and deliver their services virtually to avoid bankruptcy. These studies amply demonstrate the construction effect that the coronavirus has on technology adaptation. Based on the data from the investigations, the researcher can emphasize that there is a construction effect in the business operating models used by SMEs, and that this will undoubtedly have an impact on how small enterprises will function even after the pandemic. Social distancing and lockdown measures were used to help stop the virus's spread, which inspired companies to come up with innovative ways to run their operations and attract clients (Webster, 2020; Akpan, Soopramanien, et al., 2020). To stay afloat during the crucial period, SMEs turned to online working methods including Zoom meetings, Microsoft Teams meetings, and other digital platforms (Webster, 2020; Akpan, Soopramanien, et al., 2020). According to Puddister and Small (2020), there is a favourable association between these technology adaptations and small firms' ability to improve everyday operations and increase productivity by enabling workers to work

remotely. The COVID-19 lockdown limitations have accelerated and intensified the impact of technology on the business strategy of some companies (Akpan, Soopramanien, et al., 2020). Additionally, SMEs' adoption of digital technologies to facilitate remote operations and customer delivery has been positively correlated with sustainability, even though implementing new work practices in these organisations comes with additional costs (Vaccaro et al., 2020). In addition, the coronavirus has brought attention to how developments in SMEs, such as purchasing goods online, augmented reality, and remote employment, have previously been overlooked because of the difficulty of integrating them into offices. Yet because of lockdown restrictions, these innovations now have an advantageous relationship in terms of future demand (Akpan, Soopramanien, et al., 2020). Integrating cutting-edge innovation in poor countries continues to be a nightmare, enabling the deployment of current business operating methods considerably more challenging (Akpan, Soopramanien, et al., 2020). The issue of internet connectivity persists in both developing and developed countries, adversely affecting the business models of several small and medium-sized enterprises (SMEs) (Akpan & Akpan, 2017). Even though most of the world's population lives in developing countries, their use of the internet is still lower than that of industrialized nations; Asia and Africa are among the regions with the least amount of internet coverage (I. Akpan & A. Akpan, 2017). The researcher is highlighting the impediments that developing nations face when adapting to new technologies as they will be investigating retail SMEs in the Gauteng region of South Africa where many informal SMEs have it hard when it comes to internet accessibility. SMEs also continue to face slower development in productivity, less opportunities in the market, and lower profits, which will make it more difficult for them to apply new technologies to conduct business amid the global crisis brought on by the coronavirus (Brynjolfsson & Hitt, 2000). Small and medium-sized enterprises (SMEs) in Africa and Asia, respectively, are worried about the safety threats and dangers that come with newly adopted technical advancements (OCED, 2020). Fear of losing data, misconceptions about technological difficulties, and the costs of the additional time and resources needed to acquire modern technology skills are a few of the operational problems that SMEs deal with (Akpan, Udoh, et al., 2020).

The analysis conducted by I. and A. Akpan (2017) indicates that connectivity to the internet is a problem in Asian and African nations, which makes the researcher realise

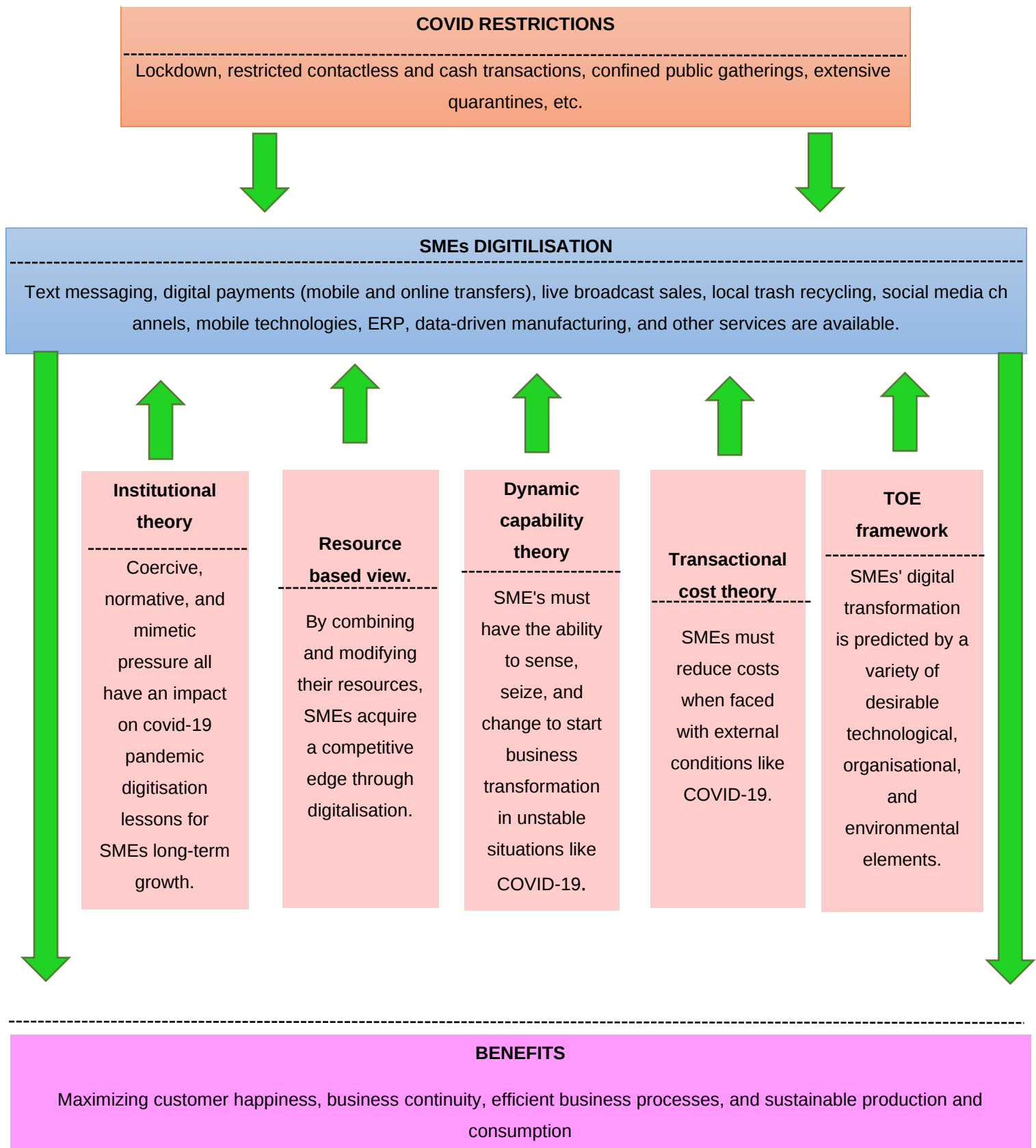
that the South African SMEs market also currently has difficulties creating new business models of operation to launch their ventures or improving current models in their organisations. However, while online connectivity is generally available and a useful tool for small businesses operating in metropolitan South Africa, having limited access to the internet does not eliminate the need for SMEs to be more tech focused. To ascertain if the public's perception of South Africa's restricted internet access has a role in SMEs' decision to shift most of their activities online to save expenses, a comprehensive poll was carried out. The results of this study and other studies make it clear that many SMEs, particularly informal ones, lack the resources required to operate online.

2.4.1 TOE framework and digital transformation of SMEs

The Technology-Organisation-Environment (TOE) Framework has become broadly utilised in research on the technology adoption of SMEs (Bai et al., 2021). Because adopting the digital revolution involves technological, organisational, and external factors, TOE provides a more holistic picture of technology adoption (Orji et al., 2020). Conclusions drawn from the research suggest that Small and Medium-sized Enterprises' (SMEs) use of the TOE framework aids in the development of their resources, which in turn aids in the implementation of new technologies. SMEs adaptations strategies to adopting innovative technologies in the period of COVID-19 requires a clear TOE to be sustainable post the pandemic.

Bai et al. (2021) have used different theories to outline how they assist the COVID-19 pandemic's digital teachings for SMEs long-term development. See **Figure 1** below. The researcher can clearly see how the resource-based theory, which was chosen for the adopted theoretical review, contributes to bettering the adoption of digital technologies in SMEs where resources are altered in the image below. Based off the figure below, business performance, financial innovation, and sustainability of SMEs are linked to technology adaptation Technology adaptation in SMEs is achievable when the resources are upgraded. There is a clear positive correlation between technology adaptation and the sustainability of SMEs.

Figure 2: A framework to promote COVID-19 pandemic digitisation lessons for SMEs sustainability.



(Bai et al., 2021)

2.4.2 A summary of how coronavirus has had impact on technology adaptation of SMEs.

Table 3: Summarised factors that affect Technology Adaptation

1. Increasing reliance on technology	The growing problem has increased the usage of online collaboration tools, video conferencing, and e-commerce platforms. Due to the limits on travel, SMEs have been forced to switch to digital platforms to continue operations and maintain client relationships. Retail SMEs have been forced to adapt to technological methods like creating/enhancing the use online stores to reach consumers and with the informal retailer adopting to selling their products via WhatsApp and other social media platforms (Webster, 2020; Akpan, Soopramanien, et al., 2020).
2. Greater focus on e-commerce	Due to many individuals remaining at home and avoiding public spaces, online buying has significantly increased. To meet demand, SMEs that have not yet embraced e-commerce are increasingly doing so (Ting et al., 2020).
3. Remote work and telecommuting	This been more popular in recent years because to COVID-19. To allow their staff to work from home, many SMEs who had not adopted this technology before the epidemic have now been forced to do so.

4. Cloud computing adoption	As remote work has become more popular; SMEs have had to migrate their company activities to the cloud (OCED, 2020). They may now access a variety of software services that would otherwise be too expensive to deploy on-site thanks to this. such adaptations were only possible with SMEs that had financing. The researcher can conclude on the opinion that adopting such cloud methods are essential in any business and help improve the technologies as such, security and cloud computing are an informative variable to undertake in further research (Webster, 2020; Akpan, Soopramanien, et al., 2020).
5. Improved digital communication	Most of the communication between SMEs and clients now takes place online (Pu et al., 2021). Consequently, of the epidemic, messaging applications, social media, and video conferencing have changed from being the exception to the rule and become more customized digital interactions. Such innovation makes it possible for retail SMEs from a variety of industries to do business and connect with customers easily, improving their performance.

Technology is crucial for boosting market competitiveness in the contemporary period of growing marketplaces and varied business operations (Das et al., 2020). Given the status of the economy and companies' persistent quest of economies of scale, globalisation appears to have a significant influence on economies and business conditions (Pu et al., 2021). According to Pu et al. (2021), who further elaborate on their findings, the technology revolution also presents new difficulties for Small and Medium-sized Enterprises (SMEs) owners throughout the world. The researcher also discovered that technical innovation is crucial for SMEs to prosper and achieve long-term prosperity.

To sum up, for SMEs to adapt to the new normal, the COVID-19 epidemic has forced them to embrace digital technologies. SMEs who masterly embraced technology were able to continue operating and efficiently service their clientele. Significant obstacles have been experienced by those who have been sluggish to adapt or averse to change. The success of SMEs depends on their capacity to continually using cutting-edge technology and creative solutions to stay up with the ever-evolving business environment. As such innovations like financial innovation are essential in SMEs.

2.4.3 *H₂: Technology Adaptation has a positive association with SMEs' sustainability during the pandemic.*

H₂: The hypothesis proposes that technology adaptation is positively associated with SME sustainability during the pandemic. This suggests that SMEs that effectively integrate and utilise technology tools and platforms are more likely to withstand challenges and disruptions brought about by the pandemic. The specific technologies, strategies, and mechanisms through which technology adaptation impacts sustainability have been investigated further in this study to understand the nuances of this relationship.

2.5 IV3: Financial innovation

Within Small and Medium-sized Enterprises (SMEs), the COVID-19 epidemic has had a significant effect on financial innovation. These entities have been confronted with unprecedented challenges, including revenue shocks, supply chain disruptions, and a sudden shift in consumer behaviour, because of the pandemic. The pandemic's impact on the economy has reignited interest in financial innovation, prompting SMEs to explore novel approaches to address the challenges they face. The following are some of the ways in which the coronavirus has influenced financial innovation in SMEs:

The objective of the current research is to examine financial innovation as the third variable when it comes to small and medium-sized businesses (SMEs). The rapid impact of financial performance on SMEs necessitates the exploration of innovative finance as a viable variable in the study of SMEs. According to Tahir et al. (2018), financial innovation is the summary of new financial instruments that innovative technology has brought to financial markets and entities. Innovation in process, product, and institution are all included. Innovation in processes encompasses a variety of innovative business practices and IT executions, such as ATMs, mobile banking, online banking, and so on (Tahir et al., 2018). Financial innovation, according to research by Chen (2021), is the process of creating new financial items, services, or procedures. Financial innovation has been bolstered by advancements in technology, payment systems, and financial instruments (Chen, 2021). Cher (2021) goes on to discuss financial innovation by saying that digital technology has transformed the financial services industry and changed how consumers save, borrow, invest, and make purchases.

To assess this independent variable, the researcher uses metrics that she took from Okello Candiya Bongomin et al. (2017) because they are valid, trustworthy, and relevant measurements that may give the researcher the theory and context she needs to look at SMEs in Gauteng, South Africa. The scales have been somewhat modified and reworded by the researcher to better suit the target demographic of retail SMEs in Gauteng. The research problem for financial innovation is studied by investigating factors such as the financial performance of the business, borrowing capacity, as well as appropriate bookkeeping techniques.

This variable has the following effect: financial services accessibility has improved SMEs' chances and development globally (Pu et al., 2021). Because of this, financial innovation in small company financing has become a noteworthy and contentious issue in several ways (Pu et al., 2021). Both internal and external financial instruments are required for good performance (Raimi & Uzodinma, 2019). Characteristics like insufficient resources and tactical actions because of internal and external constraints are what mostly influence business success (Srisusilawati et al., 2021). According to the resource-based strategy, you may get a competitive advantage by using and possessing more resources than your rivals (Pu et al., 2021).

Development, commercial, and merchant banks often provide traditional support for SMEs by offering financial services to them (Pu et al., 2021). The bank was established to enhance state or corporate capitalist companies' financial accounting records (Pu et al., 2021). To assist the economic operator in achieving this crucial business goal, banks commonly take on a variety of duties, such as offering a practical path for the transfer of economic means (Pu et al., 2021). Studies reveal that for businesses to launch and run efficiently, they need bank loans (Pu et al., 2021). For investment purposes, it is also necessary to coordinate other production elements, such as the initial demand for money (Pu et al., 2021). A clear correlation exists between the performance of small and medium-sized enterprises (SMEs) and bank credit. This association extends to the government's level of economic pursuits (Pu et al., 2021).

The research papers unambiguously show a connection between innovative finance and the sustainability of SMEs. A critical analysis of Pu et al.'s study from 2021 reveals that creative financing in SMEs can only occur with financial institutions' help, resulting in SMEs that are sustainable both during and after the coronavirus. In this section of the study the researcher provides a model that illustrates how the two factors relate to one another and how financial innovation might motivate business owners of SMEs to enhance their creative financing solutions. Innovative finance, which facilitates cost-saving financial transactions, helps enable SMEs and aspiring entrepreneurs to build an environmentally friendly system which will in turn enable industry participants to expand and have a favourable influence on the South African economy (Pu et al., 2021).

According to Kambanda and Brown (2017), SMEs that integrate e-commerce, such as mobile banking, benefit from increased organisational flexibility and a significant ease in resolving financial transactions. According to research by Pu et al. (2021), innovative financing methods help to reduce expenses and speed up monetary activities in terms of economic benefits. Furthermore, Muchiri's (2018) study discovered that the use of mobile banking by SMEs promotes product diversification, cost effectiveness, dependability, and ease in financial operation pay-outs. M-commerce makes use of radiocommunication technologies and networks to carry out explicit or implicit transfers of financial values (Clarke, 2019). Since more people are using their cell phones and other portable devices to make purchases of goods and services, more study is needed in the field of mobile banking, as M-Banking is still in its early stages (Barati & Mohammadi, 2009). Smartphone banking makes it possible for banks to use virtual assistance technology to provide properties and information to their clients (Ibrahim et al., 2006).

The research papers provide background information on the problems that SMEs confront, with a particular emphasis on emerging nations. Mobile banking is still in its infancy, according to research by Barati and Mohammadi (2009), who also pointed out that studies have revealed a gap in the growth of tech-focused services in poor nations. The study concluded that SMEs require a defined strategy to have a clear direction and creative funding integrated into their operations. To find out if creative funding helps SMEs amid the coronavirus epidemic, a hypothesis has been explored. Because they are actively involved in the management of their businesses, entrepreneurs in the SME sector offer a vivid illustration of the hypothesis effect. It is also crucial to remember that the research that is currently accessible, especially one by Pu et al. (2021), revealed that innovative financing mechanisms save costs and aid in the development of sophisticated monetary systems. This emphasizes how crucial it is to use creative financing in your SMEs to increase output and save expenses. Due diligence must be done by prospective and current SME sector entrepreneurs when implementing novel finance into their companies both during and after the epidemic. Research by Pu et al. (2021) has shown that these innovations are a great approach for small enterprises to reduce expenses.

It is evident from the studies above that Innovative companies, particularly SMEs, are by their very nature more prone to experience financial difficulties (Brancati, 2014). As such it was of importance that this research paper explores the theory of financial innovation of SMEs amid the COVID-19 period to strengthen the financial capabilities of SMEs. Financial innovation and the long-term viability of SMEs are directly correlated. Innovative financial methods have demonstrated their ability to help SMEs reinvent themselves and adopt new financial methods of doing business.

During the global epidemic, we must be able to innovate in marketing and manufacturing to sustain financial success throughout the COVID-19 disaster (El Chaarani et al., 2022). SMEs may find it easier to manage crises and boost business performance if they embrace technology and are highly adaptive, even in the face of innovation (Charoennan et al., 2022). The link between technology adaptation and financial innovation presents itself as a great balance in SMEs. This provide clarity as to how the two resources need to be adapted in organisations for them to be effective and sustainable in the future.

2.5.1 A summary of how coronavirus influences the financial innovation of SMEs.

Table 4: A summary of the factors influenced by financial innovation

1. Digital payment mechanisms:	Have begun to emerge because of the pandemic's huge growth in online activity, especially e-commerce purchases. SMEs have been compelled to adapt to new payment methods including contactless, mobile, and digital wallets. This has encouraged financial innovation in the shape of digital payment methods, allowing them to go on dealing in a world without physical interaction. This
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	has allowed retail SMEs to trade without interruptions.
2. Access to other sources of funding:	During the pandemic, SMEs, particularly those in the hotel, tourist, and retail industries, have faced major funding difficulties. Due to this, new forms of financing have emerged, including invoice financing, crowdsourcing, and peer-to-peer lending. The factors above all have a positive correlation with the sustainability of SMEs
3. Expansion of financial inclusion initiatives	The COVID-19 pandemic has made financial inclusion even more crucial, especially for SMEs struggling to get capital. As a result, efforts to increase financial inclusion have grown, including those that offer loans to SMEs with little or no collateral. A conclusion can be drawn that failure to adapt to various financial inclusions will lead to retail SMEs sustainability threatened.
4. Transition to sustainable finance	The pandemic has brought attention to the significance of ESG issues. Small and medium-sized businesses are now concentrating on sustainable financing, which entails investing in businesses that benefit society and the economy.

5. Increased attention paid to risk management:	The pandemic exposed SMEs to several hazards, including currency rate risk, supply chain risk, and liquidity risk. SMEs are currently concentrating on financial innovation that might aid them in better managing these risks, such as hedging instruments and insurance products.
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A major factor in the growth and prospects of Small and Medium-sized Enterprises (SMEs) worldwide was simple access to financial services. Financial innovation in SME finance has therefore grown to be a significant and contentious phenomenon in several ways (Pu et al., 2021). The research can clearly show a good association between financial innovation and the viability of SMEs during the pandemic, based on the studies conducted by Pu et al. (2021). Financial resources from both internal and external sources are required for good performance (Raimi & Uzodinma, 2019). According to Srisusilawati et al. (2021), strategic decisions and limited resources have a significant impact on a company's performance because of both internal and external constraints. The resource-based approach states that you may get a competitive advantage by using and possessing resources that are superior to those of your rivals (Pu et al., 2021). Financial innovation and the success of SMEs are positively correlated, according to research on the topic that has been conducted thus far.

In conclusion, the pandemic's new normal has forced SMEs to adapt, which has sped up financial innovation. Digital payment systems, alternative financing options, attempts to promote financial inclusion, sustainable finance, and a stronger emphasis on risk management have all resulted from this. The pandemic has highlighted the value of innovation in financial services to SMEs, and it is probable that this trend will persist long after the pandemic has ended, which brings in the concept of lockdown restrictions and sustainability.

2.5.2 H₃: Financial innovation is positively related with SMEs sustainability during the pandemic.

H₃: This hypothesis posits that financial innovation is positively related to SME sustainability during the pandemic. Financial innovation refers to the development and implementation of new financial products, services, or practices that enhance the financial resilience and performance of SMEs. The specific forms of financial innovation, their impact on sustainability, and the contextual factors influencing this relationship have been explored in more detail in this study.

2.6 IV4: Lockdown restrictions

Governments worldwide have instituted lockdown actions taken in reaction to the COVID-19 outbreak with the aim of mitigating the spread of the virus and reducing the burden on healthcare systems (Thukral, 2021). These measures have encompassed a range of interventions, such as work-from-home mandates, curfews, and travel restrictions. The resulting restrictions have significantly influenced various facets of society, the economy, and daily routines (Haider et al., 2020).

