A BUSINESS INTELLIGENCE SYSTEMS ADOPTION FRAMEWORK FOR THE SMALL, MEDIUM, AND MICRO-ENTERPRISES GROCERY RETAIL SECTOR: A CASE OF TSHWANE METROPOLITAN MUNICIPALITY

BY

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DECLARATION

I, Ashlyn Ennie Stubbs Muleya hereby declare that this dissertation entitled: "A business intelligence systems adoption framework for the small, medium, and micro-enterprises grocery retail sector: A case of Tshwane Metropolitan Municipality" for the degree of Masters of Commerce in Business Information Systems, hereby submitted by me, has not previously been submitted for a degree at this or any other institution, and that this is my work in design and execution and that all reference material contained therein have been duly acknowledged.

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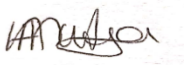
Researcher's Signature:  **Date:** 08/02/2021

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DEDICATION

I dedicate this study to God Almighty for his guidance, inspiration, protection, and for giving me the strength to overcome obstacles and pursue my goals. This study is also dedicated to my beloved parents for their constant encouragement and care towards my education.

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ABSTRACT

Business Intelligence Systems (BIS) is regarded as a leveraging suite of tools and technologies to enhance the decision-making process of an organization by transforming data into valuable and actionable knowledge to gain a competitive advantage. While some small to medium enterprises (SMMEs) have adopted BIS technologies and are deriving benefits from them, others are confronted with a host of challenges when trying to adopt BIS. This study examined factors that are hampering the smooth adoption of BIS by SMMEs in the grocery retail sector in South Africa, focusing on the Tshwane Metropolitan Municipality, and proposed a suitable framework to guide such adoption. Three technology adoption models which underpinned this study are the technology acceptance model, task-technology fit model, and diffusion on innovation model. These models were integrated to develop a conceptual framework for the study. A survey research design was considered suitable for this study because it is the best method for generalizing the findings to the entire population. The study adopted a quantitative research approach, which is an approach for testing objective theories by examining the relationship among variables. In total, 300 close-ended questionnaires were distributed to SMMEs owners/managers around Pretoria. The data collected were analysed using the IBM SPSS version 27 software package. Multiple regression analysis was used to test the seven proposed hypotheses and to determine the statistical significance of each hypothesis. The final tested framework demonstrated that observability, trialability, perceived BIS ease of use, and perceived BIS usefulness were all positively correlated to BIS adoption. Furthermore, the framework also showed that BIS characteristics and task characteristics positively influence task technology fit. Recommendations are made for SMMEs to overcome barriers in adopting BIS, these are: there is a need for SMMEs management to invest in IT projects by allocating enough budget for technology purchase and implementation, sponsored IT support programs could enable SMMEs to increase their knowledge regarding the latest technologies they could adopt for their business, SME managers should be able to build a culture that is complimentary with technology and innovation and SMME managers should engage in strategic collaboration with other major business players to enhance learning experiences about BIS technologies.

Keywords: Business Intelligence systems; Grocery retail sector' SMMEs, BIS adoption; Technology acceptance model; Task-Technology fit model, Diffusion of Innovation

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BIS	Business Intelligence Systems
SMME	Small, Medium, and Micro-Enterprises
IT	Information Technology
ICT	Information Communication Technology
TAM	Technology Acceptance Model
DOI	Diffusion of Innovation
TTF	Task Technology Fit
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
CSF	Critical Success Factors
SPSS	Statistical Package for the Social Sciences
KMO	Kaiser-Meyer-Olkin
GDP	Gross Domestic Product

Chapter One: Introduction and background of the study

1.1 Introduction

Business intelligence systems (BIS) are regarded as a leveraging suite of tools and technologies to enhance the decision-making process of an organization by transforming data into valuable and actionable knowledge to gain a competitive advantage. BIS continues to be a top priority for organizations as they need to gain actionable insight and provide quick responses to customers and remain relevant in the increasingly competitive business environment (Kinunda, 2016). According to Chaudhuri and Narasayya (2011), it is difficult in today's business world to find successful enterprises that have not leveraged the power of BIS technology for their business. This indicates that BIS plays a critical role in organizations to support decision-making and improve organizational performance (Ranjan, 2009). By providing capabilities such as data mining and analytical processing, organizations can gain valuable insight to improve decision-making, optimize internal processes, and drive further revenues (Kinunda, 2016).

Previous studies show that SMMEs contribute to the growth of the South African economy (Nieman, 2006; Rajgopaul, 2017; Susman, 2017). According to the Banking Association of South Africa (2017), Small and Medium Enterprises (SMMEs) have been identified as the productive drivers of inclusive economic growth and development in South Africa. It has been estimated that in South Africa, SMMEs makeup 91% of formalized businesses, employ about 60% of the labour force and the total economic outputs account for roughly 34% of Gross Domestic Product (GDP) (Kalane, 2015; Mkagamale, 2017). The considerable contribution of SMMEs to the South African GDP is the reason why they should adopt BIS technologies as a tool for spearheading economic growth.

1.2 Background of the Study

In today`s customer-centric, digital-first world, many business owners and managers are overwhelmed by information and are seeking innovative ways to derive greater control, understanding, and intelligence from their organizational data (Richardson, 2018). One of the possible solutions to this growing problem is the adoption of a BIS strategy. However, many companies have been slow to adopt BIS due to a lack of knowledge of what it involves, where to start and how long it will take to see any benefit (Richardson, 2018). BIS plays a critical role in supporting decision-making to improve organizational effectiveness (Kinunda, 2016). Eliminating waste, reducing costs, and delivering efficient and reliable products or services is currently the prerogative of any organization and in doing so, they are turning these large,

accumulated data to gain valuable insights (Amoako, 2013). Reliable data and information form the basis of any strategic management decision (Boikanyo, Lotriet & Buys, 2016). Business Intelligence Systems have made it possible for organizations to mine useful information from large amounts of data. Investment in BI technologies continues to grow and organizations are increasingly becoming reliant on BI to help reduce operational costs and grow revenues.

According to Ranjan (2009), these systems enable firms to store, retrieve, and analyse large volumes of information and allow them to improve strategic and tactical decision-making and gain a competitive advantage in the industry. Olexova (2014) describes Business Intelligence as a wide term that is commonly used for technologies, applications, tools, and processes to gather, store, access, and analyse data for better decision-making. Access to adequate information by any organization is crucial for competitive advantage, therefore, an organization needs to adopt BIS to have a competitive advantage over other organizations in the market (Kfouri, 2018). Previous studies show that BIS yield real business benefits and are used by decision-makers throughout the firm for effective decision-making across a broad range of business activities (Crossland, 2010, Richardson, 2018; Hoque, 2015, Ranjan, 2009).

BIS technologies can eliminate a lot of guesswork within an organization, enhance communication among departments while coordinating activities, and enabling companies to respond quickly to changes in financial conditions, customer preferences, and supply chain operations (Ranjan, 2009). According to Kinunda (2016), organizations are increasingly using BI tools for data-driven decision-making as it enables a comprehensive analysis of the dynamic business environment in real-time, thereby allowing for strategic adjustments, overall cost management, and optimization of business operations. According to Brand South Africa (2018), the retail sector is among the key sectors that contribute to the gross domestic product (GDP) and keep the South African economic engine running.

The retail industry continues to grow, and the aim is to deliver a seamless experience across stores and on their websites. To remain competitive and meet customers` demands, organizations ought to adopt BIS as a way of improving business performance. Retailers are looking beyond reporting capabilities to applications for syncing information from a wide variety of systems to analyse the performance of sales, margin, the effectiveness of promotions, and allowing them to effectively react to business pressure.

1.3 Problem Statement

Small and Medium Enterprises play a significant role in the South African economy, but they face several obstacles that affect their development and limit their ability to boost the economy to the desired target. In

this ever-changing environment, retailers must have complete insight into how actual results compare to plan numbers, revenue by store, product line, and other factors. The retail enterprise must carefully manage operational costs to ensure that these costs are optimized (ElegantJ BI, 2019). With the increase of pervasive digitization and ubiquitous connectivity, there has been a rapid increase in volume, velocity, and a variety of structured and unstructured data with which organizations are struggling to extract key value to gain competitive advantage (Kinunda, 2016). The adoption of BIS in organizations has led to improved decision-making, increased operational efficiency, competitive advantage, and increased revenue. The competitive game is changing for the retail sector.

As the industry continues to consolidate, retailers have begun to realize that using technology to better understand customer buying behaviour, to drive sales and profitability, and to reduce operational costs is a necessity for long-term survival (Dubin, 2018) While some grocery retailers are aware of BI technologies and derive benefits from them, other organizations fail to capitalize on its potential because they possess limited resources and cannot afford the same sophisticated and expensive BI tools that are within access for larger organizations (Kfouri, 2018).

The complexity of "real-world" BIS applications continues to grow with the increasing demand for information at all levels of business (Venter, 2005). Kfouri (2018) contends that the failure to adopt and implement the most advanced technology could be the complex nature of BI, which calls for high maintenance and implementation costs. To prove the worth of investments to stakeholders, it is important to understand what value BIS adds to organizations. One of the main challenges is to identify the value brought by BIS implementations and their impact on organizational performance (Eybers, 2015).

1.4 Aim and Objectives

This study aims to establish factors that influence the adoption of BIS by SMMEs in the grocery retail sector in Tshwane Metropolitan Municipality, South Africa, and to propose a framework to guide the adoption of such systems in SMMEs.

To achieve this aim, this study seeks to:

- identify the challenges currently experienced in BIS adoption
- determine why BIS are vital to the business` success
- analyse the current models used in BIS adoption by SMMEs in SA and identify their shortfalls
- propose a conceptual framework suitable to the South African context to guide the adoption of BIS in the SMMEs grocery retail sector

- refine the proposed framework based on the findings of this study.

1.5 Hypotheses

H1: Observability will positively influence BIS adoption.

H2: Trialability will positively influence BIS adoption.

H3: Perceived ease of use of the BIS positively influences BIS adoption.

H4: Perceived usefulness of BIS positively influences BIS adoption.

H5: BIS characteristics will positively influence task-technology fit.

H6: Task characteristics will positively influence task-technology fit.

H7: Perceived Task-BIS fit will positively influence BIS adoption.

1.6 Significance of the Study

The economic contribution made by SMMEs in the grocery retail industry is of great value to the economy. With increasing consumer demand and dynamic market conditions, the players in the retail industry need to understand customer preferences and intensify their research (InfinitiResearch, 2019). Therefore, retailers need to adopt BIS to help them address customer needs and identify the latest trends. Firms are re-engineering their operations and investing a lot of their money in ICT solutions to take advantage of the consistently ever-changing business environment (Chube, 2015). Some managers often fail to make better business decisions due to insufficient business information. With BIS, data are collected within and outside the organization, enabling transparency within the organization and improving the decision-making process.

It is important to understand what benefits are achieved by organizations that use BIS, however, no specific method for measuring the benefits exists (Elbashair, Collier & Davern, 2008). The purpose of this study is to investigate the adoption of BIS in the SMMEs retail sector and to determine its effectiveness in guiding this adoption. The researcher will propose a framework that could assist these retail organizations to properly adopt BIS and get the best out of such systems. The study will also be of value for those desiring to pursue any research related to the adoption of BIS in organizations. It will also contribute towards a theoretical understanding of factors influencing BIS adoption.

1.7 Operational Definitions

To assist the reader in understanding the study, important terms and definitions used throughout the dissertation are provided below:

1.7.1 Business Intelligence System

B1S can be defined as leveraging a suite of tools and technologies to enhance the decision-making process by transforming data into valuable and actionable knowledge to gain a competitive advantage (Venter & Tustin, 2006; Crossland, 2010). Davenport (2006), defines BIS as a term that encompasses a wide array of processes and software to collect, analyse, and disseminate data, all in the interest of better decision-making. Building on these definitions, BIS in this study means technologies that help management to transform data into useful information that improves decision-making, thereby improving business operations.

1.7.2 Retail industry

The retail industry involves reselling goods and services to the end-user; general stores and kiosks are the initial forms of retailing points where only the nearby community usually buys their daily necessities (Zamba, Mahlangu, Giyane & Rebanowaki, 2018). According to Day (2015), retailing includes all the activities involved in selling goods or services directly to final consumers for personal use. In this study, the researcher will be focusing on the grocery retail sector.

1.7.3 Small, Medium and Micro-Enterprises

According to the National Small Business Act of 1996, as amended by the National Small Business Amendment Acts of 2003 and 2005, SMMEs are a separate and distinct business entity, including co-operative enterprises and nongovernmental organizations, managed by one owner or more, including its branches or subsidiaries if any, and is predominantly carried on in any sector or sub-sector of the economy. Definition of SMMEs per the National Small Business Act:

- ✓ **Survivalist enterprise:** the income generated is less than the minimum income standard or the poverty line. This category is considered pre-entrepreneurial and includes hawkers, vendors, and subsistence farmers. In practice, survivalist enterprises are often categorized as part of the micro-enterprise sector.

- ✓ **Micro-enterprise:** the turnover is less than the value-added tax (VAT) registration limits. These enterprises usually lack formality in terms of registration. They include, for example, shops, minibus taxis, and household industries. They employ no more than 5 people.

- ✓ **Small enterprise:** The upper limit is 50 employees. Small enterprises are generally more established than very small enterprises and exhibit more complex business practices.

- ✓ **Very small enterprise:** These are enterprises employing fewer than 10 paid employees, except for the mining, electricity, manufacturing, and construction sectors, in which the figure is 20 employees. These enterprises operate in the formal market and have access to technology.

- ✓ **Medium enterprise:** The maximum number of employees is 100 or 200 for the mining, electricity, manufacturing, and construction sectors. These enterprises are often characterized by the decentralization of power to an additional management layer.

This study will mostly focus on small and micro-enterprises in the grocery retail sector.

1.8 Structure of the dissertation

This dissertation comprises five chapters:

Chapter 1: Introduction and background of the study

This chapter provides the introduction and background of the study, the problem statement, aim and objectives of the study, hypotheses, and an overview of the methodological approach. The significance and delimitation of the study are explained in this chapter.

Chapter 2: Literature review

A review of existing knowledge relating to BIS adoption is provided in this chapter. In this chapter, the researcher investigates different sources of information regarding the value and impact of business intelligence technologies in organizational operations. The chapter covers the definition of operational terms and an overview of the business intelligence, BIS in the retail industry, benefits derived from the successful adoption of BIS, challenges faced in BIS implementation as well as the key success factors of BIS implementation. The chapter also presents the hypotheses and conceptual framework is of the study.

Chapter 3: Research methodology

This chapter presents the research design and methodology employed in this study. It also covers the research approach to be adopted, target population, sampling technique, sampling size, data collection instruments, techniques, and procedures used to analyse the collected data.

Chapter 4: Data Analysis and Interpretation

This chapter presents the results and analysis of data collected from the participants.

Chapter 5: Conclusions and Recommendations

This chapter provides conclusions of the study based on the empirical findings and literature review. All the findings are summarized, and the research questions are answered at this stage. Recommendations are also discussed in this chapter.

1.9 Summary

This chapter provided an introduction and background for the research study. It also discussed the problem statement, which is the reason why the researcher is carrying out this study. The aims and objectives of this study were also identified in this chapter, as well as the research hypotheses. The researcher motivates the study and its significance.

Chapter Two: Literature Review

A literature review relating to business intelligence systems (BIS) adoption is conducted in this chapter. The review provides context and enhances understanding of how BIS adoption is vital to business success. This chapter covers an overview of SMMEs and Business Intelligence, business intelligence framework, benefits of BIS in retail organizations, challenges faced in adopting BIS, critical success factors, and a conceptual framework of the study.

2.1. Small, Medium, and Micro-Enterprises Overview

In the era of economic globalization, SMMEs are recognized as an engine for sustainable economic development in both developed and developing countries (Prasanna, Jayasundara, Gamage, Ekanayke, Rajapakshe & Abeyrathne, 2019). Currently, there is no widely accepted definition of SMMEs because of the diversity of variables that are often used to define SMMEs because the idea is dynamic and relative (Makiwa, 2018). However, to understand SMMEs, it is essential to start by defining its key components, that is, small, medium, and micro-enterprise as outlined hereunder.

Defining Small, Medium, and Micro-Enterprises

SMMEs differ from large well-established firms, not only in terms of the number of employees but also in terms of access to financial resources, access to a diverse pool of skilled employees as well as access to other intangible resources such as reliable market and customer information (Campbell, 2014). The Department of Trade and Industry (2008) defines SMMEs as a broad range of firms, including formally registered, informal, and non-VAT registered organizations. SMMEs are defined as relatively small-sized industries that are actively managed by their owners, highly personalized, largely local in their area of operations, and largely dependent on internal sources of capital to finance their growth (Ali, 2017). Small businesses range from medium-sized enterprises such as established traditional family businesses employing over a hundred people to informal micro-enterprises (The Small Enterprise Development Agency, 2016).

According to Section 1 of the National Small Business Act of 1996, as amended by the National Small Business Amendment Act of 2004, small enterprise means a separate and distinct business entity, together with its branches or subsidiaries, if any, including co-operative enterprises, managed by one owner or more, predominantly carried on in any sector or subsector of the economy. The National Small Business Act of 1996 also categorizes South African businesses into five groups as stated below:

i. **Medium enterprise**: the maximum number of employees is 100 or 200 for the mining, electricity, manufacturing, and construction sectors. These enterprises are often characterized by the decentralization of power to an additional management layer.

ii. **Small enterprise:** the upper limit is 50 employees. Small enterprises are generally more established than very small enterprises and exhibit more complex business practices.

iii. **Very small enterprises:** these are enterprises employing fewer than 10 paid employees, except for the mining, electricity, manufacturing, and construction sectors, in which the figure is 20 employees. These enterprises operate in the informal market and have access to technology.

iv. **Micro-enterprises:** the turnover is less than the value-added tax registration limit, that is, R150 000 per year. These enterprises usually lack formality in terms of registration. They include spaza shops, minibus taxis, and household industries. They employ no more than 5 people.

v. **Survivalist enterprise:** the income generated is less than the minimum income standard or the poverty line. This category is considered pre-entrepreneurial and includes hawkers, vendors, and subsistence farmers. In practice, survivalist enterprises are often categorized as part of the micro-enterprise sector.

These categories are summarized in Table 2.1. The definition uses the number of employees per enterprise size category combined with the annual turnover categories, the gross assets excluding fixed property.

Table 2. 1 Definition of SMMEs (National Small Business Act, 1996)

Enterprise size	Number of employees	Annual turnover (South African Rand)	Gross assets, excluding fixed property
Medium	Fewer than 100 to 200 depending on the industry	Less than R4 million to R50 million, depending on the industry	Less than R2 million to R18 million, depending on the industry
Small	Fewer than 50	Less than R2 million to R5 million depending on the industry	Less than R2 million to R4.5million, depending on the industry
Very small	Fewer than 10 to 20, depending on the industry	Less than R200 000 to R500 000, depending on the industry	Less than R150 000 to R500 000, depending on the industry
Micro	Fewer than 5	Less than R150 000	Less than R100 000

Source: (Abor & Quatery, 2010)

SMMEs characteristics

Wong and Aspinwall (2004) categorized the SMMEs characteristics into six categories, which are: ownership and management structure; culture and behaviour; system, processes, and procedures; human resources and customers and markets.

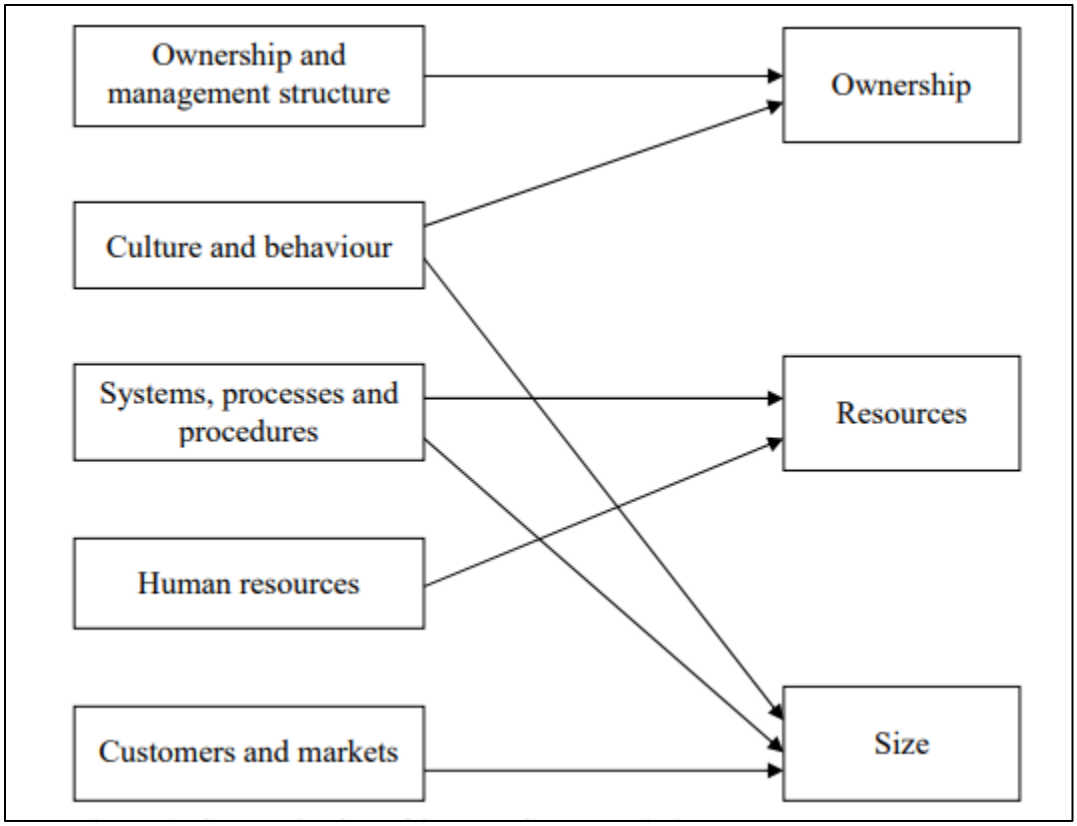

Figure 2. 1: Categorisation of SMMEs characteristics (Source: (Cass, 2012))

Ownership and management structure

SMMEs are autonomous, independently owned enterprises not operating within the structure of a large organization, differentiating them from small business units (Cass, 2012). A firm is regarded as small if it is managed by owners or part-owners in a personalized way and not through the medium of a formalized management structure (Le Fleur, Koor, Chetty, Ntshangase, Mackenzie & Rawoot, 2014)

Culture and Behaviour

A unified culture is often found in SMMEs which allow for easier implementation of new strategies and processes (Wong & Aspinwall, 2004). SMMEs tend to be more people-oriented with a culture of learning and change rather than control (Cass, 2012).

Systems, processes, and procedures

SMMEs generally have fewer complex systems and tend to operate with a more labour oriented approach which allows these systems to be more flexible in adapting to changes (Wong & Aspinwall, 2004). Small business often focuses on operations rather than on strategic challenges.

Human resources

Small business employs smaller teams of employees compared to companies that operate on larger scales (Ingram, 2019). This is a result of small operations, to have less definite job descriptions and a little job specialization which in turn develops a more versatile workforce. Quartey (2010) mentioned that SMMEs have lower capital costs associated with job creation due to their more labour oriented approach.

Customers and markets

SMMEs serve a small number of customers within local and regional markets, hence, they often have close relationships with customers and are in a good position to understand the needs of a customer (Cass, 2012). SMMEs also tend to have a small number of product lines and with more specialization often serving niche markets (Cass, 2012).

Cronje, Du Toit, and Motlatla (2001) also identified the following SMMEs characteristics:

- SMMEs are generally more labour intensive than larger businesses.
- On average, SMMEs generate more job opportunities per unit of invested capital.
- They are an instrument for utilizing the talents, energy, and entrepreneurship of individuals who cannot reach their full potential in larger organizations.
- SMMEs often flourish by rendering services to a small or restricted market which larger businesses do not find attractive.
- They are also breeding grounds for entrepreneurial talent and the testing ground for new industries.
- SMMEs contribute to the competitiveness of the economy.
- SMMEs create social stability, cause less damage to the physical environment than large factories, stimulate personal savings, increase prosperity in rural areas, and enhance the population's general level of economic participation.

Cass (2012) avers that the characteristics of SMMEs often form the constraints within which the success of an SMME is bound. However, some of these characteristics may be a competitive advantage that allows SMMEs to be successful.

Current situation of SMMEs in South Africa

The SMME sector in South Africa provides an attractive and largely under-tapped market opportunity for the country`s economic growth through funder opportunities and corporate supplier development (Vuba, 2019). SMMEs in South Africa are facing challenges ranging from accessing credit to the complexity of technology adoption (Kikawa, Kalema & Mavuso, 2019). SMMEs are now the government`s main developmental focus. Furthermore, SMMEs have the potential to contribute to South African economic growth and reduce the unemployment rate in South Africa.

It has been estimated that in South Africa, SMMEs makes up 91% of formalized businesses, employ about 60% of the labour force, and the total economic output accounts for roughly 34% of GDP (Mkagamale, 2017). However, several studies have found that many small businesses in South Africa do not make it past the second year of trading with failure rates as high as 63 percent (Roberts, 2010; Cant & Wiid, 2013; Kikawa et al., 2019). The National Small Business Act of 1996 together with various policies and programs has been initiated and implemented to support SMMEs, and this has been considered as the driving force towards the growth of the economy and that their role in job creation is great (Kikawa et al., 2019).

2.2. Business Intelligence System Overview

BIS has become increasingly important in the past three decades as more public and private sector organizations are implementing them to improve decision-making in the competitive business environment (Kinunda, 2016). BIS became popular starting in the 1990s, it is a term that has been used to describe a variety of systems that have been operational since the 1950s (Chen, Chiang & Storey, 2012). From a historical standpoint, the underlying concept of BIS is not new. The term “Business Intelligence” has been given different meanings over the years, although they all lead to the same conclusion.

Defining Business Intelligence

Davenport (2006) posits that the term “Business intelligence” was popularized during the 1990s and could be considered a term that encompasses a wide variety of processes and software used to collect, analyse and disseminate data all in the interest of better decision-making. Businesses are making use of BIS to help them better understand the quantity of data in their systems and operations. The Mathematical and Information Sciences Department of the Commonwealth Scientific and Industrial Research Organization defines BIS as a process of increasing the competitive advantage of a business by intelligent use of available data in decision-making (Venter, 2005). BIS consists of five key stages:

Data sourcing – extraction of electronic information from multiple sources of data like text documents, databases, images, media files, and web pages.

Data analysis – synthesizing useful knowledge from collections of data using data mining, text understanding, and image analysis techniques.

Situation awareness – filtering of irrelevant information and setting the remaining information in the context of the business and its environment.

Risk assessment – discovering what plausible actions might be taken or decisions made at different times based on the expectation of risk and reward.

Decision support – using information wisely to make better business decisions.

Business Intelligence System framework

The BIS framework involves the establishment and integration of hardware and software components. Rouse (2010) maintains that the underlying BIS framework plays an important role in BIS projects as it affects developments and implementation decisions. (see Figure 2.2)

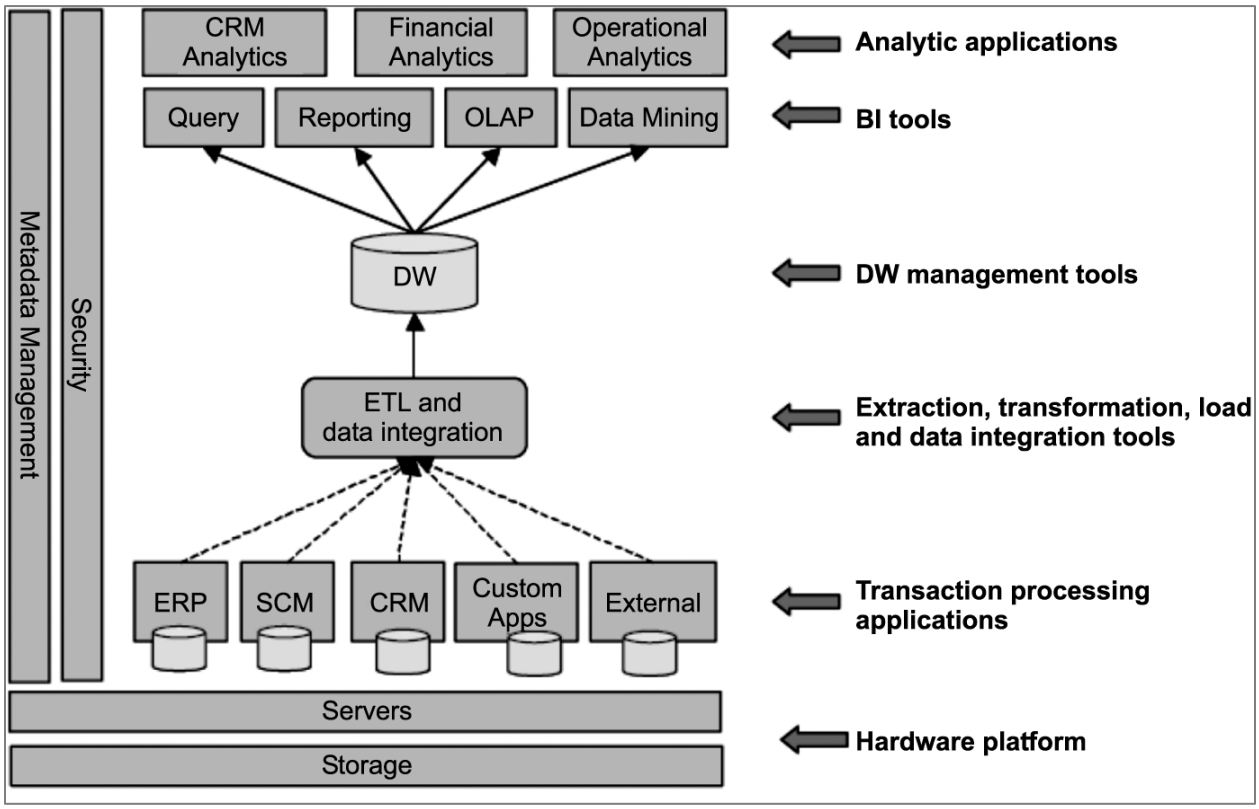

Figure 2. 2: BIS environment (Source: Crossland, 2008)

Hardware Platform

Hardware facilitates data possession, storage, access, and management (Jain & Das, 2011). The data components of the BIS framework include data sources that corporate executives and other users need to access and analyse to meet their business requirements. Businesses need to make decisions on hardware requirements to maintain high performance and scalable BIS.