Lockdown restrictions are the fourth variable that the researcher investigates in the study. Restrictions imposed by COVID-19 have severely disrupted the economies of numerous companies globally. As a result, while examining the impact of coronavirus on organisational resources, lockdown constraints continue to be a crucial concept to examine. Lockdown restrictions are a set of necessary COVID-19 spreading mitigation techniques that are routinely applied throughout the general population and impose specific constraints on the usual flow of social and economic activities, according to Haider et al. (2020). In addition, Haider et al. (2021) argue that, despite the term "lockdown" becoming widely used, it is not well defined, which broadens the meaning of lockdown constraints. Furthermore, words that are frequently used to describe the phrase—such as "complete lockdown," "partial lockdown," "hard lockdown," and "soft lockdown"—have no exact definitions (Haider et al., 2020).

To gauge the impact that lockout limitations have on Small and Medium-sized Enterprises (SMEs) performance, the researcher assesses this variable using identical scales that are employed to gauge business performance. Using scales taken

from Guo et al. (2020), the association between lockdown restrictions and the sustainability of SMEs will be assessed. The scales for the first independent variable, business performance, are shown above. The commercial performance of SMEs during the coronavirus epidemic will be examined to better understand the research topic of shutdown constraints.

Thukral (2021) discovered that this variable has the effect of causing the pandemic to afflict several firms worldwide because of social isolation and full or partial lockdowns, which are required to limit the virus's spread. Many countries used "lockdown" measures to restrict idle time and stop the virus from spreading. We can see from the author's above reasoning that lockout limitations have a detrimental impact on the viability of SMEs. Small and medium-sized enterprises (SMEs) are often the main engines of economies worldwide, but they are also among the business sectors most affected by a variety of challenges. Numerous businesses and industries that rely on social interaction, including as sports, travel, tourism, hospitality, and manufacturing, have been significantly impacted by these rules (Thukral, 2021). According to March 2020 McKinsey research that examined the South African market, the sectors most negatively impacted were tourism, hospitality, and general retail, as well as the services sector (which includes private accounting and legal firms) (Kalidas et al., 2020).

Although the growth rates of these SME sectors are among the greatest in the nation, many of their businesses were unable to function during the 35-day lockdown, and they were still subject to level 3 and 4 lockdown limitations (Kalidas et al., 2020). According to relevant research, lockdown limitations have a detrimental effect on the performance and sustainability of SMEs. This has been noted by the writers mentioned above. Due to the constraints forcing many SMEs out of business, many SMEs with growth rates may have to close entirely or suffer significant effects on their operating models.

Lockdown regulations have harmed the workplace, leading to closures, a weak supply chain, and decreased output (Thukral, 2021). The personnel section of the resource-based theory of entrepreneurship highlights the significance of leveraging an organisation's human resources to enhance the calibre of its operations. A shutdown that halted all output at the industrial plants following the coronavirus epidemic

(Thukral, 2021). The Thukral (2021) research offers more proof of how lockdown limitations have affected SMEs' business performance throughout the course of the lockdown period and how they further jeopardize SMEs' capacity to remain sustainable in the future.

2.6.1 Technology and Digital Adaptation

The research shows that lockdown measures have posed challenges for traditional brick-and-mortar Small and Medium-sized Enterprises (SMEs) while also highlighting the increasing need for digital transformation., but they have also made it more urgent for digital transformation. Additionally, SMEs have been better positioned to preserve company continuity and consumer engagement when they immediately adopted remote labour, digital sales channels, and e-commerce platforms.

COVID-19 has imposed unprecedented limitations on travel and gatherings, compelling businesses, and organisations to seek alternative means of communication and collaboration (Ganotakis et al., 2021). In this context, technology and digital adaptation have emerged as crucial facilitators of remote work in SMEs. Video meetings and online meeting websites like Zoom, Skype, and Teams have become indispensable tools for remote collaboration, while digital document-sharing and editing platforms have enabled teams to work on projects collaboratively and effectively, regardless of their physical location (Saher & Anjum, 2021).

Moreover, technology has been extremely important in facilitating remote contact to healthcare services through IoT platforms as supported by the authors mentioned above.

Digital adaptation has also enabled people to adapt to the restrictions placed on social gatherings (Ganotakis et al., 2021). Social media platforms, messaging apps, and online forums have provided a means for people to stay connected and engaged, despite the inability to meet in person (Ganotakis et al., 2021). Online shopping and delivery services have allowed people to purchase essential items and groceries without leaving their homes, as such increasing the technology adaptability in the SMEs sector.

COVID-19 has accelerated the implementation process of technology and other digital adaptation, compelling individuals, and organisations to easily adjust to new lifestyle and employment arrangements. As a result, technology has become a critical tool in enabling us to continue our daily lives and remain connected, even in the face of lockdown restrictions.

2.6.2 COVID-19- related lockdown restrictions

Table 5: A summary of COVID-19- related lockdown restrictions

1. Economic impact	Because lockdown restrictions forced company closures and disrupted supply networks, they had a detrimental effect on the economy. Significant revenue losses suffered by many SMEs have resulted in job losses and financial hardship for both people and companies. As per the studies references above informal sectors in the SMEs were the most affected.
2. Social Impact	Significant social effects of lockdown restrictions include increased social isolation, mental health issues, and domestic violence. People have been unable to mingle and connect with others in the same way they did before to the epidemic due to social isolation measures. In the context of SMEs retailers, research studies have shown that people were unable to go to the stores to purchase goods and services, the increased social isolation also led to entrepreneurs being unable

	to do their door-to-door sales and networking.
3. Impact on politics	Lockdown restrictions have been a divisive topic that has sparked political arguments and challenges to the legitimacy of the executive branch. Some have claimed that the limitations violate human rights and individual liberties. The political aspect of lockdown restrictions made it hard for many SMEs to get government support during the lockdowns due to corruption and the social setting of many SMEs. Those without accessibility and networking circles didn't benefit from government programmes. The researcher has identified political impact as one of the variables that be investigated on in other research studies to get a holistic overview among the consequences of COVID-19.

Lockdown restrictions have, in conclusion, had a profound influence on businesses, cultures, and people across the world. Although the limits were required to stop the COVID-19 virus from spreading, they also had several unforeseen side effects. Countries must weigh the necessity for public health precautions with the effects of lockdown limitations as they continue to navigate the pandemic. This motivates the researcher to investigate the connection between lockout regulations and the long-term viability of SMEs.

2.7 DV: SMEs Sustainability³

The COVID-19 epidemic has had a major effect on small and medium-sized enterprises' (SMEs') capacity to stay in business. Due to the pandemic, SMEs have encountered hitherto unheard-of difficulties such as decreased demand, broken supply chains, and problems with worker management. Due of the pandemic's emphasis on sustainability, SMEs have forced to change the way they do operations. Here are a few ways that the coronavirus affects the sustainability of SMEs:

The fifth variable that is investigated in this study is SMEs sustainability. SMEs sustainability presents itself as a rigor construct as the sustainability of SMEs is dependent on the organisational resources such as financial innovation, business performance, technology adaptation as well as lockdown restrictions. According to Murphy (2013), sustainability in small and medium-sized enterprises (SMEs) refers to a philosophy and practice that focuses on conducting business in an ethical manner in response to social, ecological, and economic concerns that are local, national, and worldwide. The idea suggests a long-term general commitment to maintaining balance between social, ecological, and economic challenges as opposed to short-term gains and random, add-on activities (Murphy, 2013). Murphy (2013) goes into greater detail about the notion of sustainability, stating that while it is a subject that has just lately started to surface in management literature, there is a dearth of studies on the actual operations of SMEs and that definitions of the term are frequently at odds. According to research by Pu et al. (2021), sustainability is a notion that helps companies improve their market knowledge, consumer response skills, and trade partner relationships.

Since Guo et al. (2020) have validated their scales and shown them to have composite reliability, the researcher uses them to evaluate the variable SMEs sustainability. These scales are pertinent and appropriate for studying SMEs in the South African context. According to Guo et al. (2020), the scales have a composite reliability of 0.71 and a Likert scale of five points, ranging from strongly disagree to strongly agree. The utilisation of digital technologies and the ways in which SMEs want to alter their current

³ Within the framework of this research, sustainability pertains to the capacity of small and medium-sized enterprises (SMEs) operating in the retail sector of Gauteng to uphold their environmental, social, and economic sustainability within the COVID-19 epidemic. In this context, sustainability basically means that SMEs may function in a way that satisfies current demands without jeopardizing the ability of future generations to satiate their own needs.

product lines will be examined to address the research challenge of SMEs sustainability.

The variable in question, as brought to light by Pu et al. (2021), has the effect of limiting the breadth of the sustainability issue by making it difficult to gather crucial information on SMEs. As a result, the purpose of this study is to gather information from a sample to assess the sustainability of different SMEs both now and in the future. Pu et al. (2021) also emphasized how difficult it is to confirm the veracity and quality of the data that SMEs' owners have been reluctant to provide regarding the success of their businesses due to the lack of an authorized database. As a result, several entrepreneurs still find sustainability in SMEs to be a strange notion.

According to Zutshi et al. (2021), the coronavirus pandemic is still causing SMEs to suffer significant losses in sustainability and profitability. The researcher will create a connection between the sustainability of SMEs and their use of new technologies. The assistance that small and medium-sized enterprises receive and the cutting-edge business concepts they employ are critical to their sustainability. Previous research has shown that the profitability and financial innovation of SMEs greatly enhances and adds to their sustainability.

2.7.1 *Knowledge, acquisition, conversion, and protection for SMEs Sustainability*

According to Otundo (2023) we can determine that in Small and Medium-sized Enterprises (SMEs), creating knowledge entails the development, discovery, and capture of novel knowledge and its integration into the structure of the organisation. They further argue that the knowledge that is pertinent to the target market is the crucial knowledge. Research by Otundo (2023) also gives context on how SMEs have far fewer assets and have a harder time learning the skills necessary for an effective entrance into emerging economies. Based on the scientific literature above the researcher can conclude on the basis that for SMEs to be sustainable in the COVID-19 era and beyond they need to constantly adopt new knowledge and acquire more knowledge in the industries they operate in. Additionally, based on the study above there is evidence proving that SMEs have fewer resources to enhance their skills, and the researcher has noted this in the retail SMEs industry as several of them in the

Gauteng townships operate in the informal setting and have no access to financial opportunities that would allow them to acquire skills that are needed to be sustainable.

Higher levels of inventive production are produced by the generation of new knowledge in SMEs, which then manifests itself in sustaining business performance to protect it from the consequences of coronavirus (Otundo, 2023). The analysis makes it clear that retail SMEs must use knowledge management to improve their business performance. The process to convert knowledge in SMEs involves creating tacit knowledge through informal sharing, a shift from tacit into explicit and content enhancement by combining codified knowledge with the use of explicit knowledge for producing new tacit knowledge based on thought and exchange (Otundo, 2023).

Informal exchanges between SMEs and experts, managers, and practitioners through ongoing mentorship and apprentice relationships, or through quick conversations by phone or video conferences, are the most popular means of knowledge transfer across businesses in all industries (Otundo, 2023). The findings above give the researcher insight on how retail SMEs can benefit from interacting with industry experts on how to effectively run their business. Technology adaptation will allow for the entrepreneurs in the SME sector to effectively collaborate and connect with industry experts worldwide. Additionally, business performance will be boosted as the knowledge transfer is likely to cause a positive shift in SMEs. An SMEs sustainability depends on its ability to share information quickly so that it may reach the many parts of the company that can most benefit from it (Omar Sharifuddin Syed-Ikhsan & Rowland, 2004).

2.7.2 A summary of how coronavirus impacts the Sustainability of SMEs

Table 6: A summary of the factors affecting SMEs Sustainability.

1. A greater emphasis on sustainable business practices	COVID-19 has emphasized the need of implementing sustainable business practices. As such, environmental, social, and governance (ESG) initiatives, including as lowering carbon emissions, utilising renewable
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	energy sources, and fostering social responsibility, are being adopted by retail SMEs at an increasing rate.
2. Reduced carbon footprint	The pandemic's effects on economic activity have led to a decline in carbon emissions. With the help of sustainability techniques like energy-efficient systems, recycling, and the use of sustainable materials, retail SMEs are now concentrating on lowering their carbon footprint even further. Research has found that retail SMEs are being cautious when it comes to the carbon footprint of their manufacturing processes.
3. An increased emphasis on employee safety	The worldwide crisis has highlighted the need of preserving workers' health and safety. SMEs are increasingly putting more of an emphasis on putting safety measures in place, such offering personal protective equipment and teaching staff about hygienic standards to remain sustainable and avoid business closure
4. Resilience of the supply chain	The worldwide outbreak has caused disruptions to global supply chains, exposing SMEs to different risks. Based on this study retail SMEs are increasingly putting their attention on bolstering the resilience of their supply chains by diversifying their supplier bases and investing in digital systems

	that can track the state of such linkages.
5. Fostering regional supply chains: investments in neighbourhood areas.	COVID-19 has emphasized the need of assisting regional economies and companies. SMEs are increasingly concentrating on promoting local supply chains, including procuring raw materials locally, forging alliances with other local companies.

According to Pu et al. (2021) published research, it appears to be difficult to get crucial information on Small and Medium-sized Enterprises, which restricts the scope of the sustainability problem. Based off the studies above there is a clear indication that the sustainability of SMEs has been compromised by the lockdown restrictions that were imposed on SMEs. The failure of SMEs to remain sustainable has also been attributed to several other problems.

To sum up, the COVID-19 epidemic has had a major effect on SMEs' capacity to survive, causing a greater emphasis to be placed on implementing sustainable practices, lowering carbon footprint, ensuring employee safety, building supply chain resilience, and supporting local supply chains. These initiatives not only lessen the pandemic's effects but also set up SMEs for long-term success. SMEs' sustainability initiatives will be vital in creating a more sustainable and resilient future as the globe navigates the current crisis.

2.7.3 H₄: Lockdown restrictions have a negative relationship with the sustainability of SMEs during and post pandemic.

H₄: The final hypothesis suggests that lockdown restrictions have a negative relationship with the sustainability of SMEs during and post-pandemic. This implies that strict lockdown measures, which limit business operations, customer interactions, and economic activities, can negatively impact the sustainability of SMEs. The extent, duration, and enforcement of lockdown restrictions, as well as the mitigating strategies

adopted by SMEs, have been critically examined to understand the overall impact on sustainability outcomes.

2.8 Conclusion of Literature Review

The review of the literature looked at and analysed many relevant publications that help with this study project. The literature review includes a critical analysis of important writers who have contributed to the scholarly literature. The literature indicates that lockdown limitations have an impact on both large and small organisations, with small companies suffering the most operational disruptions (Ipsos, 2020). The study unequivocally shows that the coronavirus has a building influence on people's ability to adapt to new technologies. Ipsos (2020) research contends that the lockdown limitation led Small and Medium-sized Enterprises (SMEs) to halt activities, which had an impact on business performance. The study also discovered that SMEs' prospects and development worldwide have benefited from access to financial services (Pu et al., 2021). According to Thukral's (2021) study, lockdown limitations have been proven to have an adverse effect on the workplace, leading to closures, low production, and supply chain disruptions.

In summary, the global coronavirus outbreak has significantly impacted SMEs business performance, technological adaptability, financial innovation, and sustainability. Due to the pandemic's disruption of supply chains, customer behaviour, and market dynamics, there have been decreased sales, cash flow issues, and job losses. SMEs who were able to adjust to remote work and improve their digital skills showed more resilience and were better prepared to weather the crisis. Government loans and grants, among other financial innovations, were instrumental in helping SMEs in many nations survive and thrive. Despite the difficulties the pandemic caused, there were also chances for SMEs to switch to more robust and sustainable business models.

This research literature review emphasized the significance of SMEs' crisis response capabilities and their ability to innovate during hardship. The longstanding consequences of the pandemic on SMEs need to be examined in future studies, as well as the possibility for post-crisis recovery through innovative and sustainability-focused initiatives. The researcher aims to investigate SMEs in the retail sector while using the existing theories as a foundation for this research study.

2.9 Hypotheses

H₁: Business performance has a positive correlation with SMEs sustainability.

H₂: Technology adaptation has a positive association with SMEs' sustainability during the pandemic.

H₃: Financial innovation is positively related with SMEs sustainability during the pandemic.

H₄: Lockdown restrictions have a negative relationship with the sustainability of SMEs during and post pandemic.

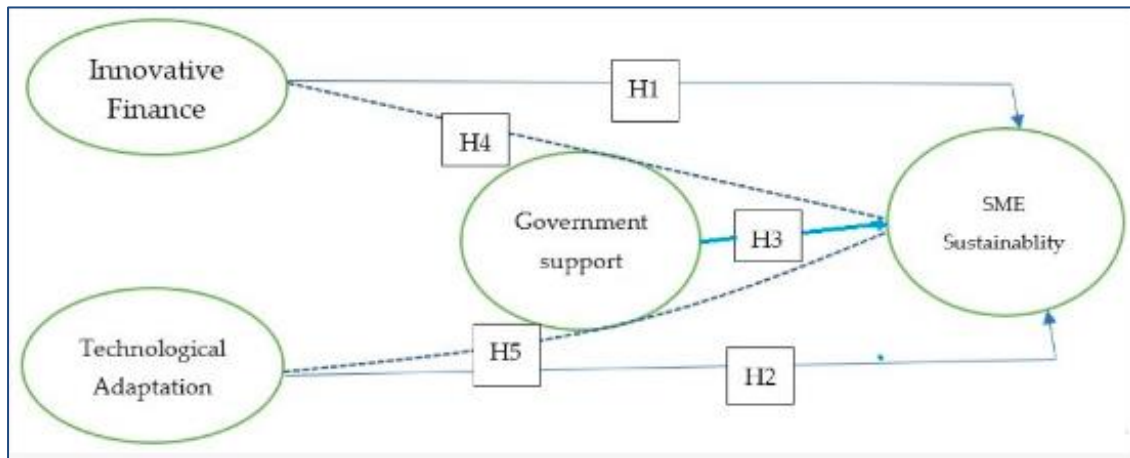
2.10 The conceptual framework

An earlier research study by Pu et al. (2021) served as the basis for the conceptual framework that follows (see **Figure 2**). The researcher intends to use similar research factors in this investigation as she did in the last one. This conceptual model was chosen by the researcher because it makes it evident how the dependent variable—SMEs sustainability—relates to the independent variables—financial innovation, technological adaptation, lockdown restrictions, and business performance. The conceptual framework was chosen by the researcher as it has been shown to be dependable and yields quantifiable outcomes.

Innovative financing, sustainability, and technological adaption were all included in the pre-existing conceptual framework from Pu et al. (2021), and these are some of the constructs that the researcher will look at in this study. Government support was a mediating variable in the model from the authors, but the researcher in this study made the decision to ignore the issue of government support for retail SMEs in South Africa because there wasn't necessarily a lot of it during the coronavirus outbreak.

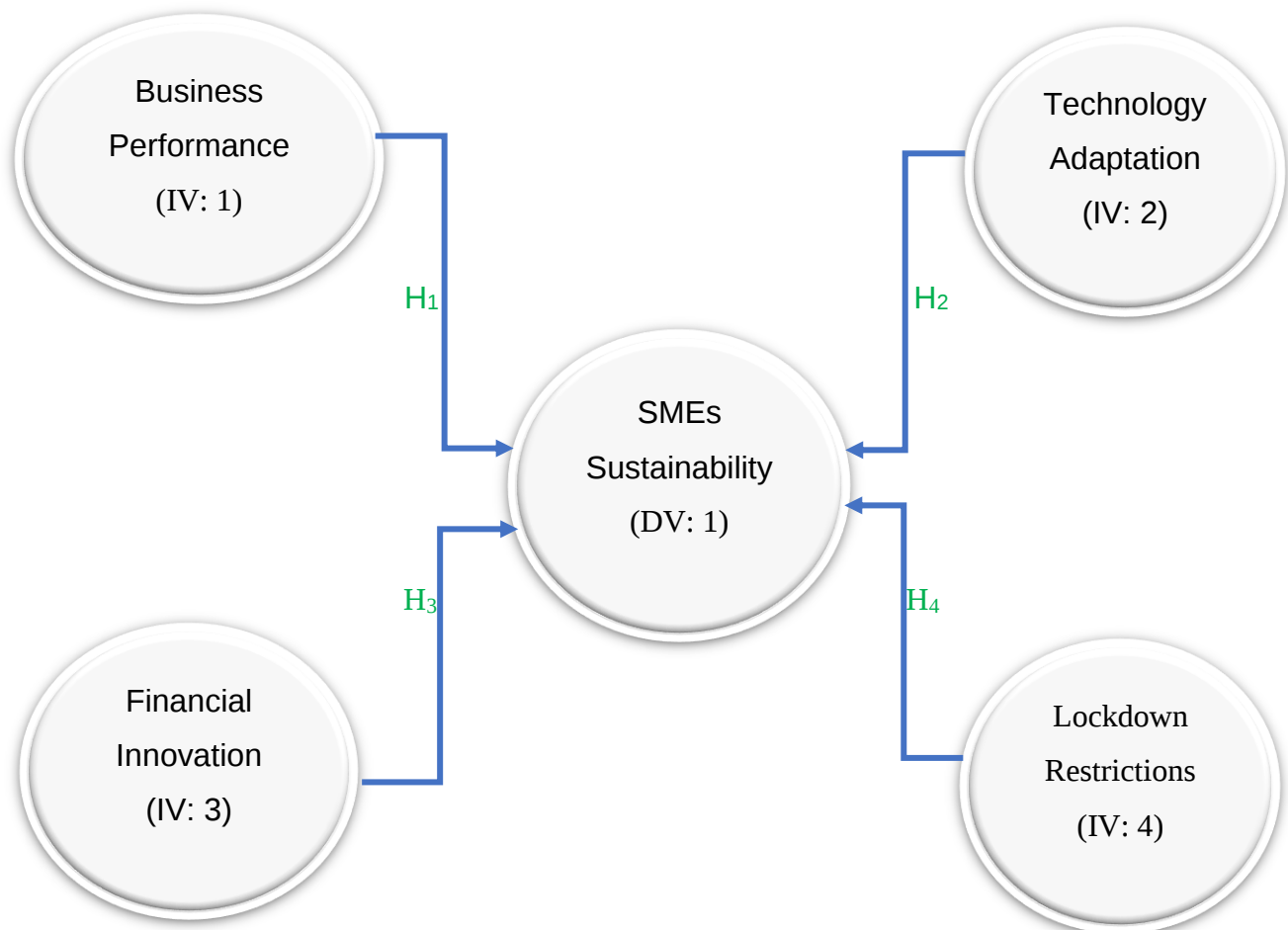
This research study is different from that of Pu et al. (2021) as the researcher is not trying to examine the mediating impact of government support on sustainability, financial innovation as well technology adaptation. Instead, the researcher has chosen to investigate two additional independent variables which are business performance and lockdown restrictions. With the foundation of the adopted framework the impacts can be examined by the researcher of coronavirus on the subject matter.