Extract, Transform, Load (ETL)

The extract is the process that involves connecting to the source systems and both selecting and collecting the necessary data needed for analytical processing within the data warehouse, while transform involves applying a variety of rules and functions to previously extracted data to prepare that data for the next process, that is, loading (Dakic & Markovski, 2017). Lastly, load involves importing extracted and transformed data into a target data warehouse.

In this study, the ETL processes are important as they provide the basis on which data is accumulated into data warehouses for the use of BIS by retail organizations. Without proper ETL systems in place, it is unlikely that retail organizations will be able to gather in the proper format the necessary data required for mining and decision-making.

Data Warehousing

Inmon (1990) describes a data warehouse (DW) as a subject-oriented, integrated, time-variant, and non-volatile collection of data in support of management`s decision-making process. Ranjan (2009) notes that a data warehouse supports the physical propagation of data by handling numerous enterprise records for integration, cleansing, aggregation, and query tasks. It can also contain the operational data which can be defined as an updateable set of integrated data used for enterprise-wide tactical decision-making of a subject area. Kumar (2012) suggests that data warehouse is one of the most valuable things for BIS or data warehouse rises, and effective use can help decision-making intelligently that can improve the operations of BIS or data warehouse rises notably. He furthermore identifies four major components of the data warehouse as:

Subject-oriented means the data are arranged and optimized to provide a variety of analysis requirements from diverse functional departments within an organization.

Integrated means the data warehouse combines operational data derived from the different departments and strategic business units of the organization. It can use consistent naming conventions, measurement standards, encoding structures, and data attribution characteristics.

Time- variant means data is periodically loaded to the data warehouse, all time-dependent aggregations need to be recomputed.

Non-volatile means the data warehouse is static. Data in the warehouse system are read-only generally, thus, data in the database are rarely changed. Data are updated or refreshed on a periodic, incremental, or full refresh basis.

2.3 BIS capabilities

Gartner defines business intelligence as a software platform that delivers 15 capabilities across three categories as shown in Table 2.2.

Table 2. 2 Gartner's BIS platform capabilities

Category	Capabilities
Integration	• BI infrastructure • Metadata management • Development tools • Workflow and collaboration
Information delivery	• Reporting • Dashboards • Ad hoc query • Microsoft Office integration
Analysis	• OLAP • Advanced visualization • Predictive modelling and data mining • Scorecards

Integration

This capability provides a platform of programmatic and visual tools, coupled with a software developer`s kit for creating analytic applications, integrating them into a business process, and embedding them in another application (Wuyts, 2013). This capability enables the users to share and discuss information, BI content, and results and manage hierarchies and metrics via discussion threads, chat, and annotations, embedded either in the BIS platform or through integration with collaboration, social software, and analytical master data management. It has four components which are BI infrastructure, metadata management, development tools, workflow, and collaboration.

Information delivery

This capability assists the businesses to improve access to the business data and using that data to increase profitability. It assists in transforming data into actionable insights that will have a great impact on business strategic and tactical decisions. Tools like dashboards assist the users in displaying the state of the

performance metric compared with a goal or target value which will help in performance decision making. The tools enable users to ask their questions about the data without relying on IT to create a report. It has four components which are reporting, dashboards, ad hoc query, and Microsoft integration. These tools enable the dissemination of data to the right people.

Analysis

This capability assists businesses to transform raw data into a meaningful format. It assists in the analysis of large data to find meaningful patterns and correlations which will assist in optimizing internal business processes, thereby, increasing operational efficiency. The analysis tools give users the ability to display numerous aspects of the data more efficiently by using interactive graphs and charts (Mudzana, 2016). It has four components which are online analytical processing, advanced visualization, predictive modelling, and data mining and scorecards.

2.4 Business intelligence in the South African retail sector

Retailing involves reselling goods and services to the end-user; general stores and kiosks are the initial forms of retailing points where only the nearby community usually shops their daily necessities (Zamba et. al.,2018). In the retail industry, understanding customer behaviours, attitudes, needs, and pain points is essential for the success of the retail organization, therefore, the right data at the right time can help you make informed and data-driven decisions (Kumar, 2016).

Business intelligence provides the ability to collect and analyse a huge amount of data about customers, vendors, markets, internal processes, and the business environment (Gujrati, 2016). BI tools enable the recording of a huge amount of data and generate actionable insights via graphical representations of customer trends. Retailers can then leverage BI data to effectively target customers through personalization (Kumar, 2016). Retailers need to frequently analyse their data and access a real-time BI solution that will enable them to respond to changes promptly and remain competitive in a very tough industry (Panintelligence, 2019).

2.4.1 Case of Walmart

Walmart is the biggest retailer in the world and handles more than one million customer transactions every hour and generates more than 2.5 petabytes of data storage. BIS platforms help management to truly understand its customer base and predict customer demands. Walmart uses various BI tools to understand how online behaviour influences in-store behaviours and vice-versa (Bartley research, 2015). By adopting BIS, Walmart has gained a positive change in customer relations. For example, using SAS Analytics, the

company has easily recognized and analysed consumer behaviour patterns from a large set of data. BIS helps Walmart to discover new places in which they can start their stores according to consumer demand (Dewispelare, 2014).

2.5 Benefits of Business Intelligence in the Retail Industry

Several studies have shown that BIS adds great value to retail organizations (Elbashir at al, 2008; Kumar, 2016; Hennel, 2019). Some of the benefits are keeping up with consumer trends, improved efficiency of internal processes, visualize important information, and improved competitive advantage, that is, BIS technologies enable 24/7 real-time monitoring of competitors, including competitor profiling, business model analysis, and competitive forecasting.

Elbashir et al. (2008) categorized BIS benefits into three groups related to business processes:

1. Business supplier/partner benefits, which include the benefits that the organization realizes from the improved relationships with suppliers such as reduced transaction costs and supply chain improvements.
2. Internal efficiency benefits: These are benefits that arise from the optimization of internal processes, including a reduction in operational costs and improved staff productivity.
3. Customer intelligence benefits: These are benefits realized because of enhanced insight into customer behaviours such as buying preferences and patterns and customer segmentation.

2.6 BIS and decision making

There are many benefits associated with automated decision-making. Well-informed business decisions can be a competitive advantage, that is, they expedite decision-making, as acting quickly and correctly on the information before competing businesses do (Ranjan, 2009). If the goal of better information and better analysis is ultimately better decisions and actions taken based on them, organizations must have a strong focus on decisions and their linkage to information (Davenport, 2010).

Due to poor business decision-making, many organizations tend to experience low productivity, low revenue, and poor business processes. Ranjan (2009) also states that information is often regarded as the most important resource a company has, so when a company can make decisions based on timely and accurate information, it can improve its performance.

Olszak and Ziemba (2007) aver that BIS support data analyses and decision making in different areas of organization performance including the following:

i. **Financial analyses** that involve reviewing of costs and revenues, calculations and comparative analyses of corporate income statements, analyses of corporate balance sheet and profitability, analyses of financial markets, and sophisticated controlling.
ii. **Marketing analyses** involve analyses of sales receipts, sales profitability, profit margins, meeting sales targets, time of orders, actions undertaken by competitors, and stock exchange quotations.
iii. **Customer analyses** that concern the time of maintaining contacts with customers, customer profitability, modelling customers' behaviour and reactions, and customer satisfaction.
iv. **Production management analyses** make it possible to identify production 'bottlenecks' and delayed orders, thus enabling organizations to examine production dynamics and to compare production results obtained by departments or plants.
v. **Logistics analyses** that enable the identification of partners for the supply chain management.
vi. **Analyses of wage-related data** including wage component reports made regarding the type of required reports made from the perspective of a given enterprise, wage reports distinguishing employment types, payroll surcharges, personal contribution reports, and analyses of average wages.
vii. **Personal data analyses** involve examination of employee turnover, employment types, and presentation of information on individual employee`s data.

2.7 BIS and organizational effectiveness

Scholars have argued that there is a positive relationship between BI and organizational effectiveness (Arefin, 2016; Elbashir et al., 2008; Turban, Sharda, Delen & Afraim, 2007) and that BI helps organizations optimize their performances. It assists management in making accurate decisions, thus, leading to an increase in productivity and profitability of an organization (Arefin, Hoque & Yukun, 2015). Watson and Wixon (2007) found that when there is alignment between business and BI strategies, BI can be a powerful enabler of business strategy, including new business models that bring about organizational transformation.

2.8 Challenges faced by SMMEs in BIS adoption in South Africa

SMMEs in South Africa are confronted with numerous challenges in their effort to adopt BIS systems. Among some of these challenges include the lack of executive support, lack of BI strategy and understanding, exorbitant costs of acquiring and using BI, and the lack of skills. These sentiments were

echoed by several scholars who suggested that in the context of South Africa, many SMMEs struggles to secure financial support for sustaining their businesses and acquire BI solutions (Shah, 2012; Venter, 2005), have a poor business IT strategy alignment (Moyo, 2019), fail to attract and pay suitably skilled employees (Otieno, 2015). Furthermore, Bose (2009) suggests that BIS is not an easy technology for users to understand or know how to use, thus, it requires training and assistance from a specialist – usually at high costs which SMMEs cannot afford.

2.9 Critical success factors for BIS adoption

Critical success factors (CSF) are an element that an organization or project needs to achieve its mission (Pham, Mai, Misra, & Crawford, 2016). Yeoh and Koronois (2010) proposed a framework that categorizes CSFs into organization, process, and technology. This framework (see Figure 2.3) treats the CSFs as necessary for the implementation success of the BIS whereas the absence of CFs would lead to the failure of the systems (Yeoh & Koronios, 2010).

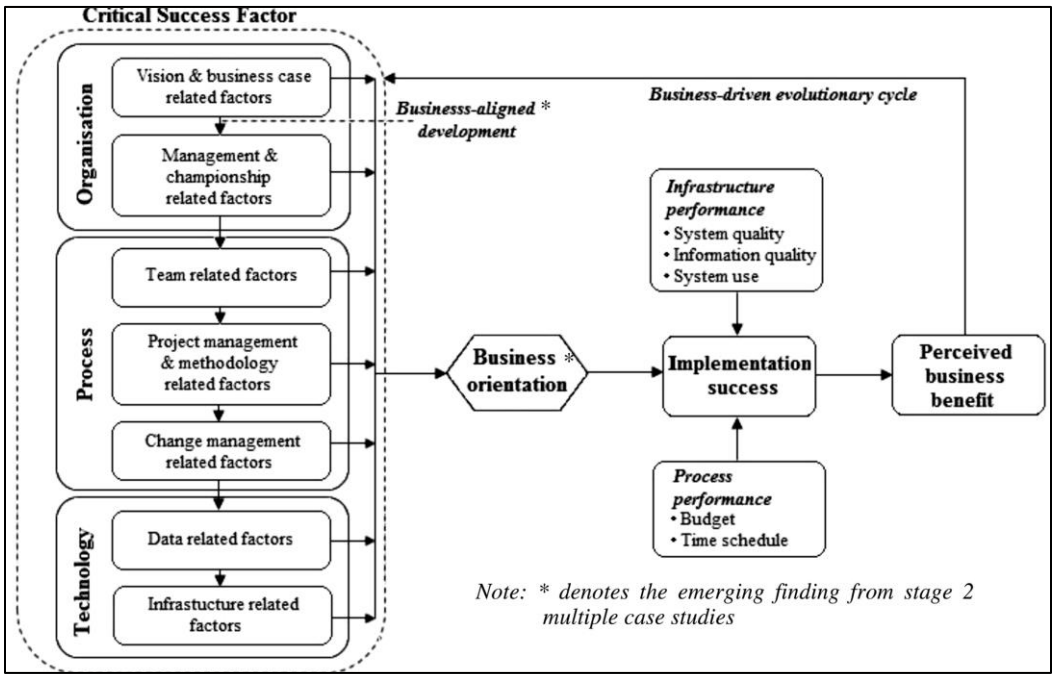

Figure 2. 3: Critical Success Factors (Source: **(Yeoh & Koronios, 2010)**)

2.9.1 Organization dimension

This dimension requires BIS implementation to be aligned with the organizational strategic plans. Yeons and Koronois (2010) assert that if the business vision is not clearly understood, it would eventually impact the adoption and outcome of the BIS. A long-term vision is needed to establish a good business case and the business case must be aligned to the strategic vision (Gao, Koronis & Yeoh, 2008).

This dimension also includes committed management support and sponsorship which has been widely acknowledged as the most important factor for BIS implementation (Yeoh & Koronios, 2010). It is vital as it shows to the rest of the organization the importance of BIS implementation and helps remove any obstacles such as resistance to change and to get support for the necessary funding and human resource needs (Canstello, 2019). The management helps in developing and aligning business strategies with BI. According to Thamir and Poulis (2015), BI should be implemented through business-driven strategies to know which resources and capabilities are important.

2.9.2 Process dimension

This dimension requires change management strategies that are user-centric and can be achieved through formal participation by the users to achieve a user-driven iterative approach to change requirements (Kfouri & Skyrius, 2016). The system quality is affected by a skilled project team as well as management support, adequate resources, and user participation (Hirsimäki, 2017). Yeon and Koronois (2010) avow that key users must be involved throughout the implementation cycle because they can provide valuable input that the BIS team may overlook.

The alignment between BIS and the organizations evolves with changing requirements, thus BIS must incorporate necessary changes and feedback mechanisms to ensure continuous contributions to business performance (Grevler, 2017). If the business users do not change the business processes to leverage BIS, then the investment in BIS will not have the necessary profit and productivity (Kirange, 2016).

2.9.3 Technology dimension

This dimension requires a business-driven, scalable, and flexible technical framework of a BIS which must be able to accommodate scalability and flexibility requirements in line with dynamic business needs, that is, flexible and scalable infrastructure design allows for easy expansion of the system to align it with evolving information needs (Yeoh & Koronios, 2010). Businesses that succeed with the deployment of BIS encounter great difficulty when the number of users increases because the current infrastructure cannot meet the growing needs of users (Venter, 2005).

Yeon and Koronios (2010) found that the quality of data, particularly in the source systems, is crucial if a BIS is to be implemented successfully. Furthermore, Hirsimäki (2017) pointed out that not only collecting clean, consistent, high quality and integrated data could form a crucial foundation for BIS success, but also leads to high benefits through BIS. Kirange (2016) asserts that most analysts agree that the main reason for erroneous reporting is the operational data that is used for analysis as the data is filled with errors and inconsistencies, hence, data quality management plays an important role in BIS success.

Theoretical background

To have a better understanding of BIS adoption in SMMEs, different frameworks and adoption theories are analysed. The successful diffusions and acceptance of technology are important to every business operation. Hillmer (2009) maintains that the field of theories and models that investigates successful technology diffusion is broad and can be categorized in various ways. He, furthermore, categorized these theories based on the goal and focus as depicted in Table 2.3:

Table 2. 3 Common technology adoption theories, grouped by purpose

Diffusion Theories	**User Acceptance Theories**	**Decision-Making Theories**	**Personality Theories**	**Organization Structure Theories**
Innovation Diffusion Theory (IDT) also called Diffusion of Innovation Theory (DOI) (Rogers 1962; Moore 1995) **Focus on technology, on the environment, and the using organization**	Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1973, 1975) Theory of Planned Behaviour (TPB) (Ajzen 1991) Technology Acceptance Model (Davis 1989) Motivation Model (Vallerand 1997) User Acceptance of Information Technology (UTAUT) (Vankatesh et al., 2003) **Focus on the rational employee interest**	Rational Choice Theory/Game Theory Decision Making under Uncertainty Risk Management Change Management Media Richness Theory (Daft & Lengel 1984) **Focus on the rational organizational/management interest**	Technology Lifecycle Theory (Rogers 1962; Moore 1995) Non-technology related approaches are: Social Cognitive Theories (SCT) (Compeau and Higgins 1995) **Focus on the individual cognitive interest**	Disruptive Technology Theory (Bower & Christensen 1995) Creative Destruction Theory (Schumpeter 1912, 1942) **Focus on the strategic organizational interest**

The study will only focus on the technology acceptance model, task-technology fit model, and diffusion of innovation model as theoretical underpinnings for this study to derive the conceptual framework.

2.9.4 Technology Acceptance Model

For the BIS to be successful, they have to be accepted by their users. Arvidsson and Pettersson (2012) suggest that the success of any information technology (IT) or system is highly determined by user acceptance. All the potential benefits of a system, be it in the form of increased productivity or performance, do not matter if the users end up rejecting the system (Arvidsson & Pettersson, 2012).

Figure 2.4 shows the adopted Technology Acceptance Model (TAM) constructed by Davis (1989) to predict the use and acceptance of information systems and technology by individual users. TAM is the most adopted model for studying the acceptance and use of information technologies. TAM is an adaptation of the Theory of Reasoned Action and was proposed specifically for modeling user acceptance of IT systems (Maduku, 2010).

TAM posits that the perceived usefulness of a BIS is directly impacted by the perceived ease of its use and they both determine an individual`s intention to use it (Serumaga-Zake, 2017). Two specific beliefs, that is, perceived usefulness(PU) and perceived ease of use (PEOU) have been identified as important user acceptance criteria (Davis, 1993). Davis (1993) defines *perceived usefulness* as the degree to which an individual believes that using a particular system would enhance his or her job performance. He also defined *perceived ease of use* as the degree to which an individual believed that using a particular system would be free of physical and mental effort. If a system is not useful, it does not matter how easy it is to use, but if it is useful then a user can learn to live with the hardship of a more difficult to use system (Davis, 1989).

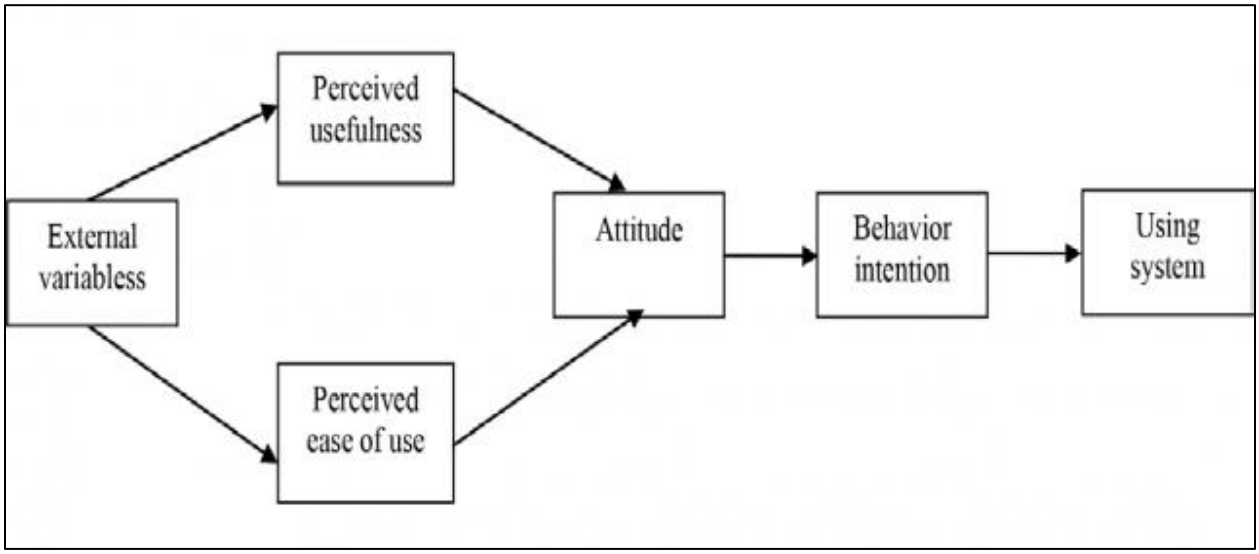

Figure 2. 4: TAM model (Source: **(Doulani, 2018)**)

2.9.5 Task-Technology- Fit model

The ability of IT to support a task is expressed by a formal construct known as Task- Technology fit (Dishaw & Strong, 1998). According to Goodhue and Thompson (1995), the TTF model holds that IT is likely to have a positive impact on individual performance and can be used if the capabilities of the IT match the tasks that the user must perform. Ahmed (2017) avers that the TTF model proposes that if a new technology is suitable to perform the daily task professionally, the user will adopt it. The TTF model consists of six constructs, that is; task characteristics, technology characteristics, task technology fit, performance, and utilization (see Figure 2.5). Goodhue and Thompson (1995) further explain these constructs as follows:

Tasks characteristics - refer to actions carried out by individuals in turning inputs into outputs. Task characteristics of interest include those that might move a user to rely heavily on certain aspects of IT.

Technology characteristics - these are viewed as tools used by individuals in carrying out their tasks. The model is intended to be general enough to focus on either the impacts of a specific system or the more general impacts of the entire systems, policies, and services provided by an information systems department.

Task- technology fit - is the degree to which technology assists an individual in performing his or her portfolio of tasks. More specifically, TTF is the correspondence between task requirements, individual abilities, and the functionality of the technology.

Performance impact - relates to the accomplishment of the portfolio of tasks by an individual. Higher performance implies some mix of improved efficiency, improved effectiveness, and/or higher quality.

Utilization – refers to the behaviour of employing technology in completing tasks. Measures such as the frequency of use or the diversity of applications are employed.

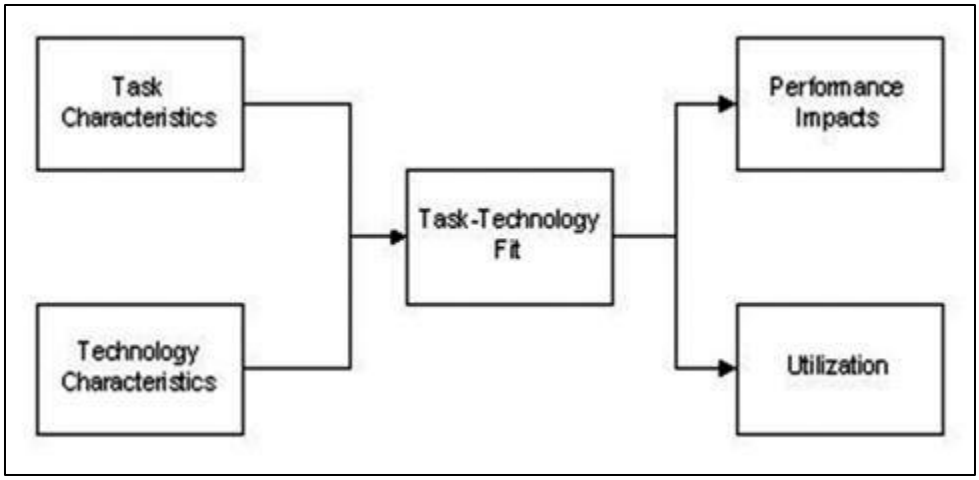

Figure 2. 5: **TTF model** (Source: **(Goodhue & Thompson, 1995)**)

2.9.6 Diffusion of Innovation (DOI)

The theory of diffusion of innovation establishes the foundation for researching innovation acceptance and adoption (Lai, 2017). Rogers (1983) defines diffusion as the process by which an innovation is communicated through certain channels over time among members of a social system. He also maintains that the innovation and adoption happen after going through several stages, including understanding, persuasion, decision, implementation, and confirmation that lead to the adoption curve of innovators, early adopters, early majority, late majority, and laggards as shown in Figure 2.6.

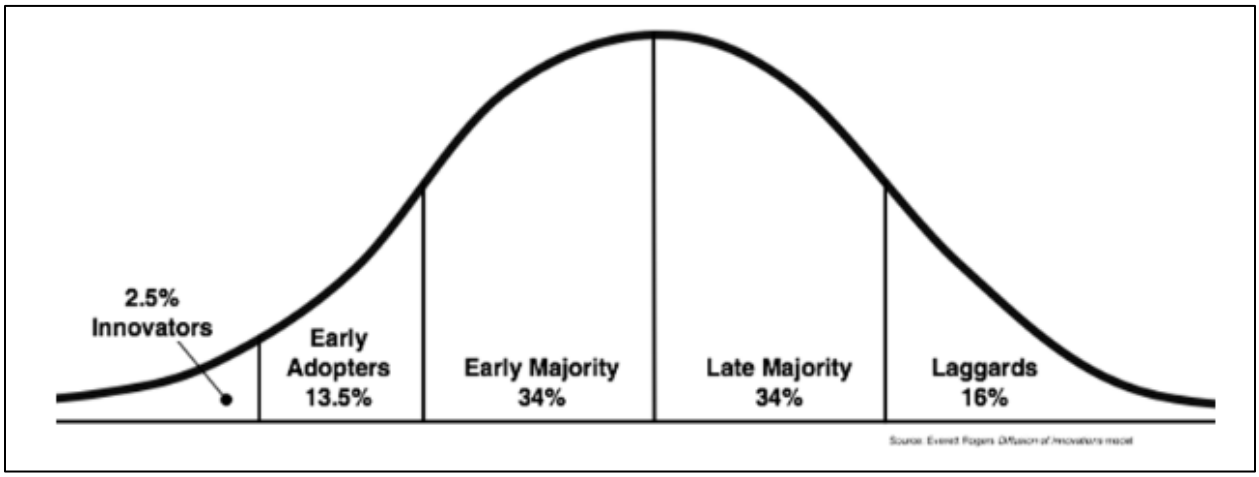

Figure 2. 6: Innovation Adoption Curve (Source: **((LaMorte, 2019)**)

Kinunda (2016) defines diffusion of innovation as involving the study of a variety of innovations through an information-centric view of adoption consisting of five attributes of complexity, compatibility, trialability, relative advantage, and observability. Al-Jabri and Sohail (2012) assert that DOI seeks to explain how, why, and at what rate are new ideas and technology spread through cultures. Rogers (1983) proposed characteristics of innovations, as perceived by individuals and how they impact the rate of adoption of innovations:

Observability- describes the extent to which an innovation is visible to the members of a social system and how the benefits can be easily observed and communicated (Rogers, 2003). If the observed effects are perceived to be small or non-existent, then the likelihood of adoption is reduced. The visibility of the results of innovation also influences individual and community perceptions. Visibility encourages communication among individuals as peers often ask for innovation evaluation information (Ahmad, Ahmad & Hasim, 2016)

Relative advantage – refers to the degree to which an innovation is perceived as being better than the idea it supersedes (Rogers, 2003). The degree of relative advantage may be measured in economic terms, but social prestige factors, convenience, and satisfaction are also important components.

Trialability - is the degree to which an innovation may be experimented with on a limited basis. The available innovation tends to have less uncertainty perceived by individuals who consider adopting it and those individuals tend to learn through this experience (Al-Rahmi, Yahaya, Aldraiweesh, Alamari, Aljarboa, Alturki & Aljeraiwi, 2019)

Trialability is positively correlated with the rate of adoption, that is, the more innovation is tried, the faster its adoption (Sahin, 2006).

Compatibility - is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). Sahin (2006) argues that the lack of compatibility in IT with individual needs may negatively affect the individual`s IT use.

Complexity - is the degree to which an innovation is perceived as relatively difficult to understand and use. Innovations that are perceived by individuals as having less complexity will be adopted more rapidly than other innovations. Cooper and Zmud (1990) hold that innovation with substantial complexity requires more technical skills and needs greater implementation and operational efforts to increase the chances of adoption.