Figure 3: The adopted theoretical framework from a pre-existing study



(Pu et al., 2021)

Figure 4: The theoretical foundation of the intended investigation



H₁: This hypothesis suggests that there is a positive correlation between business performance and SME sustainability. This implies that SMEs that perform well in terms of profitability, growth, and overall success are more likely to be sustainable in the long term. However, the nature of this correlation and the specific indicators of business performance need to be further defined and analysed in empirical studies on a higher level than this master's degree. However, the data that the researcher gathered is sufficient for the purposes of this study.

H₂: The hypothesis proposes that technology adaptation is positively associated with SME sustainability during the pandemic. This suggests that SMEs that effectively integrate and utilise technology tools and platforms are more likely to withstand challenges and disruptions brought about by the pandemic. The specific technologies, strategies, and mechanisms through which technology adaptation impacts sustainability have been critically investigated further to understand the nuances of this relationship.

H₃: This hypothesis posits that financial innovation is positively related to SME sustainability during the pandemic. Financial innovation refers to the development and implementation of new financial products, services, or practices that enhance the financial resilience and performance of SMEs. The specific forms of financial innovation, their impact on sustainability, and the contextual factors influencing this relationship have been explored in more detail in this study.

H₄: The final hypothesis suggests that lockdown restrictions have a negative relationship with the sustainability of SMEs during and post-pandemic. This implies that strict lockdown measures, which limit business operations, customer interactions, and economic activities, can negatively impact the sustainability of SMEs. The extent, duration, and enforcement of lockdown restrictions, as well as the mitigating strategies adopted by SMEs, have all been critically examined in this study to understand the overall impact on sustainability outcomes.

Overall, the theoretical framework provides a foundation for exploring and understanding the complex interplay of factors that influence SME sustainability in the context of a pandemic. However, further empirical research (on a higher level than masters study), data analysis, and contextual assessments are needed to validate and refine the relationships proposed within the framework.

CHAPTER 3. RESEARCH METHODOLOGY

Owing to the wide-ranging consequences of the pandemic, it is crucial to evaluate the research methodology employed in studies that examine the impact of the coronavirus on the operations of small and medium-sized businesses (SMEs), their financial innovation, technological adaptation, and sustainability. The goal of this research methodology chapter is to look at the study design, data collecting strategies, data analysis approaches, and ethical issues used in examining how the pandemic affected the operations of SMEs. In addition to highlighting the benefits and drawbacks of the many research techniques used in data collecting, analysis, and interpretation, the chapter seeks to provide insights on the effectiveness of the research methodology used. This chapter examines the methodology used in previous studies on the effects of the coronavirus on the financial innovation, business performance, technology adaptation, and sustainability of SMEs. The goal is to give researchers useful insights into how to design credible and trustworthy future studies.

3.1 Research methodology/ paradigm

The most appropriate research paradigm for this area of study is positivism. In positivism, the importance of what is said is emphasized, and real facts and data are rigidly considered without regard to human prejudice (Scotland, 2012; Saunders et al., 2012). The positivist paradigm is being used by the researcher to maintain objectivity and generate accurate data for the study. The researcher employed a hypothesis-driven methodology in conducting the study, whereby the hypothesis was subjected to empirical testing by the methodical gathering and examination of information. The creation of a hypothesis, which is an initial declaration that clarifies the relationship between two or more variables, is the first stage in the research process. In this investigation, four hypotheses have been formulated based on the four independent variables, namely business performance, technology adaptation, financial innovation, and lockdown restrictions, in conjunction with the dependent variable of SMEs sustainability. In positivist studies, deductive approaches are usually assumed (Crowther & Lancaster, 2008). Research carried out in a positivist fashion do not prioritize proving or disproving ideas (Ryan, 2018).

The primary aim of a positivist inquiry is to establish causal connections among variables, thereby laying the groundwork for prognostication and regulation (Scotland,

2012; Saunders et al., 2012). Fundamentally, positivism in research underscores the significance of objectivity, precision, and methodology in the pursuit of comprehending and elucidating social phenomena, thus the researcher has chosen the positivist view.

Epistemological- It discusses what constitutes appropriate knowledge. Furthermore, theories and concepts are said to be oversimplified, with an excessive focus instead being placed on stories, narratives, feelings, and interpretations (Saunders et al., 2012). Observations and facts are measurable. Given that this is a positivist study, the investigator will investigate high standards of uniformity. Based on the research factors, the study will make assumptions and draw conclusions while taking an unbiased look at the data gathered. To determine the relationship between four independent variables and a dependent variable, the current study used a variety of statistical approaches, such as descriptive statistics, ordinal regression analysis, multinomial regression analysis, and correlation analysis.

Ontological Its nature is quite intricate. It assumes that there is just one true world and is very organised (Killam, 2013). The researcher will conduct the study objectively, without regard to social pressures, and from the outside looking in. The researcher will conduct this research study objectively and without regard to personal ethics. The researcher collected quantitative data about the study and drawn conclusions according to the data. The present study's research methods and conclusions are deemed to be both valid and reliable. The Likert-scale questions utilised in the study were derived from prior research and have been established to possess both reliability and validity.

Axiological- Axiology pertains to the ethical values and principles that govern the behaviour of a researcher throughout the course of a study (Bryman, 2012). It is preoccupied with the researcher's convictions regarding what is morally commendable, correct, and equitable in the research undertaking. Since the researcher is unbiased and uninterested in the issue, the study has no inherent value. Consequently, the investigator will uphold impartiality (Bryman, 2012). For the researchers to adopt an impartial stance, this research is carried out in a non-judgmental manner. Data was gathered by the researcher from retail SMEs in Gauteng, South Africa, using a sizable random sample. The SMEs in Gauteng were selected by the researcher because they will be easily accessible. To maintain the

study's axiology the researcher has taken measures to ensure that the participants in the study have provided informed consent prior to their inclusion in the research. Throughout this process, precise and succinct information on the goals, methods, possible dangers, and advantages of the study were provided, as well as the rights of the participants. The participants were made aware that their participation was voluntary and that they had the option to withdraw from the study at any given point.

Regarding privacy and confidentiality, the researcher has always kept the study participants' identities private. This was achieved through the protection of their personal information and the assurance that their data would not be disclosed without their explicit consent. The participants received assurances that their data would only be used for research and that their names would be kept private.

3.2 Research design

This inquiry is guided using a quantitative examination. Quantitative research needs data to enumerate information and challenge it to statistical analysis to accept or disapprove of "alternative knowledge statements" (Creswell, 2009). According to Leedy et al. (2019), there are three distinct forms of quantitative analysis: descriptive, casual comparative, and experimental. The direction of this investigation will be cross-sectional. This quantitative design enabled the researcher to assess the study's findings and vulnerabilities at the same time (Setia, 2016). The cross-sectional survey, which was used to collect data on the association between the dependent variable (SMEs sustainability) and independent variables (business performance, technology adaptation, financial innovation & sustainability), focused on SMEs operating in the retail industry in Gauteng.

Setia (2016) highlights the following as the advantages of a cross-sectional survey: In terms of cost-effectiveness, cross-sectional surveys are a more viable option compared to longitudinal surveys due to the absence of long-term data collection and follow-up with respondents. The time efficiency of cross-sectional surveys is also noteworthy, as it only requires a one-time data collection process. Additionally, cross-sectional surveys are advantageous in obtaining a large sample size, which can produce results that accurately represent a specific population. The flexibility of cross-sectional surveys is also notable, as data collection can be carried out online, allowing

for respondents' location and availability to be considered. Finally, cross-sectional surveys are useful in providing a snapshot of a particular phenomenon or situation.

Setia (2016) subsequently highlights the following as the disadvantages of a cross-sectional survey: The utilisation of cross-sectional surveys is restricted by several limitations. Firstly, such surveys can only provide data at a single point in time, thereby lacking direction or historical information to determine changes over time. Secondly, cross-sectional surveys are limited in their ability to establish causality between variables, as they do not follow a cohort or group of respondents over time to observe changes. Thirdly, response bias may be exhibited by respondents in cross-sectional surveys, leading to unrepresentative data of the intended population. Fourthly, cross-sectional surveys do not allow for a comprehensive understanding of a specific phenomenon, as they only capture data at one moment in time. Lastly, cross-sectional surveys may not provide in-depth information on variables, which can significantly impact the quality of findings.

In general, cross-sectional surveys have proven to be a viable approach for gathering information pertaining the topic for this study. Additionally, the researcher chose this sort of study since it is more affordable and allowed the researcher to finish the study more quickly (Setia, 2016).

3.3 Population and sample

3.3.1 *Population*

This study is focused on Small and Medium-Sized Businesses that have been impacted by the COVID-19 epidemic. Examining the effects of the pandemic on the financial innovation, technological adoption, business performance, and sustainability of SMEs is the main goal of this study. The population under investigation comprises retail SMEs operating in both the formal and informal sectors, which have encountered repercussions from the pandemic. This includes SMEs that have faced operational challenges, those that have had to modify their business practices, and those that have ceased operations considering the pandemic. The study's participants are limited to business owners in South Africa's Gauteng province.

Small and medium-sized businesses in Gauteng's retail industry have been designated as the main subject of this study's inquiry. The researcher's geographic

location in Gauteng is the basis for this pick, which provides convenient access to a significant number of retail SMEs in the region. This proximity is expected to facilitate the timely completion of the research study.

Finding SMEs that have been impacted by the coronavirus pandemic is the first step in entering the population. The researcher has successfully identified such SMEs through a variety of sources, including LinkedIn, the OECD study, several establishments on WhatsApp groups, online sources, business directories, and the Trade and Industry Policy Strategies (TIPS) entity.

3.4 Sampling

3.4.1 *Sampling size estimation*

While South Africa boasts an estimated 2.6 million Small and Medium-sized Enterprises (SMEs) across all sectors (OECD, 2022), this study focuses specifically on the SMEs within Gauteng province. Accurate representation of this subpopulation is crucial for drawing reliable conclusions. Therefore, the appropriate statistical method; convenience sampling was employed to determine the necessary sample size.

Considering a 95% confidence level and a 5% margin of error (common standards in research), an online sample size calculator suggested a minimum of 385 questionnaires (Sample Size Calculator, n.d.). This recommendation was based on the estimated population size, desired margin of error, and confidence level. However, this approach assumes knowledge of the population proportion of SMEs in Gauteng, which remains somewhat uncertain.

To account for this uncertainty, while still adhering to established conventions, the researcher adopted a more conservative approach. In accordance with Fox (2022), who suggests a minimum sample size of 100 for statistically significant results, the researcher determined that a sample size of **approximately 100 questionnaires** would be sufficient for this study. This decision balances the need for accurate representation with the reality of limited population data for Gauteng SMEs.

The decision to opt for a sample size of 100 questionnaires was made with careful consideration of the research objectives and constraints. While a larger sample size may have provided more robust results, practical limitations, such as time and

resource constraints, influenced this decision. It is worth noting that a sample size of 100 is still deemed acceptable in the research community for drawing meaningful conclusions, especially when dealing with a subpopulation like SMEs in Gauteng.

Additionally, efforts were made to ensure that the sample population was diverse and representative of the SME landscape in Gauteng. Various industries, sizes, and geographic locations were taken into account during the sampling process to capture a comprehensive view of the SME sector in the province.

Overall, the sample size of 100 questionnaires is deemed appropriate for the objectives of this study and aligns with best practices in research methodology, balancing precision and practicality.

The following table offers elucidation regarding the proposed sample for the present investigation.

Table 7: Profile of respondents

Entrepreneurs, whether operating within the formal or informal sector, who actively participate in running their businesses daily.	103
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3.4.2 *Sampling technique*

This study utilises convenience sampling, a non-probability method where participants are chosen based on their accessibility and availability (Bhattacharjee, 2012). This approach was deemed suitable due to its several **advantages**:

Feasibility: My location in Gauteng grants me direct access to a large pool of retail SMEs, both formal and informal (OECD, 2022). This significantly simplifies participant recruitment compared to random sampling methods. Cost-effectiveness: Convenience sampling reduces resource needs associated with identifying and contacting geographically dispersed participants. Time-efficiency: The accessibility of local Small and Medium-sized Enterprises (SMEs) allows for swift recruitment, enabling faster data collection and analysis (Bhattacharjee, 2012).

However, it's crucial to acknowledge the inherent **limitations** of convenience sampling:

Potential bias: Participants selected due to proximity may not accurately represent the wider Gauteng SME population. This could skew findings and limit generalisability.

Lack of representativeness: The sample may not reflect the diversity of characteristics within the target population, potentially leading to inaccurate conclusions.

While acknowledging these limitations, the researcher believes the chosen sampling method balances feasibility and practicality within the constraints of this research. To mitigate potential bias, the researcher will focus on analysing specific subgroups within the sample drawn from various geographic locations within Gauteng. Additionally, they will clearly highlight the limitations of generalisability in the study's conclusions and emphasize the need for further research using probabilistic sampling methods to validate the findings.

3.4.3 Sampling strategy

Upon addressing ethical considerations, the researcher commenced the data collection process by disseminating the survey link to willing participants. The researcher has identified a unit of Small and Medium-sized Enterprises (SMEs) operating in the retail sector in their local area, as well as a group of entrepreneurs on WhatsApp and LinkedIn, to serve as a sample for this study. Prior to sharing the link with interested participants, the researcher proceeded to seek permission from the WhatsApp group administrator. The researcher was granted permission by the University of the Witwatersrand's ethical committee to disseminate online questionnaires to the identified participants. In addition to the WhatsApp group, the researcher also physically visited some of the businesses near their place of residence and workplace and share the survey links with individuals who expressed interest using email or other practical messaging services, like WhatsApp. The email addresses and phone numbers have not been utilised in this study, but were only used solely for the purpose of sharing the survey links with potential participants.

To create and distribute the questionnaire, the researcher utilised Google Forms, which offers an intuitive user interface that enables the generation of surveys and forms without the need for coding expertise. The platform's drop and drag functionality

facilitates the swift addition and editing of questions, images, and conditional logic. Moreover, Google Forms is accessible from any device with an internet connection, thereby enhancing its convenience and accessibility (Chernikov, 2023). The online survey for SME owners will have a time limit before the researcher concludes the response functionality. The questionnaire for the study was administered by the researcher independently.

3.5 The research instrument.

This study employed a survey as the primary tool for exploration, consisting of an online questionnaire comprising 30 closed-ended questions. The present study has incorporated a total of 30 items in its questionnaire, as per the recommendation of Sharma (2022). It has been suggested that a well-designed questionnaire should comprise 25 to 30 questions and should be administered within a time frame of 30 minutes to ensure sustained interest and attention of the participants. The questionnaire in this study will take potential participants approximately 15 minutes to complete. It has been noted that an increase in the number of questions administered to participants results in a tendency for them to expedite their responses or engage in satisficing behaviour. This phenomenon has a detrimental impact on the quality, reliability, and response rates of the data obtained, therefore, the researcher has opted to maintain the items both captivating and concise. (Sharma, 2022). The researcher conducted a pilot survey study involving three participants to evaluate the questionnaire's user friendliness and time efficiency.

The research questionnaire was designed carefully to collect reliable and valid data. The five-point Likert scale, with 1 representing strongly disagree and 5 representing strongly agree, will be utilised by the researcher. The questionnaire has been organised and comprise questions that have been taken from previously published works. Guo et al. (2020) specifically gave the researcher items to create a questionnaire for factors such as business performance, technology adaptation, and SMEs sustainability, while Okello Candiya Bongomin et al. (2017) provided items for the financial innovation variable. Every Likert-scale item that was taken from the body of literature was initially intended to be used by companies and company owners abroad. The researcher has incorporated demographic inquiries in Section A of the

research questionnaire with the intention of introducing a unique aspect to the survey. Since Gauteng's retail SMEs are the study's target audience, the researcher has adjusted the questions to allow for adequate participation from them.

As per investigations by Jones et al. (2008) some of the advantages of web-based questionnaires are that the utilisation of survey questionnaires is among the most economical techniques for gathering data. In comparison to other methods such as interviews or focus group discussions, it is significantly less expensive. Survey questionnaires also have the advantage of being capable of gathering data from a large sample size, which enables the generalization of findings to the entire population. Participants in a survey questionnaire are afforded anonymity and confidentiality, which promotes more honest and accurate responses. Additionally, the questions in a survey questionnaire are standardized, ensuring that each participant is asked the same questions and reducing the risk of bias or influence. Finally, data collected through a survey questionnaire is straightforward to analyse using statistical software, facilitating the identification of key trends and patterns.

Jones et al. (2008) further argues that the following are some of the shortcomings of web-based questionnaires. The utilisation of survey questionnaires as a research method for investigating the impact of coronavirus on SMEs is associated with certain limitations. In comparison to other research methods for instance, focus groups or interviews, survey questionnaires have limited flexibility, which may impede the comprehensive capture of all aspects of SMEs' experiences related to the impact of coronavirus on their business. Furthermore, non-response bias can occur when individuals decide differently from those who do reply, which could impact how broadly applicable the results are. Furthermore, participants may be influenced by social desirability bias to answer in a way that is socially desirable, which might result in false information. Survey questionnaires may also lack the depth required to uncover the nuances of SMEs' lived experiences related to the impact of coronavirus on their business. Finally, survey questionnaires are limited in their capacity to identify causal relationships, because they are unable to determine a cause-and-effect connection between the factors.

In brief, the researcher opted to employ a survey questionnaire as it presents several benefits, including cost-effectiveness, anonymity, standardization, and the ability to

obtain a large sample size, to further this study. Appendix B contains the study's associated questionnaire.

3.6 Procedure for data collection

The present study involves the gathering of data from a selected sample population using research instruments in the form of an online questionnaire. The researcher got ethics approval in June 2023 and completed the data collection process in September 2023. Following data collection, the subsequent step involves data entry and cleaning, whereby the data is entered into a database and checked for accuracy, completeness, and correctness. The cleaning process entails the removal of any errors, missing data, or outliers. Subsequently, data analysis is conducted to examine the collected data and identify patterns, trends, relationships, and associations. The analysis is performed using the IBM SPSS statistical software to identify correlations, ordinal linear relationships, generalised models and multinomial regression between variables, differences between groups, or patterns in the data. The researcher ultimately assesses the analysed data and results, technological adaptability, financial innovation, and sustainability to respond to the study questions and hypotheses on the effects of coronavirus on SMEs business performance.

3.7 Data analysis and interpretation

The researcher had originally intended to employ SAS Enterprise Guide 7.1 for the purpose of data analysis. However, owing to technical difficulties, IBM SPSS (Statistical Package for the Social Sciences) was utilised as an alternative means of analysing the data.

Before utilising the SPSS software, the researcher undertook the task of coding the Likert Scale questionnaire using excel and the accompanying descriptive statistics data. This was done to facilitate ease of interpretation and analysis of the data on the SPSS platform.

As an illustration, given that the Likert Scale inquiries were formulated in an affirmative manner, the numerical code for the strongly disagree option was 1, and the numerical code for the strongly agree option was 5.

3.7.1 Descriptive statistics

In the field of biomedical research, descriptive statistics play a crucial part in elucidating the fundamental characteristics of the data being investigated (Gupta et al., 2019). These statistics offer concise summaries of both the sample and the measurements obtained. The normality test holds significant importance in the selection of appropriate measures of central tendency and statistical techniques for the analysis of continuous data (Gupta et al., 2019). In cases when the data has a normal distribution, parametric tests are utilised, enabling comparison between groups. On the other hand, nonparametric methods are applied in situations when the data deviates from a normal distribution (Gupta et al., 2019).

Several statistical techniques utilised in data analysis, such as regression, t-tests, correlation, and analysis of variance, are predicated on the assumption of normalcy (Gupta et al., 2019). Since the assumption of normalcy is the basis of parametric testing, evaluating the normalcy of data is a crucial prerequisite for many statistical tests (Gupta et al., 2019).

The two extensively used methods for determining whether data are normal—the Kolmogorov-Smirnov test and the Shapiro-Wilk test—are used in research, according to Gupta et al. (2019). They further state that while the Shapiro-Wilk test may be used with greater sample sizes, it is especially appropriate for smaller sample sizes (less than 50 samples). The Kolmogorov-Smirnov test, on the other hand, is usually applied when the sample size is 50 or more. With 103 individuals in the study, the Kolmogorov-Smirnov test was used to determine if the results for each of the four hypotheses were normal. Using such nonparametric tests, it was discovered that the data was not normally distributed for the research.

Prior to utilising nonparametric analysis, the researcher initially recorded the outcomes to verify whether the data conforms to a normal distribution.

3.7.2 Inferential statistics

There are several methods in inferential statistics that go beyond just describing a dataset. With the use of these statistical techniques, researchers may extrapolate

findings and conclusions from a sample to a broader population. By employing inferential statistics, one can investigate disparities between various groups and explore the associations between different variables (Guetterman, 2019).