2.10 Proposed Conceptual Framework

Based on the analysis of the existing technology adoption, DOI, TAM, and TTF models are integrated to come up with a conceptual framework for this study (see Figure 2.5). The premise for combining the models is that they capture two different aspects of users` choices to adopt BIS. Dishaw and Strong (1998) aver that the result of combining two models provides a better model of IT utilization than either an attitude or a fit model separately. The conceptual framework aims to provide an understanding of the factors that influence BIS adoption in retail organizations in South Africa. (see Figure 2.7)

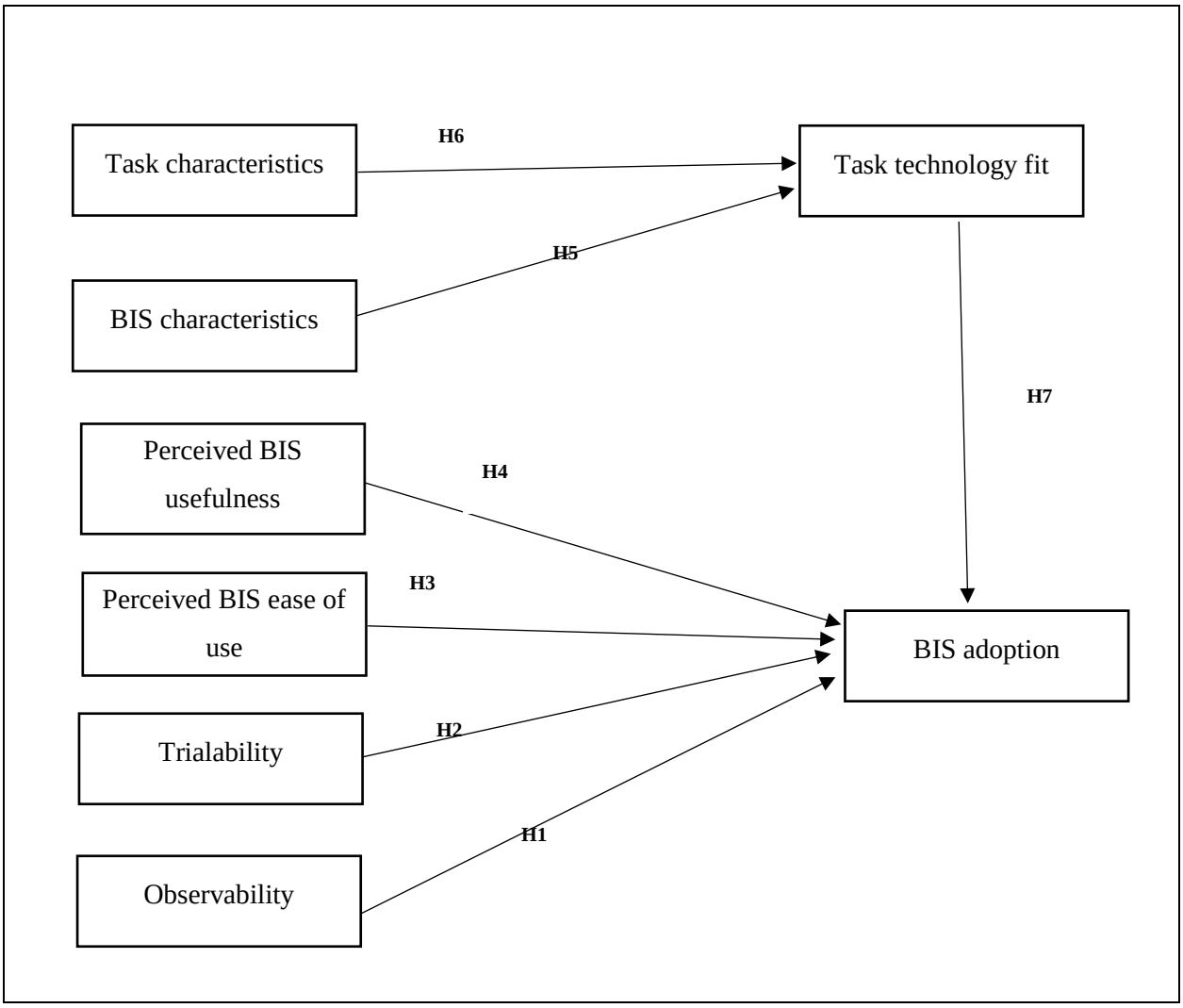

Figure 2. 7: Conceptual framework

Hypotheses Formulation

Observability

If the results for BIS adoption in business are easily visible to others, people are more likely to adopt BIS.

Ntemana and Olatokun (2012) examined the attributes of DOI on lecturers` use of ICT and discovered that observability had a higher impact on the adoption of ICT. Thus, the following hypothesis is proposed:

H1: Observability will positively influence BIS adoption.

Trialability

Trialability is the degree to which BIS may be experimented with before adoption. It refers to the extent to which people think that they need to experience the innovation before deciding to adopt it or not (Al-Rahmi, Yahaya, Alraiweesh, Alamari, Aljarboa, Alrturki & Aljeraiwi, 2019). Trialability is positively correlated with the rate of adoption, that is, the more innovation is tried, the faster its adoption (Sahin, 2006). Hence, this study postulates that:

H2: Trialability will positively influence BIS adoption.

Perceived BIS ease of use

Several studies have supported the impact of PEOU on technology usage/adoption (Davis, 1986; Kinunda, 2016). Information systems that users perceive as easier to use and less complex will increase the likelihood of their adoption and usage (Teo, Lim & Lai, 1999). In other words, if the user perceives that little effort is required to use BIS, it will encourage BIS usage, whilst, if more effort is perceived, it will discourage BIS usage. Nkuna (2011) asserts that if the interaction with a BIS is regarded as effortless, a PEOU attribute, the BIS could be perceived as efficient, a PU attribute, because effortless could also be interpreted to mean reduced time, hence, enhanced task performance. Therefore, hypothesis 3 is proposed:

H3: Perceived ease of use of the BIS positively influences BIS.

Perceived usefulness of BIS

Davis (1995) describes perceived usefulness as the degree to which an individual believes that using a particular system would enhance his or her job performance. Therefore, if retail organizations realize how BIS can transform their business, they will most likely adopt BIS. The fourth hypothesis is proposed:

H4: Perceived usefulness of BIS positively influences BIS.

Technology (BIS) characteristics

This factor explains the ability of BIS to help users to accomplish their tasks. BIS tools perform data analysis and create reports, dashboards, and graphs to provide users with detailed intelligence about the nature of the business. With components such as data warehouse, OLAP techniques, and data visualization, users are enabled to access data available throughout the organization for operational and strategic decision-making and leverage the benefits of BIS (Kinunda, 2016). For example, retail organizations can make use of Data Analysis tools in BIS technology to determine which of their products are most profitable. The fifth hypothesis is proposed:

H5: BIS characteristics will positively influence task-technology fit.

Task characteristics

Technology needs to provide functionality that meets the users` needs and features that support the fit of work requirements that will enable greater utilization of these technologies (Kinunda, 2016). The sixth hypothesis is proposed:

H6: Task characteristics will positively influence the task-technology fit.

Task- technology fit

Kinunda (2016) avers that for increased BIS adoption and utilization in organizations, BIS capabilities need to match the demands of the task of its users. He further explained that if a poor fit exists between technology capabilities and users' tasks, the end-users will find other alternatives for their task's completion. Even though technology may be perceived as being advanced, if it does not fit users' task requirements, users may not adopt it (Zhou, Wang & Lu, 2010). When users actively choose to continue to explore, adopt, use and extend the use of one or more of the BIS`s functions, the mechanism behind this is likely that the perceived task- technology fit influences their choice of BIS utilization (Larsen, Soreb & Sorebo, 2009). Therefore, the seventh hypothesis is proposed.

H7: Perceived Task-BIS fit will positively influence BIS adoption.

2.11 Chapter Summary

The literature review showed that the BIS has a huge potential to turn around the fortunes of organizations and it is in the retailers` best interest to make use of these technologies. Such systems make information available that may assist management to make accurate decisions, thus leading to an increase in productivity and profitability of an organization. This chapter discussed the adoption theories, TAM, DOI, and TTF models to provide a better understanding of BIS adoption in SMMEs and then proposed a conceptual framework by integrating the three adoption models. The next chapter provides the methodology for this study.

Chapter Three: Research Methodology

A research methodology comprises actions to be taken by the researcher to investigate a research problem and the rationale for the application of specific procedures used to identify, select, process, and analyse information applied to understand the problem. Thus, a research methodology allows the reader to critically evaluate a study`s overall validity and reliability. This chapter outlines the research paradigm adopted by the study, the research design, the area of study, target population, sampling and sampling size, data collection, the validity of research instruments, the reliability of research instruments, and data analysis and presentation procedures.

3.1 Research Paradigm

A research paradigm is a basic set of beliefs or worldviews that guides research action or an investigation (Guba & Lincoln, 1994). This study adopts a positivist paradigm. The positivist paradigm is a methodological philosophy in quantitative research where methods of natural sciences are applied to discover the study of social science (Pham, 2018). The positivist paradigm asserts that real events can be observed empirically and explained with logical analyses (Kaboub, 2008), hence it depends on quantifiable observations that lead to statistical analysis and generalization of findings. Thompson (2016) suggests that researchers who use a positivist paradigm tend to look for relationships or correlations between two or more variables. This paradigm helps the researcher to clearly understand the investigated phenomena by empirical tests and methods such as sampling and questionnaires (Pham, 2018).

Fadhel (2002) suggests that the positivist paradigm should be chosen as the preferred worldview for research that tries to interpret observations in terms of facts or measurable entities. It aims to provide explanations and to make predictions based on measurable outcomes (Kivunja & Kuyini, 2017). The measurable outcomes are supported by four assumptions, namely: determinism, empiricism, parsimony, and generalizability (Cohen, Manion & Morrison, 2000). Kivunja and Kuyini (2017) further explain these assumptions as follows:

- The assumption of determinism means that the events we observe are caused by other factors, therefore, if we are to understand casual relationships among factors, we need to be able to make predictions and to control the impacts of the explanatory factors on the dependent factors.
- The assumption of empiricism means that for us to be able to investigate a research problem, we need to collect verifiable empirical data that support the theoretical framework chosen for the research.

- The assumption of parsimony refers to the researcher`s attempts to explain the phenomena they study in the most economical way possible.
- The assumption of generalizability tells us that the results obtained from a research project conducted within the positivist paradigm in one context should apply to other situations by inductive inferences.

Positivism is a suitable paradigm for this study because it depends on quantifiable knowledge that leads to statistical analysis and generalization of findings. The researcher investigates the research problem by collecting empirical data using questionnaires for statistical analysis and developing relationships between variables. This study also involves the use of existing theories to develop a hypothesis to be tested in the research process. Antwi and Hamza (2015) stated that positivism adopts scientific methods and systematizes the knowledge generation process with the help of quantification to enhance precision in the description of parameters and the relationship between them. They further explained positivism is concerned with uncovering truth and presenting it by empirical means. The researcher achieves the aim and objectives by presenting them through empirical means. Creswell (2013) indicated that the accepted approach to research by positivists is when a researcher begins with a theory, collects data that either supports or refutes the theory, and then makes necessary revisions.

3.2 Research Approach

The research approach is defined as plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation (Creswell, 2014). He further classifies the three types of approaches used in research as qualitative, quantitative, and mixed methods.

Qualitative approach

Qualitative research is an approach for exploring and understanding the meaning that individuals and groups ascribe to a social or human problem (Creswell, 2013). Qualitative research is multimethod in focus involving an interpretative, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of phenomena in terms of the meanings people bring to them, thereby involving the studied use and collection of a variety of empirical materials (Denzin & Lincoln, 2005).

Quantitative approach

The researcher used quantitative research which is an approach for testing objective theories by examining the relationship among variables (Creswell, 2013). These variables, in turn, can be measured, typically

using a Likert or non-Likert instrument, so that numbered data can be analysed using statistical procedures. This approach is suitable for the study as it seeks to examine the relationship between BIS and SMMEs. This research approach allows for a broader study, involving a greater number of subjects and enhancing the generalization of the results (University of Southern California, 2019). Quantitative research has the advantage of providing a consistent and reliable yardstick brought about by control achieved through research design techniques, consistent research instruments, and sampling (Kinunda, 2016). Furthermore, quantitative methods are designed to provide summaries of data that support generalizations about the phenomenon under study (University of Southern California, 2019). Quantitative research was adopted in this study to test the proposed hypotheses. The application of statistical methods in quantitative data assisted in providing solid results that could be generalized to the broader society.

Mixed methods approach

Mixed methods research is an approach to an inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks (Creswell, 2014). The core assumption of this approach is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone (Creswell, 2014).

3.3 Research Design

Research design refers to the overall strategy that you choose to integrate the different components of the study coherently and logically, thereby, ensuring that you will effectively address the research problem (De Vaus, 2001). Furthermore, De Vaus (2001) identifies a research design as the blueprint for the collection, measurement, and analysis of data. The purpose of a research design is to provide a plan of study that permits an accurate assessment of cause-and-effect relationships between independent and dependent variables (Jang, 1980).

This study adopted a survey research design to evaluate the adoption of BIS in SMMEs grocery retail organizations. A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2013). This research design is suitable for this study because it is the best method for generalizing the findings to the entire population (Mathiyazhagan & Nandan, 2010). This study used questionnaires, where respondents were asked to respond to the same set of questions in a predetermined order.

3.4 Target population

A research population is known as a well-defined collection of individuals or objects known to have similar characteristics (Explorable.com, 2009). To draw up conclusions for the adoption of BIS in the SMMEs grocery retail sector, it is necessary to collect data from the target population. The population for this study consists of SMMEs in the grocery retail sector in Tshwane Metropolitan Municipality, Pretoria.

3.5 Sampling techniques

Sampling technique is a procedure used by a researcher to gather people, places, or things to study (Wanjiku, 2010). This research study will make use of purposive sampling.

3.5.1 Purposive sampling

According to Crossman (2019), purposive sampling is a non-probability sampling technique that is selected based on the characteristics of a population and the objectives of the study. Since this study evaluates the adoption of BIS in organizations, purposive sampling was used to identify SMMEs in the grocery retail sector that is operating in Pretoria.

3.6 Sample size

According to Hair et al. (2010), the minimum sample size of 100 is used when considering models containing five or fewer constructs, each with more than three items with high item commonalities (0.6 or higher), 150 when models contain seven or fewer constructs and modest commonalities, 300 when models contain seven or fewer constructs and low commonalities (0.45), and multiple under-identified constructs; and 500 when models contain a large number of constructs, some with lower commonalities and having fewer than 3 measured items. Since the retail SMMEs population was unknown, a Cochran formula was adopted:

$$\mathbf{n_0} = \boldsymbol{Z^2 \rho q / e^2}$$

Where 'n_o' is the sample size, 'Z^2' is the abscissa of the normal curve that cuts off an area α at the tails (1 – α equals the desired confidence level, that is, 95%), 'e' is the desired level precision, 'p' is the estimated proportion of an attribute that is present in the population, and q is 1-p (Israel, 1992). In-line with Hair et al.`s (2010) recommendation on the suitable sample size, the number of constructs in the proposed research framework (Figure 2.5), and given the fact that the actual number of SMMEs operating in Pretoria could not be obtained from the Small Enterprise Development Agency (SEDA), this study targeted 300 respondents from SMMEs grocery owners in Tshwane Metropolitan Municipality, Pretoria.

3.7 Data collection

Data collection is the systematic approach to gathering and measuring information from a variety of sources to get a complete and accurate picture of an area of interest (Rouse, 2016). This study used questionnaires for data collection.

Questionnaire

A questionnaire is a set of standardized questions that follow a fixed scheme to collect individual data from respondents on one or more specific investigated topics (Lavrakas, 2008). Questionnaires provide a relatively cheap, quick, and efficient way of obtaining information from a sample of people (McLeod, 2018).

The following reasons justify the suitability of questionnaires as a data collection method for this method:

- They should be simple and quick for the respondent to complete.
- They are straightforward to analyse.
- A large sample of a given population can be contacted at a relatively low cost.
- They are simple to administer.
- The finding could be generalized to the broader society.

The questionnaire was adapted from previous studies that adopted TAM, DOI, and TTF models (Kinunda, 2016; Al-Jabri & Sohail, 2012; Ahmad et al., 2016), where each construct was measured by multiple items. The questionnaire (see Annexure D) contained 38 questions, in which, 6 questions were related to Section A -demographic information,4 questions were related to Section B - BIS usage and adoption, 3 questions were related to Section C-task characteristics, 4 questions were related to Section D-business intelligence characteristics, 4 questions were related to Section E-task-technology fit, 4 questions were related to Section F-perceived ease of business intelligence use, 5 questions were related to Section G-perceived business intelligence systems usefulness, 4 questions were related to Section H-trialability and 4 questions were related to Section I-observability. Five-point Likert scale items ranging from strongly disagree to strongly agree were used for each item from section C to section I. The questionnaire was administered face to face and via email.

3.8 Data analysis

Data analysis is the process of systematically applying statistical or logical techniques to describe, illustrate, and evaluate data (Office of Research Integrity, 2019). The latest version of the IBM Statistical Package for the Social Sciences (SPSS) was used to analyse the data and to present them in graphical form. Descriptive statistics were used to analyse demographic-related information and Multiple regression was

used to analyse the factors and their relationships in the proposed conceptual framework. Multiple regression is a statistical method used for analysing associations between two or more independent variables and a single dependent variable (Salkind, 2010). It allows one to determine the overall fit of the model and the relative contribution of the predictors to the total variance (Laerd Statistics, 2018).

3.9 Pilot Study

A pilot study refers to either a trial run of the major research study or a pre-test of a research instrument or procedure (Salkind, 2010). It is done to test the feasibility and validity of the questionnaire and to establish any incorrectly structured or statements that could be misunderstood by the participants.

The pilot study was conducted on 10 participants who had the same characteristics as the participants in the main study. The 10 participants provided some valuable feedback which assisted in redefining some questions to be clarified.

3.10 Reliability and Validity

Reliability is defined as the extent to which a research instrument consistently achieves the same results if it is used in the same situation on repeated occasions (Heale & Twycross, 2015). To ensure reliability in this study, the research instrument was administered in a consistent and standardized manner. Reliability analysis of model constructs is an essential criterion for quantitative research to establish consistency and stability of the model constructs (Kinunda, 2016). To measure the reliability of the construct items, this study used Cronbach's Alpha test calculated using SPSS. Hair et al. (2014) recommends that to demonstrate good reliability for each construct, a Cronbach's Alpha score of above 0.70 should be achieved for each construct item. Validity is defined as the extent to which a concept is accurately measured in a quantitative study. For example, a survey is designed to explore depression but instead, it measures anxiety, which would not be considered valid. A pilot study was done by the researcher to test the validity of the questionnaire and to establish any incorrectly structured or statements that could be misunderstood by the participants. The supervisor and the co-supervisor critically assessed the questionnaire, ensuring that the questionnaire did not contain any common errors. Construct validity was evaluated using the KMO and Bartlett test of sphericity and correlation matrix.

3.11 Ethical considerations

Research ethics refers to the application of moral standards to decisions made in planning, conducting, and reporting the results of research studies (McNabb, 2004). The researcher obtained an ethical clearance letter issued by the University Higher Degrees Committee to guide the study. The participants were given a

consent letter stating that their participation is voluntary, with no financial benefits, and outlining that whatever information they provide will be used strictly for academic purposes and nothing else. Some principles that were adhered to when conducting this study are in line with Laerd's Dissertation (2012) and include the following:

Minimizing the risk of harm - the researcher will make sure that the research does not in any way harm the participants, that is, physical harm or putting the participants in a position of discomfort.

Obtaining informed consent - the researcher will obtain consent from the participants before collecting data from them.

Protecting anonymity and confidentiality - the researcher will assure the participants that the information they give out will be kept confidential and used only for academic purposes.

Providing the right to withdraw - the researcher will make it clear to the participants that they could withdraw from the survey whenever they want to, without prejudice to them.

On request, the researcher will provide the final report from this study to stakeholders for verification, use, and adoption to enhancing their operations.

3.12 Summary

The research process involves the application of various methods and techniques to create scientifically credible knowledge. A positivist paradigm was selected for this quantitative research study. This paradigm helps the researcher to clearly understand the phenomena by empirical tests and methods such as sampling and questionnaires. The study adopted a survey design that was found suitable for a quantitative research approach. The researcher identified the target population for this research as the owners or managers of the SMMEs in the retail sector where BIS is being utilized. Purposive sampling was identified as a suitable sampling technique for this study. The next chapter (4) presents empirical findings, analysis, and discussion of the collected data.

Chapter Four: Data Analysis and Interpretation

4.1 Introduction

This chapter focuses on analysing and interpreting the collected data. The purpose of this study was to establish factors that influence the adoption of BIS by SMMEs in the grocery retail sector in the Tshwane Metropolitan Municipality, South Africa, and to propose a framework to guide the adoption of such systems in SMMEs. A total number of 300 closed-ended questionnaires were distributed, that is, some were self-administered, and some were sent via email to SMME`s owners or managers. Out of the 300 distributed questionnaires, 275 were returned completed, 10 questionnaires were incomplete, hence, these were not included in data analysis, while 15 questionnaires were not returned by the respondents. This gave a 91.67% retention rate for the study. The data gathered were analysed using IBM SPSS Statistics. Descriptive statistics were used to analyse the collected data and regression analysis was used for hypothesis testing.

4.2 Construct Reliability Analysis

Reliability analysis of model constructs is an essential criterion used to establish the consistency and stability of model constructs (Kinunda, 2016). A Cronbach alpha test was used to measure the reliability of the framework constructs. Hair et al. (2014) recommends that to demonstrate good reliability for each construct, a Cronbach's Alpha score of above 0.70 should be achieved for each construct item. Table 4.1 shows the constructs and the Cronbach alpha scores with all values above the 0.70 minimum recommended value.

Table 4. 1: Reliability assessment

Construct	**Cronbach's Alpha**
Task characteristics	0.710
Business intelligence characteristics	0.854
Task technology fit	0.847
Perceived ease of Business Intelligence Systems uses	0.902
Perceived Business intelligence Systems usefulness	0.719
Trialability	0.725
Observability	0.783

4.3 Construct Validity

Validity is defined as the extent to which a concept is accurately measured in a quantitative study (Heale & Twycross, 2015). Construct validity was evaluated using the KMO and Bartlett test of sphericity, and correlation matrix.

4.3.1 KMO and Bartlett's Test

KMO measures the extent to which correlation between pairs of variables can be explained by other variables (Kline, 2011). Table 4.2 shows the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The maximum is 1 and KMO should not be less than 0.5 to demonstrate acceptable sampling adequacy. In this case, KMO is 0.771 and p=0.00, which implies that the sample was adequate and significant.

Table 4. 2: KMO and Bartlett`s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.771
Bartlett's Test of Sphericity	Approx. Chi-Square	8275.104
	Df	378
	Sig.	.000

4.3.2 Bivariate Correlation Analysis

Pearson's correlation test was performed to assess the nature of the association between the variables. The strength of the association can either be zero, weak, moderate, strong, or perfect, and the direction can be either positive or negative depending on the sign on the correlation coefficient (r) as shown in Table 4.3.

Table 4. 3: Bivariate Correlation Analysis

Strength of association	**Positive (r)**	**Negative (r)**
Perfect	**+1**	-1
Strong	**0.7, 0.8, 0.9**	-0.7, -0.8, - 0.9
Moderate	**0.4, 0.5, 0.6**	-0.4, -0.5, -0.6
Weak	**0.1, 0.2, 0.3**	-0.1, -0.2, -0.3
Zero	**0**	0

4.3.3 Correlation matrix

The correlation matrix shows the association between components extracted during principal component analysis (Kline, 2011). Components with correlation coefficient positively indicate that a high level of one component results in high levels of the other. On the contrary, correlation with negative value implies that a high level of one component results in low levels of the other. In this study, the correlation between the first component and the second component is 0.237 which is weak and positive. This implies that higher levels of component 1 are associated with higher levels of component 2. Similarly, the first and third components have moderate positive correlations, which means lower levels of component 1 is associated with lower levels of component 3. The results in Table 4.4 also indicate that the increase in component 1 is associated with the increase in component 4 since the correlation coefficient is 0.162. Likewise, the correlation between component 1 and component 6 is 0.234 which is weak and positive, hence high levels of component 1 are associated with component 6. As for components 2 and 3, the association is weak and positive. The association between components 2 and 4 is weak and positive (0.323). The association between components 2 and 5 is also weak and positive (0.277), however, the association of components 2 and 6 is weak and negative, which implies an inverse relationship, high levels of component 2 are associated with low levels of component 6. The findings also revealed that components 3 and 4 have a positive but weak association (0.279). In the same manner, components 3 and 5 have a weak positive association (0.069). Concerning components 3 and 6, there is a weak and positive correlation, which implies that the increase in component 3 is associated with an increase in component 6. Components 4 and 5 have positive weak correlations shown by the coefficient 0.192 while components 4 and 6 have negative and weak correlations shown by the coefficient -0.002. Likewise, components 5 and 6 have weak but positive association.

Table 4. 4: Component Correlation Matrix

Component	1	2	3	4	5	6
1	1.000	.237	.485	.217	.162	.234
2	.237	1.000	.258	.323	.277	-.157
3	.485	.258	1.000	.279	.069	.156
4	.217	.323	.279	1.000	.192	-.002
5	.162	.277	.069	.192	1.000	.043
6	.234	-.157	.156	-.002	.043	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

4.4 Analysis of the Findings

This section analyses and interprets the data collected from the respondents of this study. The data presentation is divided into nine sections as outlined below.

4.4.1 Section A – Demographic presentation

This section discusses the demographic characteristics of the respondents who participated in the study. These characteristics include gender, age, role, experience, and highest qualification.

4.4.1.1 Gender

Figure 4.1 displays the gender of the respondents. Figure 4.1 shows that most of the respondents (57.09%) were male, while the female respondents constituted 42.91%. This indicates that males are more involved in entrepreneurial ventures than females. This finding is in line with a study done by Cilliers and Strydom (2016) who also established that the SMME's retail sector is dominated by males.

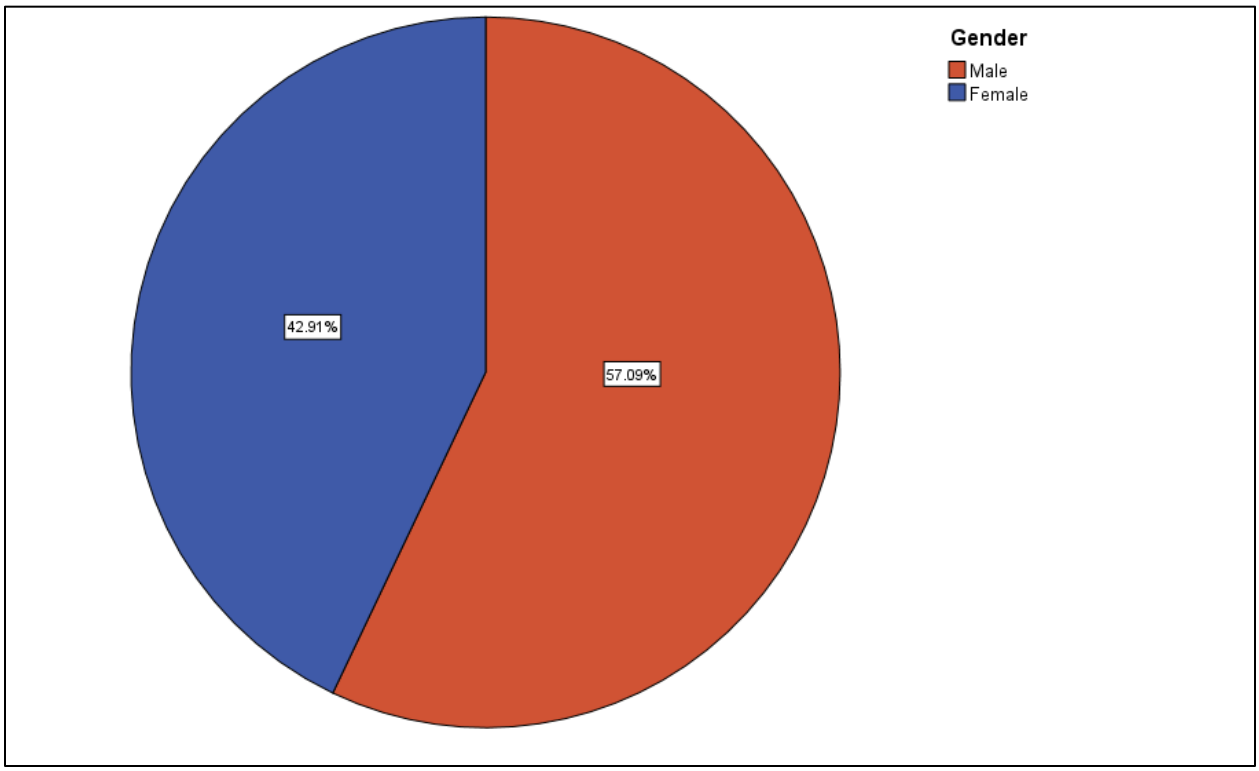

Figure 4. 1: Gender

4.4.1.2 Age

Figure 4.2 displays the age groups of the respondents. Figure 4.2 shows that most of the respondents (31.64%) are within 30-39 years, while respondents within 40-49 years comprise 28%, followed by 22.18%

who are within 20-29 years. The lowest age group is 50 and above years (18.18%). The findings clearly show that most of the SMMEs are operated by those whose ages range between 30 and 39 years. This finding agrees with findings of a study done on SMEs in the City of Tshwane by Kikawa et al. (2019) who also found many managers/owners to be ranging between 34 and 41 years old.