Nonparametric tests

Are statistical procedures employed to analyse data that deviates from a normal distribution or lacks normality (Gupta et al., 2019). Non-parametric tests were employed in this study to analyse data gathered from small and medium-sized enterprises (SMEs) involved in the retail industry in Gauteng. This choice was made due to the non-normal distribution observed across all four hypotheses. The non-parametric tests that will be used in the study include the Wilcoxon signed-rank test, the Mann-Whitney U test, and the Kruskal-Wallis's test, which the researcher has carefully chosen. The statistical significance level, denoted by the p-value, is compared to a pre-established alpha threshold of 0.05 to evaluate the significance of the results.

H₁: Business performance has a positive correlation with SMEs sustainability.

H₂: Technology adaptation has a positive association with SMEs' sustainability during the pandemic.

H₃: Financial innovation is positively related with SMEs sustainability during the pandemic.

H₄: Lockdown restrictions have a negative relationship with the sustainability of SMEs during and post pandemic.

Ordinal linear regression

A statistical technique used to investigate the relationship between an ordinal dependent variable and one or more independent variables is called ordinal linear regression (Winship & Mare, 1984). It bears resemblance to conventional linear regression, yet it is specifically tailored to accommodate ordinal data. An ordinal variable is characterized by its categorical nature, wherein a natural order exists, such as educational levels, income brackets, or satisfaction rankings (Winship & Mare, 1984).

Finding the probability of a specific value of the ordinal dependent variable given a collection of independent factors is the main goal of ordinal linear regression. A regression equation that fits the data and creates a link between the dependent and independent variables is used to achieve this (Winship & Mare, 1984).

Since the data for the study was not normally distributed, the researcher will use the linear regression model to analyse the findings for each of the four hypotheses. In this study, a strategy will be used to investigate the relationship between the ordinal dependent variable, sustainability, and the independent variables, financial innovation, business performance, technology adaptation, and lockdown restrictions to examine the linkages in line with the hypotheses, each of them was conducted individually.

To determine the risk variables connected to a certain result, OLR will be utilised. OLR will be used to determine which variables are linked to increasing illness severity, for instance, if the dependent variable is the severity of a disease (mild, moderate, or severe), and the independent variables are clinical and demographic traits (Winship & Mare, 1984).

The researcher will look for the test of individual coefficients: This tells us how important each of the model's predictor variables is. the researcher will also analyse the probabilities Ratios: These show how the probabilities of a result change with each unit increase in a predictor variable. Lastly the Model fit statistics, such as the Nagelkerke R-squared value, provide information on the model's ability to suit the data (Winship & Mare, 1984).

In summary, one useful statistical method for establishing the relationship between an ordinal dependent variable and one or more independent variables is ordinary linear regression (OLR).

Generalised linear model.

A statistical framework used to determine the relationship between a response variable and one or more predictor variables is called the Generalized Linear Model (GLM). This model is specifically designed to accommodate response variables that exhibit non-normal distributions, including count data, binomial, multinomial, and continuous data. It represents an extension of linear regression, incorporating

enhanced flexibility. The pioneering work on this method was conducted by Nelder and Wedderburn (1972).

The researcher would first need to select pertinent variables that we may use to evaluate business performance and SME sustainability before using a GLM to test the hypothesis that business performance has a positive link with SMEs sustainability (H1). These factors may consist of things like the average income.

To confirm whether the data from the ordinal linear regression are indeed normally distributed and that there is a correlation between business performance and sustainability. For the second hypothesis, the researcher will use the GLM., H₁: Business performance has a positive correlation with SMEs sustainability.

In this case, the researcher would most likely use a linear regression model to ascertain the course and severity of the relationship among the two variables. To be more precise, we would calculate the regression coefficients (slope and intercept) between SME sustainability and business success, then analyse the results to ascertain the strength of the association.

To ascertain the significance of the association we see between business performance and SMEs sustainability, the researcher must also do statistical tests. To be more precise, we would calculate *p*-values to see if the observed link is statistically significant at $\alpha = 0.05$, a predetermined threshold of significance.

In conclusion the utilisation of this method will help enable the researcher to conclude the testing of the hypothesis and raw conclusions for retail SMEs in Gauteng.

Multinomial logistic regression

A statistical method called multinomial logistic regression is used to investigate the relationship between one or more independent factors and a categorical dependent variable that has three or more unordered categories (El-Habil, 2012). It is a generalized linear model that extends binary logistic regression, which is concerned with a categorical dependent variable with two categories (El-Habil, 2012). Multinomial logistic regression seeks to determine, given a collection of predictor factors, the probability that an observation will fall into a certain category of the dependent variable. According to El-Habil (2012), the technique assumes that the log-odds of an

observation falling into every group of the dependent variable are a linear function of the predictor variables, modified by the necessary coefficients.

The researcher plans to use the Multiple Linear Regression (MLR) method to draw conclusions on the H2 and H4 hypotheses. According to Hypothesis H2, there is a favourable relationship between SMEs' sustainability throughout the pandemic and their capacity to adapt to new technologies. Conversely, hypothesis H4 indicates that lockdown regulations have a detrimental impact on SMEs' capacity to survive the epidemic and grow beyond it. However, more testing is necessary to determine the links between the dependent variable and the independent factors because the ordinal logistic regression model did not well fit the data.

The researcher's final goal is to clarify how technology adoption and SMEs' ability to survive the pandemic are related (H₂), as well as the association between lockdown restrictions and SMEs' sustainability during and post-pandemic (H4), by means of interpreting the regression coefficients, parameter of estimates and model fit. The investigation's conclusions offer insightful information on how lockdown measures and technological adaptability affect SMEs' capacity to survive both during and after the pandemic.

3.7.3 Correlation tests

According to Schober et al. (2018), the Spearman coefficient is essentially a variation of the Pearson correlation coefficient that uses the rankings of the values of two variables rather than their actual values. It is often denoted as ρ (rho) or "rs." Unlike the Pearson coefficient, the Spearman coefficient is not limited to continuous variables as it can also be applied to ordinal data, which can be ranked (Schober et al., 2018). By utilising ranks, this coefficient effectively measures strictly monotonic associations between the two variables, as the ranking process converts a non-linear strictly monotonic relationship into a linear one (Schober et al., 2018).

The data for all four hypotheses are not normally distributed, hence the Spearman rank correlation will be employed in this analysis. To ascertain how strongly or mildly these characteristics connect to the dependent variable, sustainability, the relationships between sustainability and financial innovation, business performance, technology adaptation, and lockdown restrictions will be compared.

3.8 Limitations of the study

If the sample chosen is not representative of all small and medium-sized companies (SMEs), sampling bias may affect the current study. Only particular categories of SMEs that are not typical of the general population may be included in the sample. Additionally, the data collected for this study may be biased based on self-reporting, as the respondents provide the information. There is no guarantee that respondents will provide accurate information. Furthermore, the time constraint may limit the extent of data collection, analysis, and interpretation, potentially resulting in the study not covering all aspects of the impact of Coronavirus on SMEs. Utilising a survey questionnaire as the principal tool for research might potentially restrict the comprehensiveness and precision of information gathering, as it may be challenging to capture all aspects of SMEs' experiences with regards to the impact of Coronavirus on their business through a survey questionnaire. Furthermore, because the study was cross-sectional in nature, it may be challenging to establish causality between different variables in this study. Lastly, it's possible that the results of this study cannot be applied to other nations. or regions with different social, economic, and cultural settings, thus limiting the external validity of the study.

Given that the coronavirus pandemic is a recent phenomenon that is still undergoing extensive research, it is not possible to make conclusive judgments regarding its impact on the performance and sustainability SMEs based solely on quantitative analysis. To address this limitation, to get more exact insights, high-level mixed-method research (e.g., a PhD) must be conducted using a bigger sample of SME owners from various industries in South Africa as the study's primary subjects. Additionally, the study may encounter administrative challenges, such as delayed email responses, which may impede the timely acquisition of all questionnaire responses. This limitation may be addressed, though, by performing a comprehensive literature review, examining data from several research, and formulating conclusions based on the facts at hand. It is crucial to remember that the epidemic is continuing strong and that fresh thoughts and concepts about how it affects business performance are always coming to light. Therefore, any findings obtained from this cross-sectional survey should not be considered definitive.

3.9 Validity and reliability

This study focuses on validity, which is the degree to which the information obtained accurately assesses the effect of the coronavirus pandemic on small and medium-sized businesses' (SMEs) financial innovation, technological adaptation, and sustainability. A trustworthy questionnaire was used by the researcher to guarantee the study's validity.

In accordance with the findings of Guo et al. (2020), Zamberi Ahmad and Xavier (2012), and Okello Candiya Bongomin et al. (2017), the gathered data also went through a thorough verification procedure to guarantee that it appropriately reflects the variables under inquiry.

According to the current study, dependability is the extent to which the collected data is reliable and consistent, regardless of the timing or the researcher conducting the study. To guarantee reliability, a dependable research questionnaire that yields consistent outcomes over time was employed. To avoid any discrepancies in the replies, the researcher also made sure that every participant understood the questions and answered honestly.

3.9.1 External validity

The concept of accurately measuring a notion in a quantifiable investigation is commonly referred to as validity, as noted by Heale and Twycross (2015). It is widely accepted that a questionnaire designed to examine depression, but instead assesses anxiety, for example, would not be considered valid (Heale & Twycross, 2015). Using an online questionnaire constructed from reliable, peer-reviewed literature, the researcher will examine how the novel coronavirus affects small and medium-sized enterprises' (SMEs) performance, innovation, and entrepreneurial activities with an emphasis on sustainability. Based on composite reliability measures, the validity of the questionnaire's scales has been confirmed (Guo et al., 2020; Zamberi Ahmad and Xavier, 2012; Okello Candiya Bongomin et al., 2017). Please refer to **Table 9** for a list of the scales used in this research study, along with their reliability measures.

3.9.2 Internal validity

As noted by Guo et al. (2020), and Okello Candiya Bongomin et al. (2017), the study's questionnaire was created especially for small- and medium-sized business owners, and it passed a thorough review process to guarantee its validity and reliability. The researcher has taken measures to adapt and refine the language and terminology of the scales to better suit the targeted population of retail Small and Medium-sized Enterprises (SMEs) situated in South Africa. The questionnaire has been designed with the intention of maintaining a reasonable time commitment for participants while also enhancing its visual appeal. All contributors will be informed of the purpose of this investigation and their involvement in the study will be entirely voluntary and contingent upon their explicit consent.

3.9.3 Reliability

The concept of consistency in a metric is a fundamental aspect of reliability, as posited by Heale and Twycross (2015). To illustrate, when a respondent engages in a motivational assessment tool survey, it is expected that their responses will exhibit a degree of similarity (Heale & Twycross, 2015). To evaluate the reliability of the survey instrument, the widely used Cronbach's alpha reliability measuring method will be used by the researcher. Scales with composite scores greater than 0.7 have been used in prior research, demonstrating the trustworthiness of the instruments (Guo et al., 2020; Okello Candiya Bongomin et al., 2017). The Cronbach Alpha scores are presented in **Table 8**. To guarantee reliability, a dependable research questionnaire that yields consistent outcomes over time was employed. The researcher further made steps to guarantee that each participant understood the questions and answered honestly to avoid any discrepancies in the results.

Table 8: Reliability of Constructs

Construct	Cronbach Alpha
Business Performance (IV)	0.70
Technology Adaptation (IV)	0.78

Financial Innovation (IV)	0.924
SMEs Sustainability (DV)	0.71

Table 9: Scales used for this research study.

Variable name	Scales	Items
Business performance (IV)	1. The cost of operations and production has decreased. 2. We have sold off our failed or loss-making company segments. 3. We've embraced online remote work. 4. In response to changing customer needs, we have enhanced our business plans. 5. We are no longer using the offline transactional paradigm and have established marketing channels. 6. We aggressively encourage the development of new technologies. 7. We have knowledge about my company's potential market expansions. 8. Our establishment's supply chain is in harmony. (Guo et al., 2020)	8
Technology Adaptation (IV)	1. Throughout the COVID-19 era, we have entirely shifted to selling goods and services online.	5

	2. We have finished implementing the digital platforms that enable digital products and services. 3. Digital infrastructures, including technological tools and systems, are completely embraced by us. 4. We've embraced digital business concepts in full. 5. We've completely embraced digital management techniques. (Guo et al., 2020)	
Financial innovation (IV)	1. Digital management concepts have been fully implemented. 2. We give lenders consistent income statements. 3. We are instructed in proper bookkeeping procedures. 4. We are officially insured for the establishment. 5. The management can calculate how much the borrowed funds will cost. 6. We have a savings account right now. 7. The company may create basic accounting records. 8. We know how lending firms function regarding their need for funds. 9. We are cognizant of the benefits and drawbacks associated with acquiring loans.	9

	(Okello Candiya Bongomin et al., 2017).	
SMEs sustainability (DV)	1. After the pandemic, we want to alter our current product lines. 2. We're going to adjust how we cover our local markets. 3. To make our cooperative ties viable, we shall adjust them. 4. We intend to make better use of online office tasks. 5. We are aware of initiatives to boost the digitalization of the supply chain. 6. Digital products and services will be utilised as digital artifacts. 7. Digital technologies such as digital communication platforms will be utilised. 8. We want to make advantage of digital technology systems and infrastructures. (Guo et al., 2020)	8

3.10 Demographic profile of respondents

Table 10: Demographic profiles of respondents.

<i>Gender:</i>	The participants' gender in the survey may hold significance in ascertaining the presence of gender-based prejudices in the impact of

	the Coronavirus on SMEs Such an analysis could facilitate the identification of any requisite assistance for female entrepreneurship during a pandemic. The gender distribution of the respondents was looked at in this study. The findings showed that 58.3% of participants identified as male and 40.8% of participants as female. A small proportion of the sample, specifically 0.1%, identified as other.
<i>Number of employees:</i>	The size of a company may affect its capacity to endure the challenges presented by the epidemic. Large-scale SMEs with more than fifty workers have access to resources that they may utilise, as opposed to their smaller counterparts, as such this may have an impact on their response to the situation. According to the data presented, a significant proportion of retailers in Gauteng are small enterprises, with 67.7% of them having between 0-10 employees. A further 20.8% of businesses have 11-30 employees, while 8.9% have between 31-50 employees. A mere 3% of businesses have between 51-100 employees. These findings suggest that most businesses in Gauteng are characterised by a small workforce.
<i>Sector of operation:</i>	Given the non-uniform impact of the pandemic on various sectors, it is imperative to consider the sector of operation.

	According to the findings, 40.8% of businesses operate within the formal sector, while the remaining 59.2% operate within the informal sector. Notably, the study reveals that a significant portion of the data is accounted for by informal retail businesses located in Gauteng.
<i>Average revenue:</i>	An indicator of how much the pandemic has impacted a firm is the estimate of its average revenue. SMEs with multiple sources of income might potentially have more access to resources and be better prepared to face the difficulties presented by the epidemic. There may be a link between changes in revenue and the onset of the pandemic if revenue levels are compared before, during, and after the pandemic (El Chaarani et al., 2021) The research findings indicate a notable disparity in income levels between formal and informal businesses. On average, the minimum revenue generated by businesses was observed to be R0.00, while the maximum revenue reached R10,000,000.00. In the specific context of Gauteng, retail businesses were found to generate an average revenue of R93,3061.65. These figures highlight the significant variation in income levels across different types of businesses, emphasizing the economic

	disparities between formal and informal sectors.
<i>Nature of business:</i>	Considering the kind of company that SMEs operate in might help gain a better understanding of the opportunities and challenges that they experienced throughout the pandemic. Gaining broad insights into their innovation culture and business strategy can be facilitated by this understanding. It is interesting to note that during the pandemic, companies who were previously focused on products would have switched to supplying services, and vice versa (Ipsos, 2020). In this study, it was found that 24.3% of the retail SMEs included in the sample were categorized as spaza/convenience stores. Additionally, 15.5% of the SMEs were identified as salons or barbershops, while 13.6% were classified as clothing stores. Home furnishing retailers accounted for 9.7% of the sample, followed by tourist shops at 7.8% and grocery stores at 5.9%. The remaining percentage was allocated to various other forms of retailers, such as ecommerce platforms, pharmacies, direct mail order services, and butcheries, among others.
<i>Years of the establishment:</i>	The length of time SMEs have been in business may have an impact on how the pandemic affects them, since more established businesses may have the resources and know-how to adjust. SMEs

	who have been in business longer might also have a wider clientele, which could influence how they react to the pandemic (Kalidas et al., 2020). The results of this investigation show that around 41.7% of enterprises have maintained their operations for a duration ranging from 2 to 5 years. Furthermore, 31.1% of businesses have demonstrated longevity by operating for over a decade. Additionally, a notable proportion of 22.3% of enterprises have sustained their operations for a period spanning from 6 to 10 years. Lastly, a smaller fraction of 4.9% of businesses have been in operation for a relatively short period of 0 to 1 year.
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3.11 Ethical considerations.

To conduct research involving human participants, The researcher obtained approval from the ethics committee at the University of the Witwatersrand, Johannesburg with certificate number **H23/04/11** to collect data from entrepreneurs in the Small and Medium-sized Enterprises (SMEs) retail sector across Gauteng. Prior to their participation, the researcher shall furnish prospective participants with comprehensive information regarding the study's objectives, methodologies, and ramifications, encompassing any conceivable hazards. Participants shall be entitled to withdraw from the study at their discretion. Participants' privacy will be respected, and only their express agreement will be obtained before they may take part in the survey. Participants will not have access to the data that is gathered on them, and it will only be kept for a brief period of 3 years on OneDrive before being erased. SMEs' answers and personal data will remain confidential. The Protection of Personal Information

(POPI) Act will be rigorously followed during the survey procedure, and the privacy of the SME owners will be preserved during the data gathering time.

The study must be planned so that the potential benefits to the participants outweigh any possible dangers to comply with the beneficence principle. To uphold the concept of non-maleficence, the researcher must take precautions to guarantee that participants in the study suffer no bodily, psychological, or emotional damage. The principle of respect for participants mandates that the researcher must uphold the participants' rights, cultural beliefs and values, and dignity throughout the study. Finally, the principle of conflict of interest demands that the researcher disclose any conflicts of interest, such as financial gain or bias towards a particular outcome, that may impact the research.

CHAPTER 4. PRESENTATION OF RESULTS

4.1 Introduction

Globally, the coronavirus pandemic has had a profound and wide-ranging effect on people and enterprises. SMEs (Small Medium Sized Enterprises) have suffered greatly because of the epidemic. The goal of this dissertation chapter is to present a thorough examination of the ways that SMEs' financial innovation, business performance, technological adaption, and sustainability have been impacted by the coronavirus epidemic.

Considering the COVID-19 epidemic, this study attempts to provide a comprehensive analysis of the organisational resources of SMEs, considering financial innovation, sustainability, technological adaptation, and business performance. Additionally, this study aims to elucidate the impact of lockdown constraints on the viability of SMEs in this scenario.

A positivist study was undertaken in the form of quantitative research to study the effect of COVID-19 on retail SMEs in Gauteng. The researcher utilised an online research questionnaire to solicit participation from entrepreneurs. To assess the hypotheses in this study, the researcher employed various statistical tests including tests of normality, ordinal linear regression, generalized linear model, multinomial logistic regression, and correlation analysis. These analytical methods were used to all four hypotheses to obtain a thorough grasp of the connections between the independent and dependent variables.

All things considered; the chapter offers a thorough summary of how the coronavirus pandemic has affected SMEs. Because of the information' organised, straightforward, and unambiguous presentation, the reader is better able to understand how the pandemic has affected SMEs and the economy.

4.2 Results pertaining to Hypothesis 1

H_1 : Business Performance has a positive correlation with SMEs sustainability.

4.2.1 Tests of normality

Table 11: Tests of Normality

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Sustainability	.115	103	.002	.965	103	.008
Business Performance	.104	103	.008	.982	103	.184
a. Lilliefors Significance Correction						

For the sustainability variable, the Kolmogorov-Smirnova test of normality show statistical significance ($p < .05$), indicating that the variable is not normally distributed. For the business performance variable, the Kolmogorov-Smirnova test shows statistical significance ($p < .05$), indicating that the variable is not normally distributed.

Table 12: Tests of Normality (Logged)

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
log_Sustainability	.140	103	<.001	.922	103	<.001
log_Business_Performance	.111	103	.003	.964	103	.007
a. Lilliefors Significance Correction						

The table above demonstrates that despite logging the variables to establish the normality of the data, the results remain below the significance level of 0.05 for both the dependent variable, sustainability, and the independent variable, business performance, as determined by the Kolmogorov-Smirnov test.

4.2.2 Ordinal linear regression.

Table 13: Model Fitting Information

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	349.484			
Final	334.211	15.273	1	<,001
Link function: Logit.				

The findings of a Test of Parallel Lines used to analyse the link between business performance (IV) and sustainability (DV) are displayed in the IBM SPSS (Statistical Package for the Social Sciences) output above. The statistical significance of the model fit test above is evidenced by its value being <0.05, indicating a strong fit between the model and the data.

Table 14: Goodness of Fit

Goodness-of-Fit			
	Chi-Square	Df	Sig.
Pearson	355.882	379	.798
Deviance	227.107	379	1.000
Link function: Logit.			

The results of a goodness-of-fit test applied to a logistic regression model with a logit link function are shown in the current output. According to Winship and Mare (1984), the Chi-Square goodness-of-fit test determines if the observed frequencies in the data match the expected frequencies predicted by the model.

The Pearson and Deviance Chi-Square test types are displayed in the table. Based on the difference between the actual and predicted frequencies, divided by the expected frequencies, Pearson Chi-Square is calculated. Abnormality The difference between the complete model (which includes a predictor variable) and the null model (which just includes an intercept) is measured using Chi-Square (Winship & Mare, 1984).