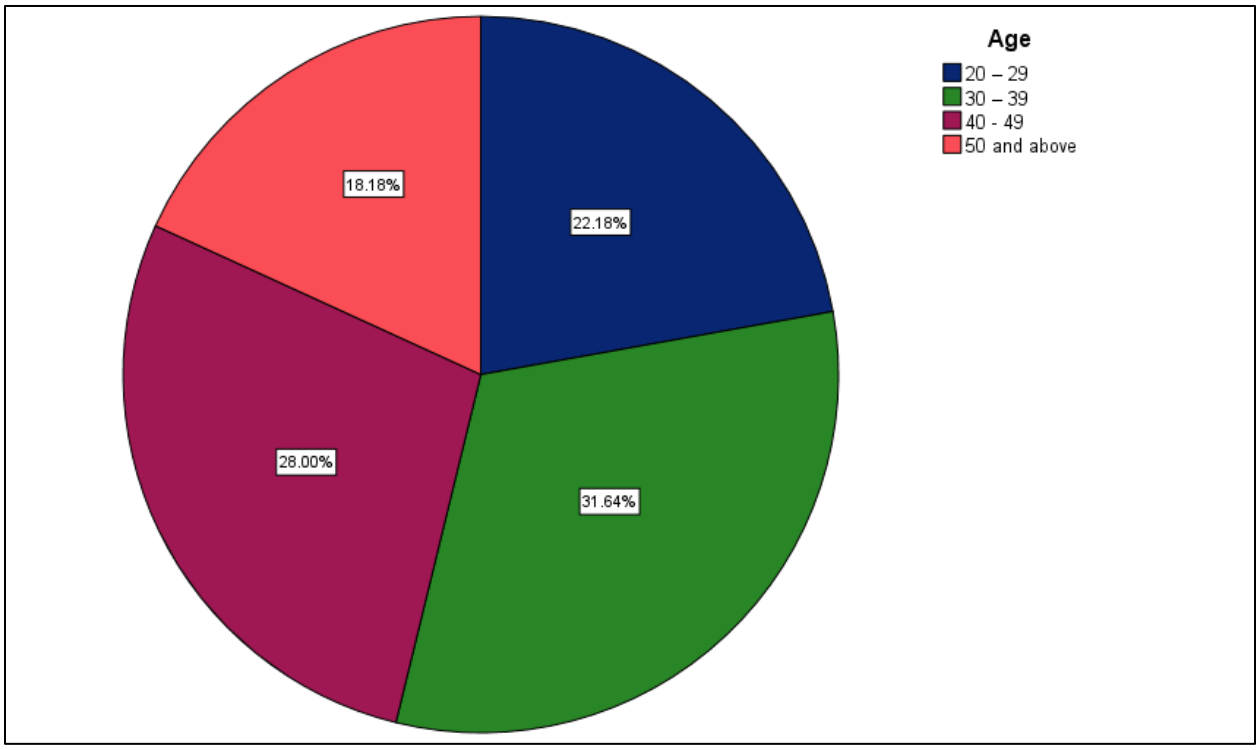

Figure 4. 2: Age of respondents

4.4.1.3 Role

The respondents were asked to indicate their positions in the business. The intention was to establish whether the respondents were the owners or managers of the SMMEs since the researcher believed that these people had a better understanding of their business operations compared to others. Figure 4.3 indicates the position distribution of the surveyed respondents.

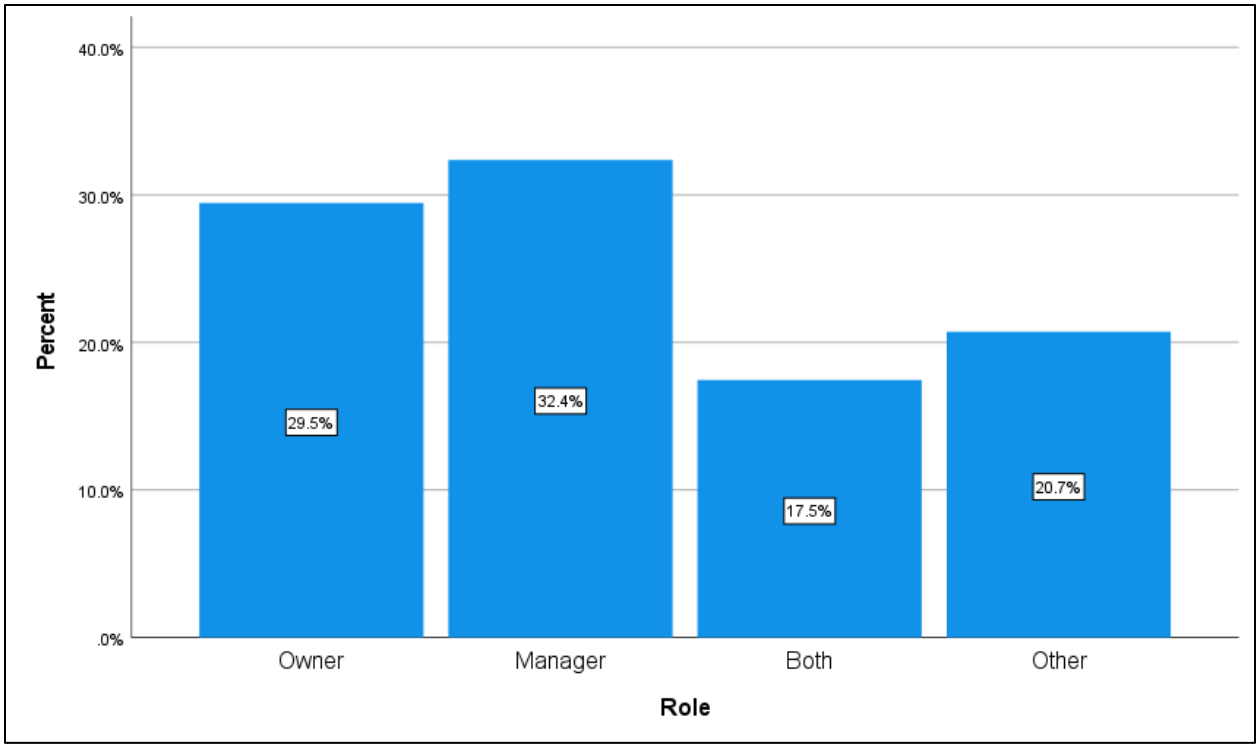

Figure 4. 3: Role of the respondents

The survey results in Figure 4.3 indicate that 32.4% of the respondents were managers of businesses, while 29.5% were the owners of the business. This implies that most of the SMMEs are run by managers. The survey results also indicate that 17.5% of the SMMEs are run by owners who are also managers of their business. The respondents (20.7%) who indicated "Other" were regular employees in the business who were neither managers nor owners. This finding established that most SMMEs are run by managers. This is in line with the study by Modimogale (2009) and Pillay (2016) who suggest that most of the SMMEs are run by managers. The finding is, however, not consistent with a study by Kikawa et al. (2019) who found SMEs to be run mostly by their owners.

4.4.1.4 Experience in using BIS

Figure 4.4 displays the pie chart showing the respondents` experience in using the BIS system.

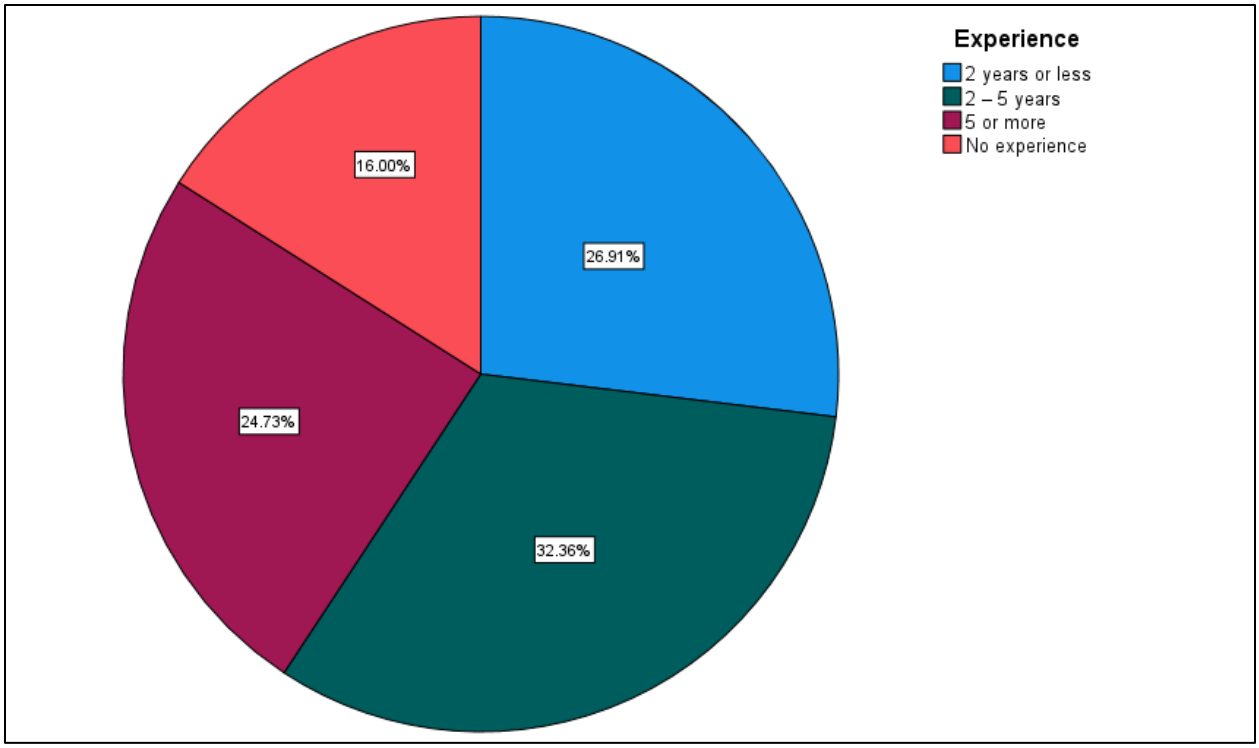

Figure 4. 4: Experience in using BIS

The survey results in **Figure 4.4** show that 32.36% of the respondents had 2-5 years of experience in making use of BIS while 24.73% had 5 or more years and 26.91% had 2 years or less in BIS experience. The survey results also indicate that the least of the respondents (16%), have no experience in making use of BIS.

4.4.1.5 Number of employees

The respondents were asked to indicate the number of employees working in their organization. This question was intended to establish the relationship between the business size and the level of ICT usage by employees. Figure 4.5 shows the number of people employed by the surveyed SMMEs. The number of employees is divided into four categorize, that is, 9 or less, 10-30 employees, 31 – 50 employees, 50 and above.

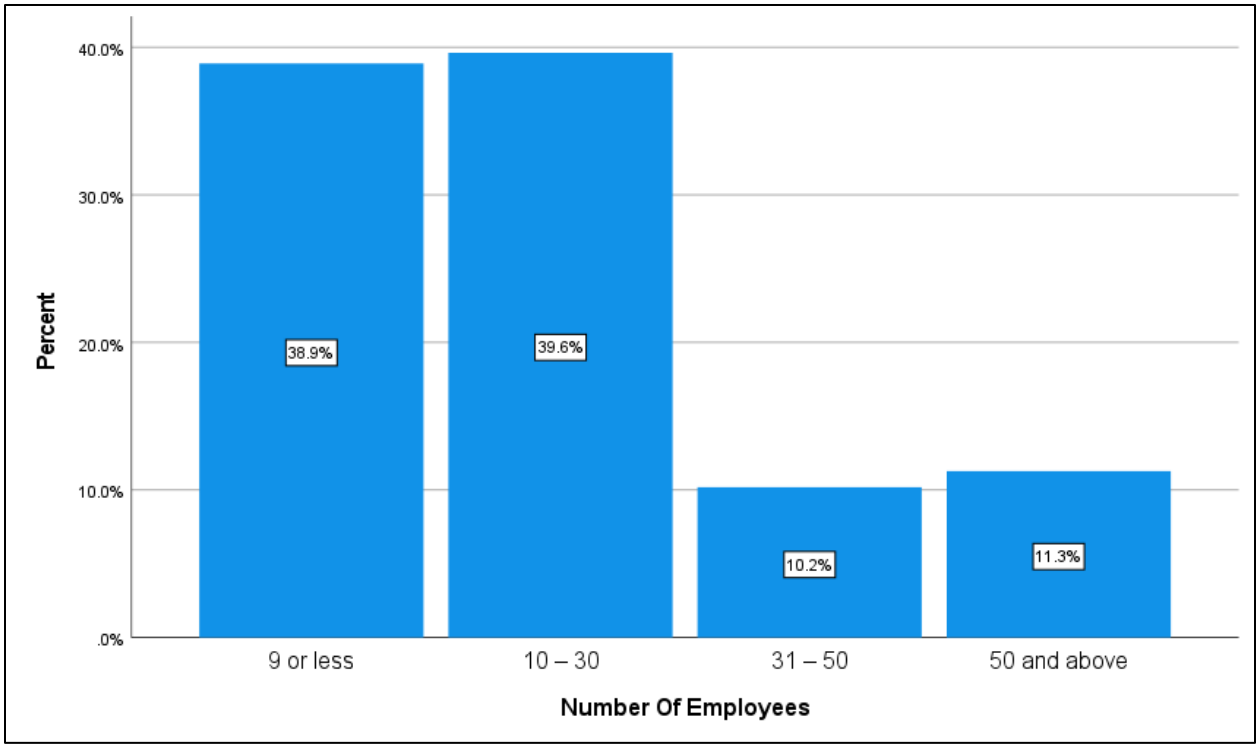

Figure 4. 5: Number of employees

Figure 4.5 shows that the highest percentage of SMMEs (39.6%) employed between 10 and 30 employees; 36.9% of the small business employed 9 or fewer employees, while those who employed above 50 employees constituted only thirteen per-cent (13%). The results indicate that 86.7% of the SMMEs in the survey falls under Micro, Very small, and Small Enterprises, while 11.3% falls under the Medium Enterprises (National Small Business Act, 1996)

4.4.1.6 Highest qualification

The respondents were asked to indicate their highest level of formal education. Figure 4.6 shows the highest qualifications of the respondents for this study.