The significance level (Sig.) in the table indicates the statistical significance of the Chi-Square test. In this example, both Pearson and Deviance tests have high p -values ($p=.910$ and $p=1.000$, respectively), indicating that the model's predicted probabilities fit the observed data well.

Table 15: Pseudo R-Square

Pseudo R-Square	
Cox and Snell	.138
Nagelkerke	.139
McFadden	.028
Link function: Logit.	

The information above presents the results of three different Pseudo R-Square measurements for a logistic regression model using a logit link function: Cox and Snell, Nagelkerke, and McFadden. By comparing the deviation of the complete model, which contains predictor variables, with the deviation of the null model, which only includes an intercept, pseudo R^2 measurements are used to assess the adequacy of fit of a logistic regression model. These metrics provide an estimate of the percentage of variation explained by the model relative to the null model.

The Cox and Snell and Nagelkerke pseudo R^2 are 0.138 and 0.139, respectively, according to the findings.

Table 16: Tests of Parallel lines

Test of Parallel Lines^a				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	334.211			
General	316.770 ^b	17.441 ^c	18	.493

The results of a Test of Parallel Lines on a logistic regression model with a logit link function and two predictor variables, "Threshold" and "Location," are shown in the current output.

The slope coefficients, or location parameters, are tested for uniformity throughout the response variable's levels using the Test of Parallel Lines. The response variable is implied to be a categorical result variable with numerous levels even if it isn't mentioned directly in the report (Winship & Mare, 1984).

For the Test of Parallel Lines, the null hypothesis states that the slope coefficients are the same for all answer categories. The results show that the null hypothesis has a significance level of .493 and a chi-square value of 17.411 on 360 degrees of freedom. These results imply that the null hypothesis cannot be refuted by strong evidence, and the slopes of the response categories stay parallel.

Table 17: Parameter of Estimates

Parameter Estimates								
		Estimate	Std. Error	Wald	Df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Thresh hold	[Sustainability = 2,13]	-.716	1.391	.265	1	.607	-3.442	2.009
	[Sustainability = 2,25]	-.005	1.202	.000	1	.997	-2.361	2.351
	[Sustainability = 2,38]	.722	1.099	.432	1	.511	-1.431	2.876
	[Sustainability = 2,50]	.966	1.078	.804	1	.370	-1.146	3.079
	[Sustainability = 2,75]	1.342	1.056	1.616	1	.204	-.727	3.411
	[Sustainability = 2,88]	1.625	1.045	2.420	1	.120	-.423	3.673
	[Sustainability = 3,00]	2.054	1.037	3.921	1	.048	.021	4.086
	[Sustainability = 3,13]	2.453	1.037	5.599	1	.018	.421	4.485
	[Sustainability = 3,25]	2.892	1.042	7.701	1	.006	.849	4.934
	[Sustainability = 3,38]	3.363	1.053	10.199	1	.001	1.299	5.426
	[Sustainability = 3,50]	3.789	1.066	12.633	1	<.001	1.700	5.878

	[Sustainability = 3,63]	4.281	1.083	15.619	1	<,001	2.158	6.405
	[Sustainability = 3,75]	5.055	1.113	20.639	1	<,001	2.874	7.236
	[Sustainability = 3,88]	5.787	1.141	25.740	1	<,001	3.551	8.023
	[Sustainability = 4,00]	5.926	1.146	26.735	1	<,001	3.679	8.172
	[Sustainability = 4,13]	6.682	1.180	32.069	1	<,001	4.369	8.995
	[Sustainability = 4,25]	7.577	1.245	37.050	1	<,001	5.137	10.017
	[Sustainability = 4,38]	8.298	1.344	38.145	1	<,001	5.665	10.931
	[Sustainability = 4,63]	9.005	1.518	35.172	1	<,001	6.029	11.981
Location	Business_Performance	1.233	.314	15.388	1	<,001	.617	1.850
Link function: Logit.								

The study analyses the values of the regression coefficients for the continuous variable business performance and each level of the categorical variable threshold, as shown in the estimate column. The business performance variable has a range of 0 to 1, and the thresholds cover a range of values from 2.13 to 4.63.

Each coefficient's significance was evaluated using the Wald test, and the resulting *p*-value is shown in the "Sig." column. For every coefficient, the study also offers a 95% confidence interval.

Regarding the business performance variable, the coefficient value is 1.233, with a standard error of .314. The *p*-value is less than .001, indicating that the coefficient is statistically significant. According to this finding, there is a positive correlation between business growth and the possibility of SMEs' sustainability. The coefficient's 95% confidence interval spans from .617 to 1.850.

4.2.3 Generalised linear model

Table 18: Goodness of Fit

Goodness of Fit ^a			
	Value	Df	Value/df
Deviance	287.684	587	.490
Scaled Deviance	287.684	587	
Pearson Chi-Square	581.000	587	.990
Scaled Pearson Chi-Square	581.000	587	
Log Likelihood ^b	-190.821		
Akaike's Information Criterion (AIC)	423.642		
Finite Sample Corrected AIC (AICC)	435.050		
Bayesian Information Criterion (BIC)	478.971		
Consistent AIC (CAIC)	499.971		

A categorical variable, the business sector (formal or informal), was employed to examine the relationship between business performance and SMEs Sustainability.

The model's suitability for fitting the data is shown by the Deviance value of 287.684, where lower values indicate a better match. With 587 degrees of freedom in the model, the Value/df ratio is .490, which is rather low and suggests that the model fits the data well.

Furthermore, the Pearson Chi-Square (.990) and Scaled Deviance (.990) statistics provide additional measures of goodness of fit and have the same values as the original Deviance and Pearson Chi-Square statistics.

Table 19: Omnibus Test

Omnibus Test ^a		
Likelihood Ratio Chi-Square	Df	Sig.
16.749	2	<.001

The fitted model's Likelihood Ratio Chi-Square score of 16.749 is compared to a thresholds-only model, or a model that just has the intercept. The p -value is $< .001$ because of the two degrees of freedom in the model. This demonstrates that compared to the threshold-only model, the three-predictor logistic regression model provides a significantly better fit to the data.

The three-predictor logistic regression model fits the data well overall, according to the Omnibus Test, and the predictor variables greatly help in predicting the dependent variable "sustainability."

Table 20: Tests of Model Effect

Tests of Model Effects			
Source	Type III		
	Likelihood Ratio Chi-Square	df	Sig.
Business Sector	1.476	1	.224
Business Performance	6.396	1	.011

With a p -value of .224 and a likelihood ratio chi-square of 1.476 with one degree of freedom, the variable representing the business sector is not a significant predictor of the dependent variable, sustainability.

On the other hand, business performance is a strong predictor of Sustainability, as evidenced by the variable's likelihood ratio chi-square of 6.396 with one degree of freedom and p -value of .011.

Table 21: Parameter of Estimates

Parameter Estimates										
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	Df	Sig.		Lower	Upper
[Business_Sector=1]	.520	.430	-.324	1.363	1.458	1	.227	1.682	.723	3.909
[Business_Sector=2]	0a	.	.	.	.	.	.	1	.	.
Business_Performance	.978	.388	.217	1.739	6.342	1	.012	2.659	1.242	5.694

Appendix C: The route two results basically give the researcher the differences in the Exp(B) column and the confidence interval.

The "Threshold" variable is made up of several categories, each of which represents a different sustainability level. It is stated using a set of dummy variables. A separate estimated coefficient, standard error, confidence range, and hypothesis test result are linked to each sustainability level. With all *p*-values less than .001, the results show a substantial positive association between the sustainability level and the log probabilities of being sustainable. A firm with a sustainability level of 4.25, for example, is expected to have 6.95 units greater log chances of being sustainable than a company with a sustainability level of 2.13.

A collection of dummy variables reflects the two categories that make up the variable "business sector": Formal and Informal. The formal sector's estimated coefficient is .52, meaning that formalized retail enterprises have a larger log chance of

sustainability than informal ones—by .52 units. The p -value of .227 indicates that this difference is not statistically significant.

The calculated coefficient for the variable "business performance" is .978, meaning that for every unit improvement in business performance, the log probabilities of being sustainable rise by .978 units. The statistical significance of this link is indicated by the p -value of .012

4.2.4 Nonparametric correlation

Table 22: Correlation Analysis

Correlations				
			Business_P erformance	Sustainabil ity
Spearman's rho	Business Performance	Correlation Coefficient	1.000	.373**
		Sig. (2-tailed)	.	<,.001
		N	103	103
	Sustainability	Correlation Coefficient	.373**	1.000
		Sig. (2-tailed)	<,.001	.
		N	103	103
**. Correlation is significant at the 0.01 level (2-tailed).				

To ascertain a relationship between Gauteng's retail business performance and sustainability the Spearman's rho correlation was deployed by the researcher as the data is not normally distributed.

The present study presents the correlation matrix for the variables business performance and sustainability, obtained through the application of Spearman's rho correlation analysis. The matrix displays the following results:

Firstly, the correlation coefficient between business performance and itself is 1.000, indicating a perfect positive correlation, as expected.

Secondly, a positive correlation was found between business performance and sustainability, with a correlation coefficient of .373. This suggests that as sustainability practices improve, business performance tends to improve as well.

Thirdly, sustainability was found to have a positive correlation with business performance, with a correlation coefficient of .373. This indicates that businesses that prioritise sustainability tend to have better overall performance.

4.3 Results pertaining to Hypothesis 2

H₂: Technology Adaptation has a positive association with SMEs' sustainability during the pandemic.

4.3.1 Test of normality

Table 23: Tests of Normality

		Tests of Normality					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Business Type	Statistic	df	Sig.	Statistic	df	Sig.
log_Technology_Adaptation	Clothing	.182	14	.200*	.931	14	.316
	Salon	.188	16	.134	.933	16	.271
	Tourist	.189	25	.022	.964	25	.499
	Spaza	.249	8	.154	.909	8	.346
	Grocery	.245	6	.200*	.914	6	.463
	Direct_Sales	.338	5	.063	.876	5	.291
	Furnishing	.227	10	.156	.902	10	.229
	Ecommerce	.223	5	.200*	.915	5	.499
	Other	.173	14	.200*	.877	14	.053
log_Sustainability	Clothing	.133	14	.200*	.954	14	.620
	Salon	.206	16	.068	.902	16	.088
	Tourist	.169	25	.064	.918	25	.047
	Spaza	.206	8	.200*	.929	8	.504
	Grocery	.255	6	.200*	.870	6	.227
	Direct_Sales	.190	5	.200*	.959	5	.799
	Furnishing	.233	10	.133	.848	10	.055
	Ecommerce	.245	5	.200*	.892	5	.368
	Other	.251	14	.017	.794	14	.004
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

In relation to the log technology adaptation variable, the findings indicate that none of the distributions exhibit significant deviation from normality at a significance level of 0.05, as determined by either the Kolmogorov-Smirnova or the Shapiro-Wilk test, except for the Tourist business type. The Kolmogorov-Smirnova test yielded a p -value of 0.022 for this business type, although this value represents a lower bound of the true significance and may not be considered a significant deviation.

Regarding the log sustainability variable, the results demonstrate that the distributions for three business types (Tourist, Direct Sales, and other) significantly deviate from normality at a significance level of 0.05 in the Shapiro-Wilk test. Furthermore, the distributions for the Tourist and other business types significantly deviate from

normality at a significance level of 0.05 in the Kolmogorov-Smirnova test, with a Lilliefors significance correction applied. As such, a nonparametric test will be deployed for the study.

4.3.2 Ordinal linear regression

Table 24: Case Processing Summary

Case Processing Summary			
		N	Marginal Percentage
Sustainability	2.13	1	1.0%
	2.25	1	1.0%
	2.38	2	1.9%
	2.50	1	1.0%
	2.75	2	1.9%
	2.88	2	1.9%
	3.00	4	3.9%
	3.13	5	4.9%
	3.25	7	6.8%
	3.38	9	8.7%
	3.50	9	8.7%
	3.63	11	10.7%
	3.75	17	16.5%
	3.88	13	12.6%
	4.00	2	1.9%
	4.13	8	7.8%
	4.25	5	4.9%
	4.38	2	1.9%
	4.63	1	1.0%
	4.75	1	1.0%
Business_Type	Clothing	14	13.6%
	Salon	16	15.5%
	Tourist	25	24.3%
	Spaza	8	7.8%
	Grocery	6	5.8%
	Direct_Sales	5	4.9%
	Furnishing	10	9.7%
	Ecommerce	5	4.9%
	Other	14	13.6%

Valid	103	100.0%
Missing	3	
Total	106	

The present study provides an overview of the Case Processing Summary table, which presents relevant information regarding the variables: sustainability and business type. Specifically, the table reports the number and percentage of valid cases for each variable.

With respect to the sustainability variable, the table indicates that 103 valid examples overall, ranging in value from 2.13 to 4.75. 3.75 (17 instances) and 3.38 (9 cases) are the most common numbers; values below 3 and over 4 are seen in a tiny number of cases. The proportion of cases that correspond to each value is shown by the percentages in the table.

The table shows 103 eligible scenarios and 9 potential values for the variable business type. "Tourist" and "Salon" are the most prevalent company kinds (25 and 16 instances, respectively), whilst "Ecommerce" and "Direct Sales" are the least prevalent (both with 5 cases). In addition, 14 instances fall under the "other" category. The percentages in the table show how many instances fall into each group relative to the total number of valid cases.

Table 25: Model Fitting Information

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	477.408			
Final	433.458	43.950	9	<,.001
Link function: Logit.				

The obtained *p*-value (<.001) of less than 0.001 provides compelling evidence that the final model is a markedly superior fit to the data in comparison to the intercept-only model.

Table 26: Goodness of Fit

Goodness-of-Fit			
	Chi-Square	Df	Sig.
Pearson	1038.894	1150	.991
Deviance	380.727	1150	1.000
Link function: Logit.			

The outcome of the Pearson chi-square test is 1038.894 with 1150 degrees of freedom (df) and a significance level of .991, with a chi-square value of .91. Since there is no discernible difference between the observed and anticipated frequencies and the p -value is larger than .05, the researcher can say that the model well describes the data.

With 1150 degrees of freedom and a significance threshold of 1.000, the Deviance test result is 380.727. We can again draw the conclusion that the model fits the data well and that there is no appreciable discrepancy between the observed and predicted frequencies since the p -value is higher than .05.

Both tests show that the model, which has a Logit link function, accurately describes the observed data.

Table 27: Pseudo R-Square

Pseudo R-Square	
Cox and Snell	.347
Nagelkerke	.349
McFadden	.081
Link function: Logit.	

For the purposes of this data set the researcher will focus on the results for the Nagelkerke, which is the R^2 for linear regression. The Cox and Snell and Nagelkerke pseudo R^2 values, which measure the goodness of fit of a model to the data, are bounded between 0 and 1. Higher values indicate a superior fit of the model to the data. In this study, both the Cox and Snell and Nagelkerke values are approximately 0.35, implying that the model accounts for roughly 35% of the variability in the dependent variable, sustainability.

Table 28: Tests of Parallel Lines

Test of Parallel Lines^a				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	306.981			
General	8.910 ^b	298.071 ^c	18	<,.001

The data set illustrates that the data has violated the odds of this proportional test as the p -value is less <0.05 . The results of the Kolmogorov-Smirnova and Shapiro-Wilk tests revealed significant departures from normality for the sustainability. Additionally, technology adaptation distribution might not be exactly normal, the degree of divergence from normality might be small.

4.3.3 Multinomial logistic regression

Table 29: Model Fitting Information

Model Fitting Information				
Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	335.014			
Final	277.839	57.175	19	<,.001

With 171 degrees of freedom and a p -value of $<.001$, the final model has a good fit to the data and there is no indication that it differs significantly from the fit of the intercept-only model.

Table 30: Goodness of Fit

Goodness-of-Fit			
	Chi-Square	Df	Sig.
Pearson	213.470	323	1.000
Deviance	176.486	323	1.000

The Pearson test results show that there is no indication of a significant difference between the observed and anticipated frequencies, with 323 degrees of freedom and a p -value of 1.000.

The difference between the response variable's actual values and those predicted by the model, as determined by the deviance test, is represented by the chi-square value in the second row. The deviance test similarly has 323 degrees of freedom and a p -value of 1.000, suggesting that there is no proof that the observed and predicted values vary significantly from one another.

Table 31: Pseudo R-Squared

Pseudo R-Square	
Cox and Snell	.426
Nagelkerke	.428
McFadden	.105

In this case the Nagelkerke's Pseudo R^2 indicates that the predictor variable, technology adaptation in the model explains approximately 42-43% of the variance in sustainability compared to the 35% of the previous model.

Table 32: Likelihood Ratio Tests

Likelihood Ratio Tests				
Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	330.987	53.148	19	<.001
Technology Adaptation	335.014	57.175	19	<.001

This table presents the results of likelihood ratio tests conducted on a statistical model that incorporates a single predictor variable. The initial row displays the -2-log likelihood of the reduced model, which solely comprises an intercept term. The subsequent row displays the -2-log likelihood of the final model, which includes the predictor variable technology adaptation. The likelihood ratio test compares the final

model to the reduced model and yields a Chi-square statistic of 57.175 with 19 degrees of freedom. This outcome indicates that the inclusion of technology adaptation in the model significantly enhances the model's fit compared to the reduced model. In summary, the likelihood ratio tests indicate that the model that incorporates the predictor variable technology adaptation provides a superior fit to the data than the model which included the categorical variable, business type.

Table 33: Parameter Estimates

Parameter Estimates								
Sustainability ^a		B	Std. Error	Wald	Df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)
								Lower Bound Upper Bound
2.25	Intercept	-155.249	2558.122	.004	1	.952		
	Technology_Adaptation	119.289	1930.963	.004	1	.951	6.403E+51	.000 . ^b
2.38	Intercept	-236.801	2450.628	.009	1	.923		
	Technology_Adaptation	175.938	1820.982	.009	1	.923	2.565E+76	.000 . ^b
2.50	Intercept	-243.393	2450.631	.010	1	.921		
	Technology_Adaptation	178.057	1820.982	.010	1	.922	2.133E+77	.000 . ^b
2.75	Intercept	-241.178	2450.629	.010	1	.922		
	Technology_Adaptation	177.566	1820.982	.010	1	.922	1.306E+77	.000 . ^b
2.88	Intercept	-233.593	2450.627	.009	1	.924		
	Technology_Adaptation	174.471	1820.982	.009	1	.924	5.915E+75	.000 . ^b

3.00	Intercept	- 239.745	2450.627	.010	1	.922			
	Technology_A daptation	177.315	1820.982	.009	1	.922	1.016E+77	.000	. ^b
3.13	Intercept	- 238.790	2450.627	.009	1	.922			
	Technology_A daptation	177.058	1820.981	.009	1	.923	7.859E+76	.000	. ^b
3.25	Intercept	- 237.419	2450.627	.009	1	.923			
	Technology_A daptation	176.679	1820.981	.009	1	.923	5.378E+76	.000	. ^b
3.38	Intercept	- 239.841	2450.627	.010	1	.922			
	Technology_A daptation	177.621	1820.981	.010	1	.922	1.380E+77	.000	. ^b
3.50	Intercept	- 238.364	2450.627	.009	1	.923			
	Technology_A daptation	177.116	1820.981	.009	1	.923	8.324E+76	.000	. ^b
3.63	Intercept	- 241.854	2450.627	.010	1	.921			
	Technology_A daptation	178.320	1820.981	.010	1	.922	2.777E+77	.000	. ^b
3.75	Intercept	- 241.020	2450.626	.010	1	.922			
	Technology_A daptation	178.199	1820.981	.010	1	.922	2.460E+77	.000	. ^b
3.88	Intercept	- 242.545	2450.627	.010	1	.921			
	Technology_A daptation	178.576	1820.981	.010	1	.922	3.584E+77	.000	. ^b

4.0 0	Intercept	- 245.9 64	2450. 629	.010	1	.920			
	Technology_A daptation	179.0 17	1820. 982	.010	1	.922	5.571E +77	.000	. ^b
4.1 3	Intercept	- 240.7 36	2450. 627	.010	1	.922			
	Technology_A daptation	177.8 74	1820. 981	.010	1	.922	1.777E +77	.000	. ^b
4.2 5	Intercept	- 247.5 61	2450. 628	.010	1	.920			
	Technology_A daptation	179.6 89	1820. 981	.010	1	.921	1.091E +78	.000	. ^b
4.3 8	Intercept	- 247.7 35	2450. 630	.010	1	.919			
	Technology_A daptation	179.4 95	1820. 982	.010	1	.921	8.991E +77	.000	. ^b
4.6 3	Intercept	- 248.4 28	2450. 633	.010	1	.919			
	Technology_A daptation	179.4 95	1820. 982	.010	1	.921	8.991E +77	.000	. ^b
4.7 5	Intercept	- 564.6 62	6678. 510	.007	1	.933			
	Technology_A daptation	243.3 43	.000	.	1	.	4.816E +105	4.816E+ 105	4.816E+1 05
a. The reference category is: 2,13.									
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.									

For a logistic regression model with sustainability as the outcome variable and technology adaptation as the predictor variable, parameter estimates are shown in the table above.

Every row in the dataset represents a different sustainability value. Two estimations are given for each sustainability value: one for the intercept term and one for the

coefficient of technological adaptation. For every estimate, the Wald statistic, degrees of freedom, standard error, and significance level are also provided.

There are several cases when the exponential function overflows when the coefficient estimate for technological adaption is sufficiently large for sustainability levels. The calculated odds ratio that arises from this is too big to be shown in floating point notation. When this occurs, the final column entry is marked as "system missing."

Sustainability's reference category is 2.13, meaning that the intercept and technological adaption estimates match the expected log-odds of sustainability in relation to this reference category, supporting the null hypothesis.

Classification

Please see **appendix C** for the classification table. Each row in the dataset corresponds to a distinct value of sustainability. For each value of sustainability, two estimates are provided: one for the intercept term and one for the coefficient of technology adaptation. Additionally, the standard error, Wald statistic, degrees of freedom, and significance level are reported for each estimate.

In certain instances, the coefficient estimate for technology adaptation is so substantial for values of sustainability that the exponential function overflows. This results in an estimated odds ratio that is too large to be represented in floating point format. In such cases, the entry in the last column is designated as system missing.

The reference category for sustainability is 2.13, indicating that the estimates for the intercept and technology adaptation correspond to the predicted log-odds of sustainability relative to this reference category. Taken together, these parameter estimates suggest that technology adaptation has a positive impact on the log-odds of sustainability.

4.3.4 Nonparametric Correlations

Table 34: Correlation Analysis

Correlations				
			Sustainabi lity	Technology Adaptation
Spearman's rho	Sustainability	Correlation Coefficient	1.000	.431**
		Sig. (2-tailed)	.	<,001
		N	103	103
	Technology_Adap tation	Correlation Coefficient	.431**	1.000
		Sig. (2-tailed)	<,001	.
		N	103	103
**. Correlation is significant at the 0.01 level (2-tailed).				

Since this is a nonparametric test the Spearman's test is deployed over Pearson's to get accurate results of the positive correlation between the sustainability and technology adaptations of retail SMEs in Gauteng.

The results report a correlation analysis between sustainability and technology adaptation, revealing a moderately strong positive correlation coefficient of 0.431. This finding indicates that an increase in sustainability is associated with a corresponding increase in technology adaptation. The statistical significance of this correlation is supported by a *p*-value of less than 0.001, indicating a significant relationship at the 0.01 level.

4.4 Results pertaining to Hypotheses 3

H₃: Financial innovation is positively related with SMEs sustainability during the pandemic.

4.4.1 Tests of normality

Table 35: Tests of Normality

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Sustainability	.115	103	.002	.965	103	.008
Financial Innovation	.103	103	.009	.982	103	.186
a. Lilliefors Significance Correction						

Table 36: Tests of Normality (Logged)

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
log_Sustainability	.140	103	<.001	.922	103	<.001
log_Financial_Innovation	.125	103	<.001	.976	103	.062
a. Lilliefors Significance Correction						

The sustainability variable was subjected to a Kolmogorov-Smirnova test, which produced a statistic of 0.115 at a significance level of 0.002. The log test produced the results of 0.140 at a significance level of < 0.001. This result suggests to the researcher that the distribution of the sustainability variable significantly deviates from normality.

The Kolmogorov-Smirnova test was conducted on the financial innovation variable, resulting in a statistic of 0.103 with a significance level of 0.009 as well as a statistic of 0.125 with a significance level of < 0.001. This implies that the distribution of the financial innovation variable significantly deviates from normality.

4.4.2 Ordinal linear regression

Table 37: Ordinal linear regression

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	343.189			
Final	320.907	22.282	1	<.001
Link function: Logit.				

Information on model fitting for a binary logistic regression model is provided in the table above. Based on the data above the model is statistically significant as the significance value is <0.001 which is less than 0.05, which indicates that our model fits the data well.

In general, the findings indicate that the binary logistic regression model is a suitable match for the dataset and can be employed to forecast the likelihood of the reliant variable in relation to the independent variable (financial innovation).

Table 38: Goodness of Fit

Goodness-of-Fit			
	Chi-Square	Df	Sig.
Pearson	483.868	398	.002
Deviance	216.565	398	1.000
Link function: Logit.			

The data above reports on the goodness-of-fit statistics of a fitted binary logistic regression model, as presented in the table above. A goodness-of-fit test is used to assess the model's ability to fit the data effectively. The Pearson Chi-Square and Deviance Chi-Square statistics are included in the test and are both included in the table.

A score of 483.868 with 398 degrees of freedom and a significance level of 0.002 was obtained using the Pearson Chi-Square test. This finding implies that the data are not sufficiently fitted by the model. On the other hand, the model's goodness-of-fit was evaluated using the Deviance Chi-Square test, which produced a result of 216.565

with 398 degrees of freedom and a significance level of 1.000. This result suggests that the model provides a good match to the data.

Table 39: Pseudo R-Square

Pseudo R-Square	
Cox and Snell	.195
Nagelkerke	.196
McFadden	.041
Link function: Logit.	

The table presented above displays the pseudo R^2 values obtained from a binary logistic regression model utilising a logit link function. Pseudo R^2 values are commonly employed to compare various models and evaluate the adequacy of fit of a logistic regression model.

The Nagelkerke pseudo R^2 value of 0.196. These values are similar, indicating that the model explains 19.6% of the variation in the outcome variable, sustainability.

Table 40: Tests of Parallel Lines

Test of Parallel Lines^a				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	320.907			
General	295.985 ^b	24.922 ^c	18	.127

The Chi-Square statistic utilised to test the parallelism of lines is 24.922, with 18 degrees of freedom and a significance level of 0.127. These results suggest that the null hypothesis cannot be refuted, and that the slopes of the predictor variables across response categories do not exhibit significant differences. Since the level of significance is $>$ than 0.05. This indicates that we have not contravened the proportional odds assumption test.

Table 41: Parameter Estimates

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Thresh old	[Sustainability = 2,13]	.966	1.507	.411	1	.522	-1.988	3.921
	[Sustainability = 2,25]	1.709	1.332	1.645	1	.200	-.903	4.320
	[Sustainability = 2,38]	2.461	1.244	3.915	1	.048	.023	4.900
	[Sustainability = 2,50]	2.708	1.228	4.866	1	.027	.302	5.114
	[Sustainability = 2,75]	3.084	1.211	6.482	1	.011	.710	5.458
	[Sustainability = 2,88]	3.365	1.204	7.805	1	.005	1.004	5.726
	[Sustainability = 3,00]	3.784	1.201	9.924	1	.002	1.430	6.138
	[Sustainability = 3,13]	4.177	1.204	12.034	1	<,001	1.817	6.537
	[Sustainability = 3,25]	4.630	1.213	14.570	1	<,001	2.253	7.008
	[Sustainability = 3,38]	5.125	1.228	17.420	1	<,001	2.718	7.532
	[Sustainability = 3,50]	5.567	1.244	20.020	1	<,001	3.129	8.006
	[Sustainability = 3,63]	6.076	1.265	23.068	1	<,001	3.596	8.555
	[Sustainability = 3,75]	6.889	1.300	28.059	1	<,001	4.340	9.437
	[Sustainability = 3,88]	7.661	1.335	32.939	1	<,001	5.045	10.277
	[Sustainability = 4,00]	7.804	1.341	33.853	1	<,001	5.175	10.433
	[Sustainability = 4,13]	8.587	1.381	38.668	1	<,001	5.881	11.294
	[Sustainability = 4,25]	9.500	1.446	43.195	1	<,001	6.667	12.333

	[Sustainability = 4,38]	10.219	1.532	44.522	1	<,001	7.217	13.221
	[Sustainability = 4,63]	10.929	1.682	42.234	1	<,001	7.633	14.226
Location	Financial_Innovation	1.661	.346	22.978	1	<,001	.982	2.339
Link function: Logit.								

The table above displays the parameter estimates for a binary logistic regression model with a logit link function. The model includes financial innovation, one predictor variable, and threshold variables for several sustainability levels, ranging from 2.13 to 4.63. The sustainability level for the threshold variable is compared to the reference category—which isn't included in the table—in each instance. The coefficient's significance is ascertained by calculating the Wald chi-square test statistic (Wald), standard error (Std. Error), and estimated coefficient (Estimate) for each comparison. There is one degree of freedom (df) for each test. The table further displays the significance level (Sig.) and 95% confidence intervals (Lower and Upper Bounds) for each test.

The results demonstrate that, in tandem with sustainability, each comparison's expected coefficient increases. The various degrees of sustainability have a statistically significant impact on the outcome variable, according to all the statistically significant threshold variable tests.

With a standard error of 0.346, the computed coefficient for the predictor variable financial innovation is 1.661. With a p-value of 0.001, the Wald chi-square test results for this coefficient with one degree of freedom are 22.978, indicating high significance. This suggests that, in addition to sustainability's influence, financial innovation also has a statistically significant effect on the outcome variable.

4.4.3 Nonparametric correlation

Table 42: Correlation Analysis

Correlations			Sustainability	Financial_Innovation
Spearman's rho	Sustainability	Correlation Coefficient	1.000	.470**
		Sig. (2-tailed)	.	<,.001
		N	103	103
	Financial_Innovation	Correlation Coefficient	.470**	1.000
		Sig. (2-tailed)	<,.001	.
		N	103	103
**. Correlation is significant at the 0.01 level (2-tailed).				

The study uses a non-parametric correlation coefficient called Spearman's rho to look at the relationship between two variables: financial innovation and sustainability. A popular statistical metric is the Spearman's rho, which has a range of -1 to +1; a value of -1 denotes a perfect negative correlation, a value of +1 denotes a perfect positive association, and a value of 0 denotes no link (Schober et al., 2018).

Since sustainability and sustainability are the same variable, the correlation coefficient between them is 1.000, according to the correlation table this study presents. However, the financial innovation and sustainability correlation coefficient is 0.470, suggesting a moderately good association between the two factors.

Moreover, the correlation coefficient between financial innovation and sustainability has a p-value of less than 0.001, which suggests that the association is statistically significant.

4.5 Results pertaining to Hypotheses 4

H₄: Lockdown restrictions have a negative relationship with the sustainability of SMEs during and post pandemic.

4.5.1 Tests of normality

Table 43: Tests of Normality

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Sustainability	.115	103	.002	.965	103	.008
Lockdown_Restrictions	.063	103	.200*	.991	103	.690
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

Based on the results of the Kolmogorov-Smirnov test, it can be inferred that the distribution of the variable sustainability is not in accordance with a normal distribution ($p = 0.002$). Conversely, the variable lockdown restrictions appear to follow a normal distribution ($p = 0.200$).

The presence of an asterisk next to the p -value of 0.200 for lockdown restrictions indicates that this p -value is a lower bound estimate of the true significance. This lower bound estimate is a result of employing the Lilliefors Significance Correction, which is utilised when assessing normality in smaller sample sizes ($n < 50$). Although this correction can yield more accurate p -values compared to traditional tests, it tends to be conservative.

Given that the sample size for this study exceeds 100, it is necessary for the researcher to apply a logarithmic transformation to the variables before determining the appropriate method for data analysis.

Table 44: Tests of Normality (Logged)

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
log_Sustainability	.140	103	<.001	.922	103	<.001
log_Lockdown_Restrictions	.100	103	.013	.976	103	.055
a. Lilliefors Significance Correction						

The results of the Kolmogorov-Smirnov test reveal that the distribution of log sustainability is non-normal, with a p -value that is less than 0.001 and statistically significant. Conversely, the Kolmogorov-Smirnov test suggests that the distribution of log lockdown restrictions is normal, with a p -value of 0.013. Nevertheless, given the non-normal distribution of the outcome variable, the researcher possesses adequate evidence to proceed with a nonparametric test.

4.5.2 Ordinal linear regression

Table 45: Model Fitting Information

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	512.643			
Final	486.717	25.926	1	<.001
Link function: Logit.				

The final model is a much better fit to the data than the intercept-only model, as demonstrated by the computed p -value (<.001) of less than 0.001.

Table 46: Goodness of Fit

Goodness-of-Fit			
	Chi-Square	Df	Sig.
Pearson	1367.042	1500	.994
Deviance	459.436	1500	1.000
Link function: Logit.			

The Pearson Chi-Square statistic produced a value of 1367.042 with 1500 degrees of freedom, and a p -value of .994, according to the data collected. The fact that the observed frequencies greatly differ from the anticipated frequencies suggests that the model does not well fit the facts.

As an alternative, the Deviance Chi-Square—a goodness-of-fit metric grounded on information theory—was also utilised. This measure contrasts the fitted model's -2-log likelihood with that of a saturated model, which provides an ideal fit to the data. With 1500 degrees of freedom, the Deviance Chi-Square in this case produced a value of 459.436 and a p-value of 1.000. Based on the Deviance statistic, this result indicates that the model fits the data rather well.

Table 47: Pseudo R-Square

Pseudo R-Square	
Cox and Snell	.223
Nagelkerke	.224
McFadden	.048
Link function: Logit.	

The presented output displays the values of various Pseudo R^2 measures for a logistic regression model. These measures serve the purpose of assessing the model's goodness-of-fit and facilitating comparisons between different models.

Cox and Snell's Pseudo R^2 and Nagelkerke's Pseudo R^2 are akin measures that possess a range from 0 to 1, with higher values indicating a superior fit. In this instance, both measures exhibit similar values of 0.223 and 0.224, respectively, implying that the model accounts for approximately 22% of the variability in sustainability. In other words, the imposed lockdown restrictions elucidate 22% of the sustainability observed in SMEs.

Table 48: Tests of Parallel Lines

Test of Parallel Lines^a				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	486.717			
General	380.702 ^b	106.015 ^c	18	<,.001

The location parameters, or slope coefficients, for the categorical variable are the same at every level, according to the null hypothesis for this test. Given that p -value

is less than 0.05, the data set shows that the data has broken the odds of this proportional test. The proportionate odds assumption test for an ordinal logistic regression model is broken by this model.

4.5.3 Multinomial logistic regression

Table 49: Model Fitting Information

Model Fitting Information				
	Model Fitting Criteria -2 Log Likelihood	Likelihood Ratio Tests		
Model		Chi-Square	df	Sig.
Intercept Only	512.643			
Final	466.376	46.267	19	<.001

The resulting model fits the data well, with 19 degrees of freedom and a p -value of less than .001; there is no evidence that it deviates considerably from the fit of the intercept-only model.

Table 50: Goodness of Fit

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	1199.438	1482	1.000
Deviance	439.094	1482	1.000

With 1482 degrees of freedom and a p -value of 1.000, the Pearson test findings demonstrate that there is no evidence of a significant difference between the observed and expected frequencies.

The chi-square value in the second row indicates the difference between the response variable's actual values and those predicted by the model, as ascertained by the deviance test. Like the deviation test, it has 1482 degrees of freedom and a p -value of 1.000, indicating that there is insufficient evidence to support a substantial difference between the observed and projected values.

Table 51: Pseudo R-Square

Pseudo R-Square	
Cox and Snell	.362
Nagelkerke	.364
McFadden	.085

According to the provided Pseudo R^2 values, it can be inferred that the model possesses a moderate to high level of explanatory capability.

With a value of .362, the Cox and Snell R^2 indicates that the model explains around 36.2% of the variability seen in the outcome variable. Furthermore, a slightly higher estimate of the model's explanatory power (.364), which indicates that it explains around 36.4% of the variation in the outcome variable, is obtained using the Nagelkerke R^2 , a modified version of the Cox and Snell measure.

Table 52: Likelihood Ratio Tests

Likelihood Ratio Tests				
Effect	Model Fitting	Likelihood Ratio Tests		
	Criteria			
	-2 Log			
	Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	509.435	43.058	19	.001
Lockdown_Restrictions	512.643	46.267	19	<.001

Based on the provided information, the study involves a comparison between two models: a final model that encompasses all predictor variables and an intercept, and a reduced model that excludes the lockdown restrictions predictor variable. The Likelihood Ratio Test is employed to ascertain whether the final model exhibits a superior fit to the data in comparison to the reduced model.

The Log -2 The final model produces a value of 512.643, while the likelihood value of the reduced model is 509.435. As a result, a chi-square value of 43.058 with 19 degrees of freedom and a p-value of .001 is calculated.

The test's null hypothesis states that there is no difference between the reduced and final models, which suggests that the predictor variable for lockout limitations has little bearing on the result variable's prediction. However, the null hypothesis can be rejected because the p -value is less than .05. This means that the addition of the lockout limitations variable to the model significantly improves its fit.

In essence, the lockdown restrictions variable emerges as a statistically significant predictor of the outcome variable, thereby warranting its inclusion in the final model.

Table 53: Parameter Estimates

Parameter Estimates									
Sustainability ^a		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							()	Lower Bound	Upper Bound
2.25	Intercept	-216.098	405.660	.284	1	.594			
	Lockdown_Restrictions	112.768	5.164	476.884	1	<.001	9.429E+48	3.793E+44	2.344E+53
2.38	Intercept	-224.279	405.582	.306	1	.580			
	Lockdown_Restrictions	116.383	3.525	1089.992	1	<.001	3.502E+50	3.497E+47	3.507E+53
2.50	Intercept	-224.628	405.603	.307	1	.580			
	Lockdown_Restrictions	116.257	3.825	923.767	1	<.001	3.090E+50	1.714E+47	5.570E+53
2.75	Intercept	-228.877	405.584	.318	1	.573			
	Lockdown_Restrictions	117.931	3.459	1162.524	1	<.001	1.648E+51	1.874E+48	1.449E+54
2.88	Intercept	-221.410	405.586	.298	1	.585			

	Lockdown_Re strictions	115.2 96	3.663	990.8 02	1	<,001	1.182 E+50	9.008E+ 46	1.550E+ 53
3.0 0	Intercept	- 226.5 07	405.5 72	.312	1	.577			
	Lockdown_Re strictions	117.3 92	3.342	1234. 093	1	<,001	9.614 E+50	1.375E+ 48	6.720E+ 53
3.1 3	Intercept	- 226.6 15	405.5 71	.312	1	.576			
	Lockdown_Re strictions	117.5 01	3.314	1257. 300	1	<,001	1.072 E+51	1.619E+ 48	7.092E+ 53
3.2 5	Intercept	- 224.0 96	405.5 68	.305	1	.581			
	Lockdown_Re strictions	116.7 64	3.299	1252. 735	1	<,001	5.127 E+50	7.975E+ 47	3.295E+ 53
3.3 8	Intercept	- 226.0 67	405.5 67	.311	1	.577			
	Lockdown_Re strictions	117.5 14	3.267	1293. 710	1	<,001	1.086 E+51	1.798E+ 48	6.557E+ 53
3.5 0	Intercept	- 225.1 57	405.5 67	.308	1	.579			
	Lockdown_Re strictions	117.2 13	3.272	1283. 373	1	<,001	8.037 E+50	1.318E+ 48	4.899E+ 53
3.6 3	Intercept	- 229.3 57	405.5 66	.320	1	.572			
	Lockdown_Re strictions	118.5 96	3.240	1340. 005	1	<,001	3.204 E+51	5.597E+ 48	1.834E+ 54
3.7 5	Intercept	- 229.0 06	405.5 65	.319	1	.572			
	Lockdown_Re strictions	118.6 21	3.222	1355. 721	1	<,001	3.284 E+51	5.946E+ 48	1.814E+ 54
3.8 8	Intercept	- 230.5 71	405.5 66	.323	1	.570			
	Lockdown_Re strictions	118.9 98	3.222	1363. 791	1	<,001	4.788 E+51	8.656E+ 48	2.648E+ 54

4.0	Intercept	-	405.5	.332	1	.565			
0		233.6	92						
	Lockdown_Re	119.3	3.452	1194.	1	<,001	6.751	7.775E+	5.862E+
	strictions	42		934			E+51	48	54
4.1	Intercept	-	405.5	.316	1	.574			
3		227.9	68						
	Lockdown_Re	118.0	3.266	1306.	1	<,001	1.922	3.187E+	1.159E+
	strictions	85		872			E+51	48	54
4.2	Intercept	-	405.5	.342	1	.559			
5		237.1	74						
	Lockdown_Re	120.5	3.238	1385.	1	<,001	2.170	3.805E+	1.238E+
	strictions	09		162			E+52	49	55
4.3	Intercept	-	405.5	.341	1	.559			
8		236.8	96						
	Lockdown_Re	120.2	3.432	1226.	1	<,001	1.599	1.916E+	1.335E+
	strictions	04		446			E+52	49	55
4.6	Intercept	-	405.6	.339	1	.560			
3		236.1	28						
	Lockdown_Re	119.8	3.718	1038.	1	<,001	1.095	7.491E+	1.601E+
	strictions	25		549			E+52	48	55
4.7	Intercept	-	405.5	.388	1	.534			
5		252.5	97						
	Lockdown_Re	123.7	.000	.	1	.	5.706	5.706E+	5.706E+
	strictions	79					E+53	53	53
a. The reference category is: 2,13.									

Based on the provided information, the present study involves a comparison between two models: a final model that encompasses all predictor variables and an intercept, and a reduced model that excludes the lockdown restrictions predictor variable. To determine if the final model fits the data better than the reduced model, the Likelihood Ratio Test is utilised.

The Log -2 The final model produces a value of 512.643, while the likelihood value of the reduced model is 509.435. As a result, a chi-square value of 43.058 with 19 degrees of freedom and a p -value of .001 is calculated.

The test's null hypothesis states that there is no difference between the reduced and final models, which suggests that the predictor variable for lockout limitations has little bearing on the result variable's prediction. However, the null hypothesis can be rejected because the p -value is less than .05. This means that the addition of the lockout limitations variable to the model significantly improves its fit.

In essence, the lockdown restrictions variable emerges as a statistically significant predictor of the outcome variable, thereby warranting its inclusion in the final model.

The following discussion is in relation to **appendix c**:

The provided information comprises a classification table that presents a comparison between observed and predicted values for a given model. The rows of the table correspond to the observed sustainability values, while the columns represent the predicted sustainability values based on the lockdown restrictions variable. Additionally, the table includes the percentage of accurate predictions for each observed sustainability level, as well as an overall percentage of correct predictions.

4.5.4 Nonparametric Correlations

Table 54: Correlation Analysis

Correlations			Sustainability	Lockdown_Restrictions
Spearman's rho	Sustainability	Correlation Coefficient	1.000	.438**
		Sig. (2-tailed)	.	<,001
		N	103	103
	Lockdown_Restrictions	Correlation Coefficient	.438**	1.000
		Sig. (2-tailed)	<,001	.
		N	103	103
**. Correlation is significant at the 0.01 level (2-tailed).				

The provided correlation table presents a summary of the correlations between sustainability and lockdown restrictions, based on a sample of 103 cases, utilising Spearman's rho correlation coefficient. With a correlation value of 1.000, the table shows that the sustainability variable has an anticipated perfect connection with itself.

Furthermore, a correlation statistic of 0.438 indicates a moderately favourable association between lockdown restrictions and sustainability. This correlation coefficient's related *p*-value is less than 0.001, which suggests that there is very little possibility that this association would have occurred by chance and indicates statistical significance at the 0.01 level (2-tailed).

103 indications were used to compute both variables. In summary, the findings show a somewhat strong but statistically significant positive link between lockdown limits and sustainability.

4.6 Conclusion

The research study's results shed light on the significant impact of COVID-19 on SMEs in the retail industry, highlighting the interconnectedness of various factors and their profound implications on outcomes. The findings not only underscore the existing relationships but also unveil potential avenues for further exploration that could enhance our understanding of this pressing issue. Moreover, the study's results have the potential to influence policy-making and operational strategies across diverse sectors, offering valuable insights for the development of effective interventions and solutions.

The implications of this research accentuate the pressing need for continued investigation to gain a comprehensive understanding of this complex phenomenon and its far-reaching consequences in various contexts. By bridging gaps in knowledge and fostering a deeper appreciation of the challenges faced by SMEs in the wake of the pandemic, future research endeavours could drive innovation, inform decision-making, and contribute to the advancement of sustainable practices in the retail industry and beyond.

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

This section's goal is to provide a clear and concise explanation of the data and how it contributes to addressing the hypotheses. Additionally, this chapter encompasses a critical evaluation of the findings and their implications. The researcher intends to juxtapose their findings with the extant literature and other studies conducted within the same domain. Furthermore, the researcher will consider any constraints or challenges encountered during the study and deliberate on how these may have influenced the outcomes.

Ultimately, the aim of the discussion of results chapter is to furnish meaningful and perceptive conclusions that augment the scholarly discourse and facilitate future research in the field.

5.2 Discussion pertaining to Hypothesis 1

H₁: Business performance has a positive correlation with SMEs sustainability.

Tables 4.1 and 4.2 display the results of the normality tests, which show that the data under examination is not normally distributed. Consequently, the researcher has sufficient evidence to conduct a nonparametric test on the hypothesis, even after altering the variables. Goodness-of-fit tests were performed on the data, and the results indicate that the logistic regression model with a logit link function fits the data well, and its predicted probabilities closely match the observed data frequencies. The analysis's pseudo R^2 value shows that, in addition to what an intercept-only model might account for, the logistic regression model explains around 14% of the variation in the outcome variable.

This finding implies that 14% of the sustainability of SMEs is attributable to their business performance, as supported by literature (Ipsos, 2020). The coronavirus pandemic lockdown restrictions have severely disrupted business performance, demonstrating the substantial impact of the variable. The statistical findings analysis further confirms the findings of Ipsos (2020), who assert that many SMEs in South

Africa have been compelled by the lockdown restrictions to adopt innovative measures to enhance their business performance. Higher values suggest a better fit. The measures have a range of 0 to 1. In this instance, the 14% change in sustainability due to business performance is statistically significant, as it falls between 0 and 1.

In accordance with the statement SMEs in both South Africa and globally are currently facing cash flow issues due to lower sales volumes and financial losses (Omar et al., 2020). These issues have a significant effect on the performance and daily operations of SMEs. This finding supports the results obtained from the parallel lines test, indicating that the researcher did not violate the test of proportional odds. Consequently, the alternative hypotheses are rejected, and the null hypotheses are accepted, which maintains that there is a positive correlation between business performance and the sustainability of SMEs.

The regression model indicates that the probability of sustainability is significantly influenced by the variable of business performance. Depending on the business performance variable, this model can be used to forecast the possibility of sustainability for small and medium-sized retail businesses.

Generalized Model: Testing the Effect of the Model

The results imply that an increase in business performance and a greater likelihood of sustainability are positively correlated. This aligns with the literature, which indicates that SMEs often experience a significant impact on the demand for their goods, heading to a decrease in business performance and revenue (Pan et al., 2020). But this study's findings run counter to the statements made by the authors, as they demonstrate that a higher probability of sustainability is indeed correlated with an improvement in business performance.

Parameter Estimates

In conclusion, the parameter estimates offer insightful information about the nature and strength of the correlations between the predictor and dependent variables. They also identify the predictor variables that are statistically significant in predicting sustainability. Based on the information presented above, it is evident that a good business performance has a greater likelihood of enhancing the sustainability of

SMEs, irrespective of the industry they operate in, as the statistics for this relationship were found to be insignificant.

Correlation Analysis

At the 0.01 level, all correlation coefficients were determined to be significant, indicating that the observed correlations are very unlikely to have happened by accident. Based on the preceding arguments, the researcher must abandon the null hypothesis and accept the alternative hypothesis, which asserts that a positive relationship exists between business performance and SME sustainability (H₁: Business performance exhibits a positive correlation with SME sustainability).

5.3 Discussion pertaining to Hypothesis 2

H₂: Technology Adaptation has a positive association with SMEs' sustainability during the pandemic.

Summary of Case Processing (Technology Adaptation by Business Type)

It's crucial to remember that the Case Processing Summary table does not include 3 missing cases from the data set. The data suggests that technology adaptation was most likely implemented in tourist shops and salons. On the other hand, businesses such as direct mail order and ecommerce did not need to implement technology adaptation, as they likely already possess these technologies, or it may be costly to implement.

Pseudo R²: This provides further evidence for researchers to accept the hypothesis that states H₂: Technology Adaptation has a positive association with the sustainability of SMEs during the pandemic. This finding explains a quarter of the sustainability, indicating a strong relationship. Based on the results obtained from the R², the researcher confirms the existing literature that the TOE Framework is a prevalent tool in studies examining the adoption of technology by small and medium-sized enterprises (SMEs). (Bai et al., 2021). An empirical analysis by I. Akpan and A. Akpan (2017) highlighted the issue of internet access in Asian and African countries, further supporting the 25% contribution of technology adaptation to the sustainability of retail SMEs in Gauteng.

The researcher has opted to utilise multinomial logistic regression to draw conclusions for H₂, which pertains to the relationship between technology adaptation and business performance. Further tests are necessary to confirm the existence of such a relationship.

The multinomial regression analysis resulted in an R² coefficient, demonstrating the model's ability to predict the outcome variable. This provides evidence for the researcher to accept the null hypothesis, which posits that H₂: Technology Adaptation has a positive association with SMEs' sustainability during the pandemic. The model explains 42-43% of the data, indicating a strong fit.

The analysis of parameter estimates indicates that the adaptability of technology in retail SMEs has a positive influence on the likelihood of sustainability. This finding is corroborated by the literature review conducted by Akpan, Soopramanien, et al. (2020), which suggests that the COVID-19 lockdown measures have amplified the impact of technology on specific business strategies. This further validates the results, as the intercept and technology adaptation align with the predicted log-odds of sustainability relative to the reference category. Consequently, the null hypothesis is accepted, leading to the conclusion that technology adaptation exhibits a positive association with SMEs' sustainability during the pandemic.

Correlation: The analysis reveals a positive correlation between the sustainability of Gauteng retail businesses and their adoption of technology. This implies that as one variable increases, the other is likely to increase as well. These findings align with existing literature, indicating that businesses have been actively adopting new technologies to develop innovative operational methods in response to recent challenges, thus preventing a complete economic downturn (Ting et al., 2020). Additionally, during this critical period, small and medium-sized enterprises (SMEs) embraced various digital platforms, such as Microsoft Teams meetings, Zoom meetings, and others, to maintain business continuity (Webster, 2020; Akpan, Soopramanien, et al., 2020). Therefore, the researcher does not have sufficient evidence to reject the null hypothesis, which states that H₂: Technology Adaptation is positively associated with SMEs' sustainability during the pandemic.

5.4 Discussion pertaining to Hypothesis 3

H₃: Financial innovation is positively related with SMEs sustainability during the pandemic.

The normality tests conducted in the previous analysis provide the researcher with the confidence to proceed with nonparametric methods. This ensures the validity and reliability of the analysis and the hypothesis. The hypothesis, H₃, proposes a positive relationship between financial innovation and SMEs sustainability during the pandemic.

Based on the analysis of parallel lines, the researcher cannot reject the null hypothesis, which states that financial innovation is positively related to SMEs sustainability during the pandemic. This is supported by evidence from the literature provided by Raimi and Uzodinma (2019), which suggests that successful performance requires the utilisation of both internal and external financial tools, as demonstrated by the test of parallel lines in this study.

The parameter estimates indicate that both financial innovation and sustainability are statistically significant predictors of the outcome variable, with sustainability having a more pronounced impact. Furthermore, based on the findings of the literature review, it can be deduced that the viability of SMEs is positively associated with the capacity of retail SMEs to incorporate innovative practices and engage in financial innovations, specifically in the context of the COVID-19 pandemic, to ensure their long-term sustainability. For example, further research conducted by Kabanda and Brown (2017) revealed that the integration of E-commerce, such as mobile banking, into SMEs substantially streamlines monetary transactions and enhances organisational resilience, thereby fostering long-term sustainability for SMEs in the future.

The present study confirms the literature discussed above, which highlights the pandemic's role in drawing attention to the importance of environmental, social, and governance (ESG) issues. Specifically, small, and medium-sized businesses are now prioritizing sustainable financing, which involves investing in businesses that benefit society and the economy. The null hypothesis, which posits no correlation between these two variables, can be rejected based on the results of the correlation test. Therefore, the researcher accepts the alternative hypothesis, which states that

financial innovation is positively related to SMEs' sustainability during the pandemic (H3).

The sample size for both variables is 103, as indicated in the table. Overall, the findings suggest a moderate positive correlation between sustainability and financial innovation. This implies that the ability of retail SMEs to innovate financially has a moderate impact on their sustainability, indicating a positive relationship between the two variables.

5.5 Discussion pertaining to Hypothesis 4

H4: Lockdown restrictions have a negative relationship with the sustainability of SMEs during and post pandemic.

The present study's literature review has revealed that lockdown restrictions have exerted a notable influence on the sustainability of SMEs, as evidenced by their business performance and the need to adapt to new technologies. To validate these hypotheses, the researcher plans to investigate the connection between business performance, technology adaptation, and sustainability. The scales of business performance and technology adaptation are considered as indicators of lockdown restrictions. Literature by Thukral (2021) supports this claim, indicating that lockdown restrictions have negatively affected workplaces, resulting in closures, low supply chain, and output, which subsequently have adverse consequences on the sustainability of such firms. The scales for technology were adopted as literature found that technology has become a critical tool in enabling individuals to continue their daily lives and remain connected, even in the face of lockdown restrictions.

To examine the fourth hypothesis, the researcher possessed ample data to perform a multinomial regression analysis using the model.

Multinomial regression: the R^2 under the multinomial regression model demonstrates a moderate to high level of explanatory power, providing support for the acceptance of the hypotheses, specifically H4: Lockdown restrictions have a negative relationship with the sustainability of SMEs during and after the pandemic. The Nagelkerke R^2 coefficient indicates a positive association of 36.4%, highlighting the ramifications of COVID-19 lockdown restrictions on the operations and performance of retail SMEs.

Appendix c presents the table presents the successful prediction of sustainability levels for 2.13, 3.75, and 4.38, with corresponding correct prediction rates of 100%, 94.1%, and 33.3% respectively. These results further reinforce the correlation between lockdown restrictions and their effects on retail SMEs in the Gauteng region.

Correlation: The positive correlation observed in this study's results validates the assertions made in a McKinsey study published in March 2020 which revealed significant negative effects on various sectors of the South African market due to the implementation of lockdown restrictions. Specifically, the services industry, including private accountancy and law businesses, as well as tourism, hospitality, and broader retail, were identified as the most adversely affected areas. This finding strengthens the correlation between lockdown restrictions and their impact on retail SMEs in Gauteng (Kalidas et al., 2020).

5.6 Conclusion

The researcher established the hypotheses in the second chapter of this study that underpin the investigation. Chapters 3, 4, and 5 were dedicated to the analysis and discussion of the findings, which were subsequently used to inform policy makers and provide recommendations for future research. The study examined the interplay between business performance, technology adaptation, financial innovation, and lockdown restrictions, with a focus on sustainability. The analysis yielded evidence of a significant relationship between all four hypotheses.

The following research questions were proposed for this study and answered:

- 1. To what extent has the business performance of SMEs been affected by the coronavirus pandemic, given the constraint that Covid-19 occurred during a specific timeframe?*
- 2. How did the adaptation of technology enhance the performance of SMEs during the coronavirus lockdowns?*
- 3. Is financial innovation able to keep SMEs afloat throughout the pandemic?*
- 4. Have SMEs remained sustainable in the climate of the coronavirus pandemic?*

The research questions served as the foundation for formulating hypotheses, which were subsequently scrutinised in detail through an analysis of existing studies and results. All four hypotheses were deemed significant and accepted. The research was guided by a comprehensive conceptual model, which was derived from Pu et al. (2021), albeit with a few modifications to accommodate the variables pertinent to this study. Through the course of discussions and results analysis, it was discovered that retail SMEs aspire to enhance their capacity to adapt to new technologies, augment their financial innovation by embracing e-commerce, digital payments, and online shopping. The study's findings emphasized that the path to SME sustainability is multifaceted, requiring a combination of organisational resources. It necessitates a holistic approach to all resources. Business performance, technology adaptation, and financial innovation all play a pivotal role in propelling the success of retail SMEs. Consequently, the resource-based theory of entrepreneurship serves as a sound foundation for entrepreneurs to implement in their organisations.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

The purpose of this chapter is to provide a comprehensive overview of the study's findings and the conclusions drawn from various research areas. The most significant research findings are outlined in this chapter, along with an explanation of their importance within the larger study framework. This section also offers helpful suggestions for more study and better methods going forward.

This chapter provides the reader and the researcher with a clear knowledge of the research's overall implications and influence, acting as a crucial conclusion to the dissertation research. The chapter's recommendations are essential reading for aspiring academics and professionals in the subject since they offer guidance for more research and real-world applications of the results. The personal reflections of the study are also outlined by the researcher to further contribute to future studies.

6.2 Conclusions of the study

The COVID-19 pandemic has caused a profound impact on the financial innovation, sustainability, technological adaptability, and business performance of SMEs. The current study highlights that Gauteng retail SMEs are currently confronted with numerous challenges stemming from the virus outbreak. Consequently, these enterprises are compelled to promptly adapt their strategies and operations to effectively flourish in the altered business landscape. The literature review conducted by Amolo and Migiro (2014) posits that the resource-based view theory provides a powerful framework for understanding organisational success. for retail entrepreneurs in the Gauteng region to fortify their businesses and explore avenues for enhancing their performance, adopting technological innovations, and innovating financially to ensure their long-term viability.

Primarily, the pandemic has had a profound effect on the operation and profitability of SMEs. Travel restrictions, lockdowns, and a fall in consumer spending caused a dramatic decline in income for many enterprises. Reinforced by both the literature review and the gathered data a significant number of gift and speciality stores were

severely impacted by the restrictions. Layoffs, company closures, and a general downturn in economic activity have been the results of this.

Second, since the epidemic, SMEs have needed to adapt to new technologies, such as online stores, WhatsApp markets, and e-commerce. Businesses who could swiftly embrace and make use of digital tools and platforms performed better than their competitors. The prevalence of online sales, remote employment, and virtual collaboration underscores the role that technology plays in maintaining corporate operations.

Another important element in SME sustainability is that has evolved is financial innovation. Several businesses were forced to go for alternate financing sources including crowdsourcing, government loans, and alternative lending platforms. Furthermore, for SMEs to successfully traverse the economic uncertainties, financial management measures including diversification, cash flow management, and cost reduction become crucial.

The pandemic has also shown how crucial sustainability is for SMEs. Enterprises that successfully shifted their activities towards environmentally conscious procedures, innovation, or aiding nearby communities, acquired a competitive edge. Ethical and sustainable business practices are becoming more and more valued by consumers, and this may improve brand loyalty and reputation.

For SMEs, this pandemic has brought opportunity despite the many obstacles. Businesses now need to innovate, adapt, and investigate new markets because of the crisis. It has forced SMEs to adopt previously unconsidered technological advancements and has sped up the digital transformation process. Through the adoption of innovative financial practices, a focus on sustainability, and an embracement of technology, SMEs might potentially enhance their ability to withstand future crises and cultivate enduring resilience.

In conclusion, the coronavirus pandemic has significantly impacted the financial innovation, sustainability, technological adaptability, and business performance of SMEs. SMEs have been compelled by the crisis to reconsider their plans, act fast to adjust to unexpected situations, and look for new possibilities. To survive in a more unpredictable and dynamic business climate going forward, SMEs must continue to

embrace innovation, leverage technology, strive for financial resilience, and place a high priority on sustainability.

6.3 Recommendations

6.3.1 *Entrepreneurs in the informal sector*

Remain informed: Learn about the most recent policies and information on the pandemic's effects on enterprises, particularly small and medium-sized ones. Try to comprehend any new rules, guidelines, or assistance options that may be relevant to your company.

Adopt new technology: During the pandemic, embrace new technologies that might assist your company in continuing operations or in identifying new areas for expansion. Consider cloud-based services, virtual meetings and conferences, e-commerce platforms, online sales, and digital marketing, for instance.

Create creative financial plans: Create creative financial plans that will enable you to run your company during the epidemic. For instance, investigate new financing opportunities, simplify your financial procedures, and consult a tax expert for guidance.

Encourage sustainability measures: Consider sustainable methods that can save expenses, boost productivity, and improve the standing of your company. As an illustration, include energy-efficient technologies, advertise environmentally friendly goods and services, and uphold moral principles in your company's operations.

Work together with industry stakeholders: Look for ways to work together with other companies, trade groups, and governmental organisations to form alliances and pool resources that will help you deal with the pandemic's effects.

6.3.2 *The South African economy*

Make money easier to access: Assist SMEs in navigating the financial uncertainties brought on by the epidemic by making funds, grants, and loans available to them.

Encourage digital transformation: To assist SMEs remain competitive in a world where many operations have migrated online, encourage SMEs to utilise technology.

Create initiatives and support programs: Create initiatives and support programs that are specifically designed to address the special difficulties that SMEs in the South African economy confront.

Encourage sustainable business practices: To guarantee long-term economic and environmental sustainability, encourage SMEs to embrace eco-friendly business practices and provide them with incentives to do so.

Promote cooperation: To create creative solutions that might lessen the pandemic's detrimental effects on the South African economy, promote cooperation between SMEs, big businesses, governmental organisations, and academic institutions.

Address skills shortages: To close the skills gap in the South African economy, assist SMEs' access to training and development opportunities. This will guarantee that they have the knowledge and abilities necessary to thrive in a business environment that is changing quickly.

6.3.3 University students

Remain informed: Learn about the most recent policies and information on the pandemic's effects on enterprises, particularly small and medium-sized ones. Try to comprehend any new rules, guidelines, or assistance offerings that may be relevant to your future employment in the SME industry.

Expand your skill set: Make the most of the time and resources at your disposal to expand your knowledge of finance, technology, innovation, and sustainability. To obtain real-world knowledge and experience, think about signing up for training programs, internships, and job experience.

Adopt technology: Gain a solid grasp of emerging technologies, which are becoming more and more important to the success of SMEs. Examples of these technologies include cloud computing, digital marketing, and e-commerce platforms.

Create networks: Make the most of your time on campus by establishing contacts with experts, entrepreneurs, and graduates who have worked in the SME sector and can provide insightful guidance and connections for next career chances.

Investigate possible employers: Investigate SMEs that are well-known for their sustainability and are pioneers in their industry. When evaluating possible employers, consider the possibility of long-term growth and professional development.

Be flexible: As the pandemic continues to affect the economy and the SME sector, be ready to adjust to changing conditions and be receptive to new possibilities and methods of working.

Promote sustainability: Since SMEs are increasingly required to address environmental, social, and governance (ESG) problems, promote sustainable business practices and take the social and environmental effects into account when evaluating potential employment prospects.

6.3.4 Industry associations

Promote support programs: Industry groups may promote more assistance initiatives that specifically target SMEs affected by COVID-19 considering the research's findings. These initiatives may encompass financial resources, adaptable work schedules, and tax benefits.

Encourage best practices: Industry groups can advise their members on how to adjust to the present business environment by sharing best practices. This might involve financial planning, client involvement, and remote working tactics.

Encourage cooperation: To save expenses, pool resources, and collaborate on projects, industry groups may help SMEs collaborate. SMEs can negotiate the unpredictable economic climate brought on by the pandemic with the aid of collaboration.

Give SMEs access to pertinent data: Trade organisations may give SMEs access to pertinent data that will enable them to make well-informed decisions. This contains financial information, predictions and trends for the industry, and information on government programs and regulations.

Promote sustainability: among light of the COVID-19 pandemic, industry organisations may promote sustainable practices among SMEs. This entails encouraging social responsibility, environmental friendliness, and sound governance in SMEs.

Offer resources and training: Industry groups may offer SMEs resources and training on innovation, technology adoption, and sustainable practices. These tools can assist SMEs in enhancing their capacity to do business and withstand the pandemic.

Work together to create policies that promote SMEs: Industry associations may work together to create policies that benefit SMEs. As part of this partnership, input on suggested policies and the study findings may be shared.

6.4 Suggestions for further research

Research efforts should prioritise comparative analyses of the coronavirus's impact on SMEs in industrialised and developing countries. The study might concentrate on determining how the pandemic has affected SMEs differently in these two sets of nations. Researchers should look at the elements that contribute to these disparities, such as government backing, infrastructure, and capital availability.

An intriguing topic for further study is the variables influencing SMEs' degree of technology use during the pandemic. Research could pinpoint the elements that help or impede SMEs' adoption of technology. Scholars may investigate the ways in which financial resources, preparation, mentality, and digital literacy influence the integration of new technologies.

Financial innovations have played a crucial role in mitigating the detrimental effects of the COVID-19 pandemic on SMEs. Future studies might look at how financial innovation helps keep SMEs afloat both during and after the epidemic. The adoption of several financial technologies by SMEs, including crowd-lending, invoice financing, and online payments, and how well these technologies serve SMEs' financial requirements might be the subject of the study.

Research on how government stimulus packages affect SMEs is essential. Researchers might investigate the efficacy of the stimulus packages that governments throughout the world have implemented to alleviate the burdens of SMEs during the epidemic. To assess the extent to which government stimulus packages have mitigated the negative effects of economic shocks on SMEs, variables including the

nature of the packages, eligibility requirements, and application processes might be examined.

There has been an effect of the pandemic on SMEs' sustainability practices. Future studies might investigate how the pandemic has affected SMEs' perspectives on sustainability and pinpoint new developments in this area. Researchers might investigate how SME performance—including growth, profitability, and market access—relates to sustainability.

Future study should also examine how remote work habits affected SMEs' financial value creation and resource allocation throughout the pandemic. The research can look at how remote work practices affect SMEs and what possibilities and difficulties they present, including how workforce management, communication, and technology access are affected. Scholars could analyse the impact of remote work on the financial performance and productivity of small and medium-sized enterprises.

In the wake of the pandemic, adopting e-commerce has also become more and more important for SMEs. Future studies should look at the potential and difficulties SMEs have while adopting e-commerce. Scholars may investigate how e-commerce affects SMEs' expenses, consumer engagement, and market reach. Investigations might also be conducted on aspects like infrastructure, rules, and the degree of digital literacy.

An intriguing subject for investigation is how supply chain management techniques helped SMEs during the epidemic. Researchers might look at how supply chain disruption affects SMEs and find strategies that help them keep up cash flow and operations. The investigation may also assess how supply chain management techniques can lessen the pandemic's negative effects on SMEs.

Future studies should also focus on how the coronavirus affects the operational and financial performance of SMEs across various industries. Researchers might investigate how the pandemic has caused widespread disruption to SMEs in numerous sectors, including manufacturing and food and beverage. The research might determine prospects for recovery and expansion as well as evaluate how much the pandemic has impacted the performance of SMEs.

Lastly, a worthwhile subject of study is how SMEs might be able to change course and introduce new products or business models during the epidemic. The study may pinpoint the tactics that SMEs should use to turn around their companies and open up fresh avenues for expansion. It would also be possible to investigate elements like innovation, sustainability, and digital transformation.

6.5 Personal reflections

The global outbreak of the coronavirus pandemic in the year 2020 has had extensive ramifications on businesses worldwide, with a particular emphasis on SMEs. In contemplating the effect of the coronavirus on diverse traits of SMEs' operations, such as business performance, technology adoption, financial innovation, lockdown measures, and sustainability, several noteworthy observations arise.

First and foremost, the pandemic has shown the weaknesses of SMEs, particularly those that mostly depend on in-person contacts or foot traffic. Numerous companies were compelled to temporarily cease business activities, which brought about large revenue losses and, in certain circumstances, permanent closures. This has made it clear that SMEs must diversify their sources of income and investigate new ventures that can withstand unanticipated setbacks.

In addition, the pandemic has sped up SMEs' embrace of technology. Lockdowns and social distancing tactics forced firms to swiftly shift to digital platforms to stay in business. Adoption of technology has resulted in both advantages and disadvantages. SMEs who effectively used digitalization and e-commerce platforms were able to expand their consumer base and sustain operations. Conversely, companies without the means or know-how to adjust to new technologies encountered serious difficulties.

These unpredictable times have also been critical for financial innovation. To weather the storm, SMEs have had to look for alternate finance sources and creative financial solutions. Finally, the pandemic has brought attention to how crucial sustainability is to corporate operations. There is a rising awareness that companies must emphasize social and environmental responsibility as the globe struggles with the effects of the crisis. SMEs who have proven their dedication to sustainability and modified their business practices in line with it have not only improved their standing but also acquired a competitive advantage in the marketplace.

In conclusion, The COVID-19 pandemic has had a substantial influence on the ramifications on SMEs encompassing various aspects such as their business performance, technology adaptation, financial innovation, and overall sustainability. Although there have been many obstacles to overcome, SMEs have also had the chance to reconsider their approaches, embrace digital transformation, look for creative financial solutions, and place a higher priority on sustainability. It is imperative that SMEs keep growing from these experiences, take preventative measures, and strengthen their ability to withstand shocks in the future.

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APPENDIX A

Questionnaire

Title: The effects of coronavirus on SMEs business performance, technology adaptation, financial innovation, and sustainability.

Gender:
Male
Female
Nature of Business:
Clothing store
Salon or a Barbershop
Spaza shop/ Convenience shop
Tourist shop (Gift & Specialty shops)
Grocery store
Direct Sales catalog and mail order company
Home furnishing retailer
Some e-commerce business
Other
Years of Establishment:
0-1 year
2-5 years
6-10 years
beyond 10 years

Number of Employees:

1-10
employees

11-30
employees

31-50
employees

51-100
employees

101-250
employees

Do you operate in the formal or informal sector?

Formal

Informal

Average Revenue:***Business Performance***

Item No:	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		1	2	3	4	5
BP1	The cost of operations and production has decreased.					
BP2	We have sold off our failed or loss-					

	making company segments.					
BP3	We've embraced online remote work.					
BP4	In response to changing customer needs, we have enhanced our business plans.					
BP5	We are no longer using the offline transactional paradigm and have established marketing channels.					
BP6	We aggressively encourage the development of new technologies.					
BP7	We have knowledge about my company's potential market expansions.					
BP8	Our establishment's					

	supply chain is in harmony.					
--	-----------------------------	--	--	--	--	--

(Guo et al., 2020)

Technology Adaptation

Item No:	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		1	2	3	4	2
TA1	Throughout the COVID-19 era, we have entirely shifted to selling goods and services online.					
TA2	We have finished implementing the digital platforms that enable digital products and services.					
TA3	Digital infrastructures, including technological tools and systems, are completely embraced by us.					

TA4	We've embraced digital business concepts in full.					
TA5	We've completely embraced digital management techniques.					

(Guo et al., 2020)

Financial Innovation

Item No:	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		1	2	3	4	5
FI1	Digital management concepts have been fully implemented.					
FI2	We give lenders consistent income statements					
FI3	We are instructed in proper bookkeeping procedures.					

FI4	We are officially insured for the establishment.					
FI5	The management can calculate how much the borrowed funds will cost.					
FI6	We have a savings account right now.					
FI7	The company may create basic accounting records.					
FI8	We know how lending firms function regarding their need for funds.					
FI9	We are cognisant of the benefits and drawbacks associated with acquiring loans.					

(Okello Candiya Bongomin et al., 2017)

SMEs Sustainability

Item No:	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		1	2	3	4	5
S1	After the pandemic, we want to alter our current product lines.					
S2	We're going to adjust how we cover our local markets.					
S3	To make our cooperative ties viable, we shall adjust them.					
S4	We intend to make better use of online office tasks.					
S5	We are aware of initiatives to boost the digitalization of the supply chain.					
S6	Digital products and services will					

	be utilised as digital artifacts.					
S7	Digital technologies such as digital communication platforms will be utilised.					
S8	We want to make advantage of digital technology systems and infrastructures.					

(Guo et al., 2020)

APPENDIX B

Consistency matrix

Research Objective	Literature Review	Hypotheses or Research questions	Source of Data	Type of Data	Analysis
1. To assess the quantity of correlation that exists between the coronavirus and the business performance of SMEs	(Ipsos, 2020) (Sun et al., 2021).	H ₁ : Business performance has a positive correlation with SMEs sustainability.	(Guo et al., 2020) <i>Questionnaire</i>	Continuous ordinal data	Ordinal linear regression, generalized linear mode, Spearman's rho correlation
2. To investigate the extent of the recently adapted technology on the performance of SMEs throughout the coronavirus lockdowns	(Ting et al., 2020) (Akpan, Soopramanien, et al., 2020).	H ₂ : Technology adaptation has a positive association with SMEs' sustainability during the pandemic	(Guo et al., 2020) <i>Questionnaire</i>	Continuous ordinal data	Ordinal linear regression, multinomial logistic regression, Spearman's rho correlation

3. To ascertain if financial innovation can keep SMEs afloat throughout the pandemic	(Pu et al., 2021).	H ₃ : Financial innovation is positively related with SMEs sustainability during the pandemic.	(Okello Candiya Bongomin et al., 2017) <i>Questionnaire</i>	Continuous ordinal data	Ordinal linear regression, Spearman's rho correlation
4. To investigate the sustainability of SMEs during the coronavirus pandemic	(Murphy, 2013)	H ₄ : Lockdown restrictions have a negative relationship with the sustainability of SMEs during and post pandemic.	(Guo et al., 2020) <i>Questionnaire</i>	Continuous ordinal data	Ordinal linear regression, Multinomial logistic regression, Spearman's rho correlation

APPENDIX C

Participation information sheet



Good Day

I am Benjamin Kolobe, a master's student at the University of the Witwatersrand, Johannesburg, studying in the school of Business Sciences (SBS). As part of my studies, I am conducting a dissertation project focused on the impact of coronavirus on small and medium-sized enterprises (SMEs). Specifically, I am investigating the relationship between their business performance, technology adaptation, financial innovation, lockdown restrictions, and sustainability during the COVID-19 pandemic. Mr Sikhumbuzo Maisela will be supervising my research.

I would like to invite you to participate in a survey for my study. The questionnaire is suitable for individuals aged 18 and above and consists of 30 questions. It should take approximately 10 to 15 minutes to complete. Please be assured that your responses will be kept confidential and stored securely on a password-protected laptop and OneDrive. In my research paper, I will use anonymous quotes to protect your anonymity.

Your participation in this study will not involve any personal expenses. While there are no direct benefits to participating, there are no drawbacks or penalties for choosing not to participate or withdrawing at any time. If you do not wish to answer a particular question, you have the option to withdraw. The questionnaire is confidential and anonymous, as no identifying details, including your name, will be requested. Your information will be kept private and not shared with anyone else. By completing and submitting the online survey, your participation is considered as consent to take part. In my final research study, a pseudonym will be used to reflect your involvement.

If you have any questions about this research, both during and after its completion, please feel free to contact me using the provided information. The research paper will

be published and accessible through the university library's website. If you would like a review of this article, kindly let me know, and I will gladly submit it to you. The data collected for this research will be stored in my cloud storage for a period of five years. Other researchers may request to use the anonymized data with your permission. For any concerns or inquiries regarding the study's ethical procedures, please contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za

Yours Sincerely,

Benjamin Kolobe

Researcher: Benjamin Kolobe, 904410@students.wits.ac.za, 0727230586

Supervisor: Mr, Sikhumbuzo Maisela, sikhumbuzo.maisela@wits.ac.za, 0842245606

APPENDIX D

Consent form

Title of project: The effects of coronavirus on SMEs business performance, technology adaptation, financial innovation, and sustainability

Name of researcher: Benjamin Kolobe.

With full understanding and willingness, I consent to participate in this research project. I have been adequately informed about the research and its requirements, and I am fully aware of my responsibilities as a participant.:

(Please select yes to proceed)

I have carefully perused and grasped the information presented.

I voluntarily consent to participate.

I am of legal age (18 years>).

I agree to allow the researcher to incorporate anonymous quotations from me in their dissertation.

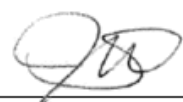
I consent to the use of my anonymized information for academic purposes by other researchers after this project has concluded, provided they obtain their own ethics clearance.

YES

NO

APPENDIX E

Ethics certificate

 UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	
Research Office	
<u>HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)</u> R14/49 Kolobe	
<u>CLEARANCE CERTIFICATE</u>	<u>PROTOCOL NUMBER: H23/04/11</u>
<u>PROJECT TITLE</u>	The effects of coronavirus on SMEs business performance, technology adaptation, financial innovation, and sustainability
<u>INVESTIGATOR(S)</u>	Mr B Kolobe
<u>SCHOOL/DEPARTMENT</u>	School of Business Sciences/
<u>DATE CONSIDERED</u>	21 April 2023
<u>DECISION OF THE COMMITTEE</u>	Approved Risk Level: Minimal
<u>EXPIRY DATE</u>	14 June 2026
<u>DATE</u> 15 June 2023	<u>CHAIRPERSON</u>  (Professor J Watermeyer)
cc: Supervisor : Professor S Maisela	
<u>DECLARATION OF INVESTIGATOR(S)</u>	
To be completed in duplicate and A SIGNED COPY returned to the Secretary electronically. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)	
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. I/we agree to completion of a regular progress report. For Minimal and Low Risk studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.	
Signature _____	Date <u> / / </u>
PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES	

APPENDIX F

Research planning- Gantt chart

Activities	<i>Feb- March '22</i>	<i>April- May 22'</i>	<i>June- July 22'</i>	<i>Aug- Sep '22</i>	<i>Oct- Nov- '22</i>	<i>June- July '23</i>	<i>July- Sep '23</i>	<i>Sep '23- Jan '24</i>
1. Identifying a research subject and scope								
2. Exploration of potential variables for scientific inquiry								
3. Identifying gaps and opportunities for future research								
4. Preliminary outline of a research project								
5. Submitting a formal proposal for research								

6. Presentation and defence of a research proposal								
7. Approval from an ethics review board								
8. Obtaining and compiling research data								
9. Examining and interpreting research data								
10. Completion and submission of the dissertation paper.								

Appendix G

SPSS Outputs

Generalised linear model (Question 4.3.3)

Parameter Estimates											
Parameter		B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
				Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold	[Sustainability=2,13]	-1.359	1.5269	-4.352	1.633	.793	1	.373	.257	.013	5.121
	[Sustainability=2,25]	-.648	1.3555	-3.304	2.009	.228	1	.633	.523	.037	7.457
	[Sustainability=2,38]	.080	1.2644	-2.398	2.558	.004	1	.950	1.083	.091	12.911
	[Sustainability=2,50]	.321	1.2486	-2.126	2.768	.066	1	.797	1.379	.119	15.930
	[Sustainability=2,75]	.690	1.2322	-1.725	3.105	.314	1	.575	1.994	.178	22.316
	[Sustainability=2,88]	.972	1.2227	-1.425	3.368	.632	1	.427	2.642	.241	29.026

	[Sustainability=3,00]	1.399	1.2133	-.979	3.777	1.329	1	.249	4.051	.376	43.686
	[Sustainability=3,13]	1.799	1.2091	-.570	4.169	2.215	1	.137	6.045	.565	64.655
	[Sustainability=3,25]	2.244	1.2080	-.123	4.612	3.452	1	.063	9.435	.884	100.692
	[Sustainability=3,38]	2.722	1.2137	.343	5.101	5.030	1	.025	15.214	1.410	164.197
	[Sustainability=3,50]	3.154	1.2258	.751	5.556	6.619	1	.010	23.419	2.119	258.794
	[Sustainability=3,63]	3.654	1.2420	1.219	6.088	8.653	1	.003	38.610	3.385	440.458
	[Sustainability=3,75]	4.437	1.2652	1.957	6.917	12.298	1	<.001	84.506	7.079	1008.852
	[Sustainability=3,88]	5.174	1.2853	2.654	7.693	16.201	1	<.001	176.551	14.216	2192.589
	[Sustainability=4,00]	5.312	1.2888	2.786	7.838	16.991	1	<.001	202.828	16.223	2535.910
	[Sustainability=4,13]	6.067	1.3179	3.484	8.650	21.192	1	<.001	431.382	32.588	5710.427
	[Sustainability=4,25]	6.954	1.3798	4.249	9.658	25.397	1	<.001	1046.978	70.053	15647.722
	[Sustainability=4,38]	7.668	1.4704	4.786	10.550	27.198	1	<.001	2139.294	119.865	38181.261
	[Sustainability=4,63]	8.375	1.6324	5.176	11.575	26.321	1	<.001	4337.924	176.906	106370.790
[Business_Sector=1]		.520	.4304	-.324	1.363	1.458	1	.227	1.682	.723	3.909

[Business_Sector=2]	0 ^a	.	.	.	.	.	.	1	.	.
Business_Performance	.978	.3884	.217	1.739	6.342	1	.012	2.659	1.242	5.694
(Scale)	1 ^b									
Dependent Variable: Sustainability										
Model: (Threshold), Business_Sector, Business_Performance										
a. Set to zero because this parameter is redundant.										
b. Fixed at the displayed value.										

Multinomial logistic regression: classification (Question 4.6.3)

Classification																					
Observed	Predicted																				Percent Correct
	2.13	2.25	2.38	2.50	2.75	2.88	3.00	3.13	3.25	3.38	3.50	3.63	3.75	3.88	4.00	4.13	4.25	4.38	4.50	4.63	
2.13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.0%
2.25	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.0%
2.38	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.0%
2.50	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.0%
2.75	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0.0%
2.88	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.0%

3.00	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0.0%
3.13	0	0	0	0	0	0	0	0	1	0	1	0	3	0	0	0	0	0	0	0	0.0%
3.25	0	1	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0.0%
3.38	0	0	0	0	0	1	0	0	0	0	2	0	6	0	0	0	0	0	0	0	0.0%
3.50	0	0	0	0	0	0	0	0	0	0	3	0	6	0	0	0	0	0	0	0	33.3%
3.63	0	0	0	0	0	0	0	0	0	0	2	0	7	1	0	0	1	0	0	0	0.0%
3.75	0	0	0	0	0	0	0	0	1	0	0	0	15	1	0	0	0	0	0	0	88.2%
3.88	0	0	0	0	0	0	0	0	0	0	1	0	10	1	0	0	1	0	0	0	7.7%
4.00	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0.0%
4.13	0	0	0	0	0	0	0	0	0	0	1	0	7	0	0	0	0	0	0	0	0.0%
4.25	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	1	0.0%
4.38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0.0%
4.63	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.0%
4.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	100.0%
Overall Percentage	1.0%	1.9%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	4.9%	0.0%	12.6%	0.0%	69.9%	3.9%	0.0%	0.0%	2.9%	0.0%	0.0%	1.9%	21.4%

Multinomial logistic regression: classification (Question 4.8.3)

Observed	Classification																				Percent Correct
	2.13	2.25	2.38	2.50	2.75	2.88	3.00	3.13	3.25	3.38	3.50	3.63	3.75	3.88	4.00	4.13	4.25	4.38	4.63	4.75	
2.13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.0%
2.25	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0%
2.38	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.0%
2.50	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.0%
2.75	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0.0%
2.88	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0.0%
3.00	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0.0%
3.13	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0.0%
3.25	0	0	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	0	0	0	14.3%
3.38	0	0	0	0	0	0	0	0	1	0	2	0	6	0	0	0	0	0	0	0	0.0%
3.50	0	0	0	0	0	0	0	0	0	0	3	0	6	0	0	0	0	0	0	0	33.3%
3.63	0	0	0	0	0	0	0	0	1	0	0	0	9	0	0	0	1	0	0	0	0.0%
3.75	0	0	0	0	0	0	0	0	1	0	0	0	16	0	0	0	0	0	0	0	94.1%
3.88	0	0	0	0	0	0	0	0	1	0	1	0	9	1	0	0	1	0	0	0	7.7%
4.00	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0.0%

4.13	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	0	0	0	0	0	0.0%
4.25	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	1	0.0%
4.38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0.0%
4.63	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.0%
4.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.0%
Overall Percent age	1.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	9.7 %	0.0 %	12.6 %	0.0 %	70.9 %	1.0 %	0.0 %	0.0 %	3.9 %	0.0 %	0.0 %	1.0 %	21.4%

Parameter of Estimates (4.31)

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Thresh old	[Sustainability = 2,13]	.966	1.507	.411	1	.522	-1.988	3.921
	[Sustainability = 2,25]	1.709	1.332	1.645	1	.200	-.903	4.320
	[Sustainability = 2,38]	2.461	1.244	3.915	1	.048	.023	4.900
	[Sustainability = 2,50]	2.708	1.228	4.866	1	.027	.302	5.114
	[Sustainability = 2,75]	3.084	1.211	6.482	1	.011	.710	5.458
	[Sustainability = 2,88]	3.365	1.204	7.805	1	.005	1.004	5.726
	[Sustainability = 3,00]	3.784	1.201	9.924	1	.002	1.430	6.138
	[Sustainability = 3,13]	4.177	1.204	12.034	1	<,001	1.817	6.537
	[Sustainability = 3,25]	4.630	1.213	14.570	1	<,001	2.253	7.008
	[Sustainability = 3,38]	5.125	1.228	17.420	1	<,001	2.718	7.532
	[Sustainability = 3,50]	5.567	1.244	20.020	1	<,001	3.129	8.006
	[Sustainability = 3,63]	6.076	1.265	23.068	1	<,001	3.596	8.555
	[Sustainability = 3,75]	6.889	1.300	28.059	1	<,001	4.340	9.437
	[Sustainability = 3,88]	7.661	1.335	32.939	1	<,001	5.045	10.277
	[Sustainability = 4,00]	7.804	1.341	33.853	1	<,001	5.175	10.433
	[Sustainability = 4,13]	8.587	1.381	38.668	1	<,001	5.881	11.294
	[Sustainability = 4,25]	9.500	1.446	43.195	1	<,001	6.667	12.333
	[Sustainability = 4,38]	10.219	1.532	44.522	1	<,001	7.217	13.221