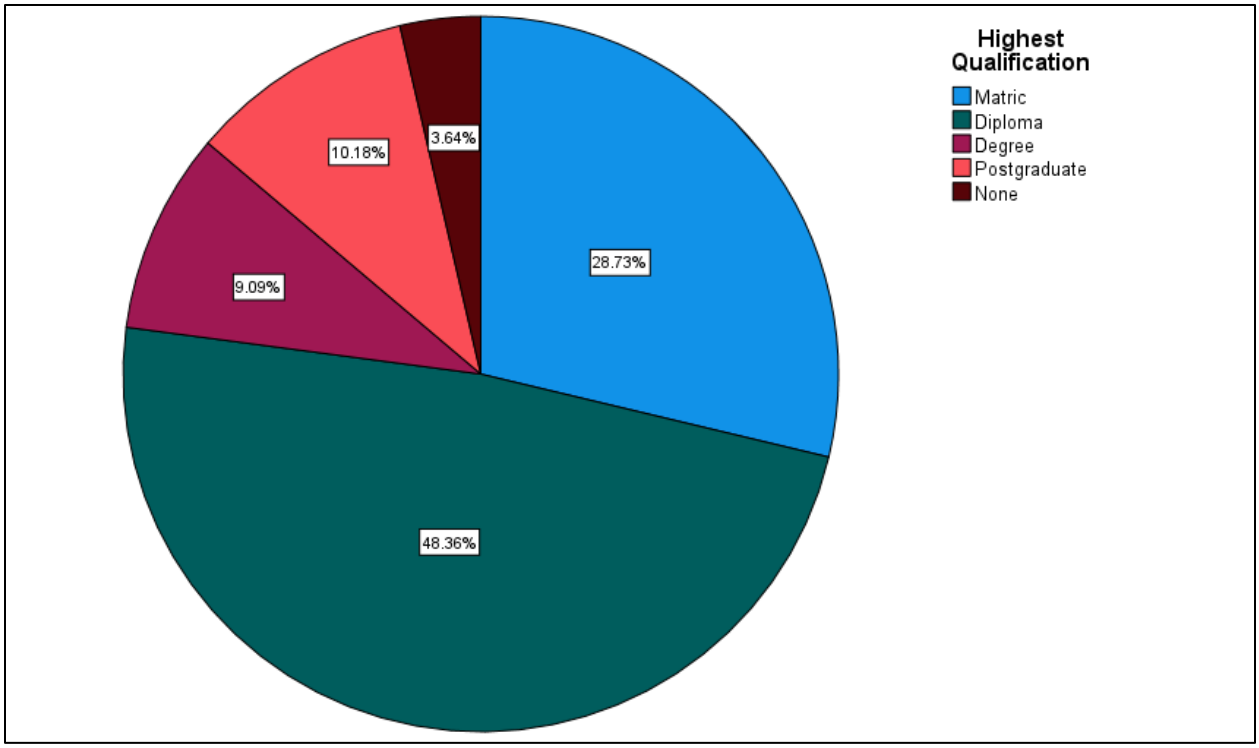

Figure 4. 6: Highest qualification

The survey results (Figure 4.6) indicate that most of the respondents were diploma holders, that is, 48% of the total respondents. Furthermore, the results indicate that 28.7% had matric qualification, 10% had a postgraduate certificate/diploma, while 9% had a university degree. The survey results also indicate that the least of the respondents (3.6%) did not have any educational qualification. This section was intended to ascertain the relationship between the educational levels of the owners/managers and their level of BIS adoption. Individuals with a high level of education and knowledge are likely to adopt BIS adoption than those with a low level of education and knowledge. Mokaya (2012), who conducted a study on small enterprises also found that most entrepreneurs had at least a college level of education and reported a high level of ICT adoption. This implies that low education levels among small-scale entrepreneurs tend to affect the confidence with which they approach investment decisions concerning ICT (Mokaya, 2012).

4.4.1.7 Regression analysis

A regression analysis was conducted on demographic information of the respondents to determine if it had an impact on BIS adoption. The model summary (Table 4.5) provides the correlation between the independent variables and the dependent variables (R). The R-square shows how much of the variance in the dependent variable (Business intelligence adoption) is explained by the model (independent variables).

In this case, the R-square value is 0.184. Expressed as a percentage, this means that the model explains 18.4% of the variance in Business intelligence adoption.

Table 4. 5: Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.429[a]	.184	.169	.84349

a. Predictors: (Constant), How many years of experience do you have in using the Business Intelligence System? Highest qualification, Which of the following describes your role in the organization? Age group, Gender

b. Dependent Variable: Business Intelligence adoption

The ANOVA test (Table 4.6) assesses the statistical significance of the result. Table 4.6 shows that the independent variables significantly impact the dependent variable, with an 'F' value of 12.147, $p<0.0005$, that is, the regression model is a good fit for the data.

Table 4. 6: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	43.211	5	8.642	12.147	.000[b]
	Residual	191.385	269	.711		
	Total	234.596	274			

a. Dependent Variable: Business Intelligence adoption

b. Predictors: (Constant), How many years of experience do you have in using the Business Intelligence System? Highest qualification, Which of the following describes your role in the organization? Age group, Gender

Estimated model coefficients

The coefficients results (**Table 4.7**) show the t-test, the coefficients, and the confidence interval for the coefficients.

Table 4. 7: Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.

1	(Constant)	1.774	.237		7.492	.000
	Gender	.103	.121	.055	.850	.396
	Age group	-.157	.052	-.175	-3.052	.002
	Highest qualification	.272	.050	.308	5.427	.000
	Which of the following describes your role in the organization?	.098	.055	.116	1.792	.074
	How many years of experience do you have in using the Business Intelligence System?	-.059	.051	-.066	-1.165	.245

a. Dependent Variable: Business Intelligence adoption

Using the unstandardised coefficients, we can determine how much the dependent variable varies with an independent variable when all other independent variables are held constant. Considering the effect of the independent variable, the unstandardised coefficient for gender is 0.103, and this means that gender is not a significant factor in 'Business intelligence adoption' as indicated by a non-significant factor of p-value = 0.396. In terms of age, the unstandardised coefficients is -0.157 which implies that the increase in age is associated with lower levels of business intelligence adoption. This demonstrates that age has a negative significant influence on BIS adoption as demonstrated by a *t*-value of 3.052 and p-value of -0.002. The result also indicates that a unit increase in qualification results in a 0.272 increase in Business intelligence adoption, which means that high level of qualification is associated with a high level of Business intelligence adoption. A *t*-value of 5.427 and a p-value of 0.000 demonstrate that the Highest Qualification variable has a positive and significant effect on BIS adoption in SMMEs groceries sector in the Tshwane Metropolitan Municipality, South Africa. Furthermore, a unit increase in the leadership/managerial role assumed by the respondents increases the level of business intelligence adoption by 0.098 standard deviation, on the contrary, the increase of the years of experience the respondents had resulted in 0.059 decrease in the level of business intelligence adoption.

4.4.2 Section B - Business Intelligence System adoption and usage

This section discusses the BIS adoption and usage by the SMMEs groceries sector in the Tshwane Metropolitan Municipality, South Africa.

4.4.2.1 Knowledgeable about BIS

The respondents were asked to indicate whether they were knowledgeable about BIS. This was intended to analyse if SMMEs were well informed about BIS use in businesses. Figure 4.7 shows the percentage of firms who were knowledgeable about BIS and those who were not.

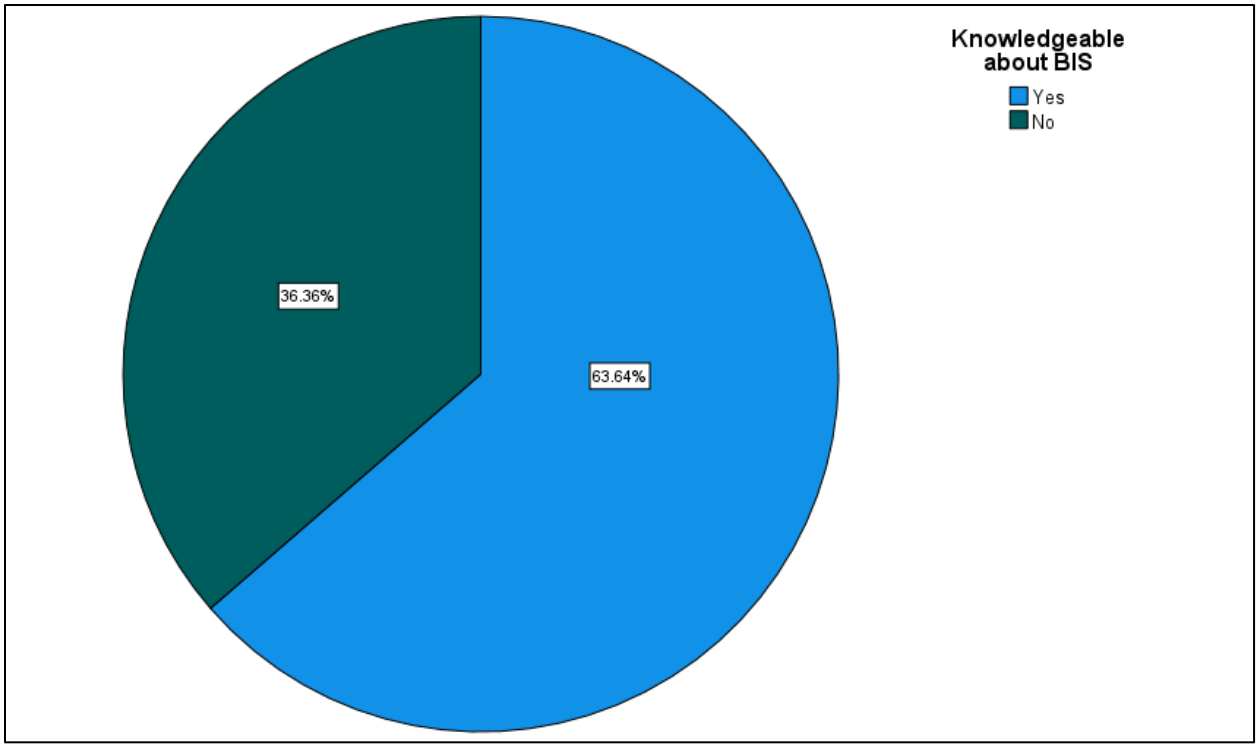

Figure 4. 7: Knowledgeable about BIS

The survey results (Figure 4.7) indicate that 63.6% of the respondents were knowledgeable about BIS while 36% of the respondents indicated that there were not. This finding indicates that most of the respondents have at least an idea or were aware of what BIS is all about.

4.4.2.2 Extent of BIS use

There was a need to establish the extent to which SMMEs made use of BIS in their business operations. This question was asked to determine the level of BIS usage by SMMEs. Figure 4.8 illustrates the level of BIS use in the operations of SMMEs.

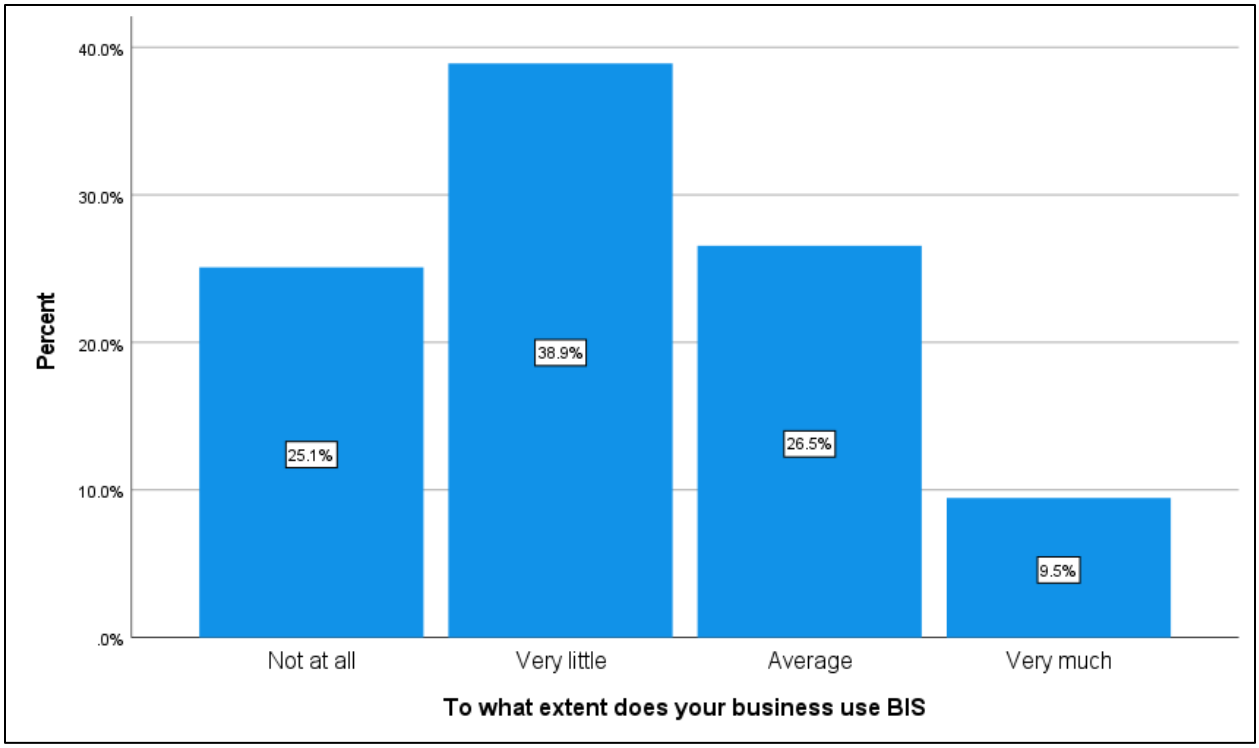

Figure 4. 8: Extent of BIS use

Figure 4.8 shows that a total of 38.9% made little use of BIS in their business operations, 26.5% indicated that their BIS use was average. The least percentage of respondents, that is, 9.5%, indicated that their use of BIS was "very much" while 25% did not make use of BIS at all. These results indicate that BIS is not fully adopted in SMMEs. Several studies have suggested that the reason behind this slow rate of adoption is, among other challenges, the lack of executive support, lack of BI strategy and understanding, exorbitant costs of acquiring and using BI, and the lack of skills (Shah, 2012; Venter, 2005; Otieno, 2015).

4.4.2.3 Barriers to BIS adoption

The respondents were also asked about the barriers/challenges they face when adopting BIS systems. A list of possible challenges was designed to enable the respondents to choose from the options. Figure 4.9 shows challenges faced by SMMEs in the adoption of BIS.

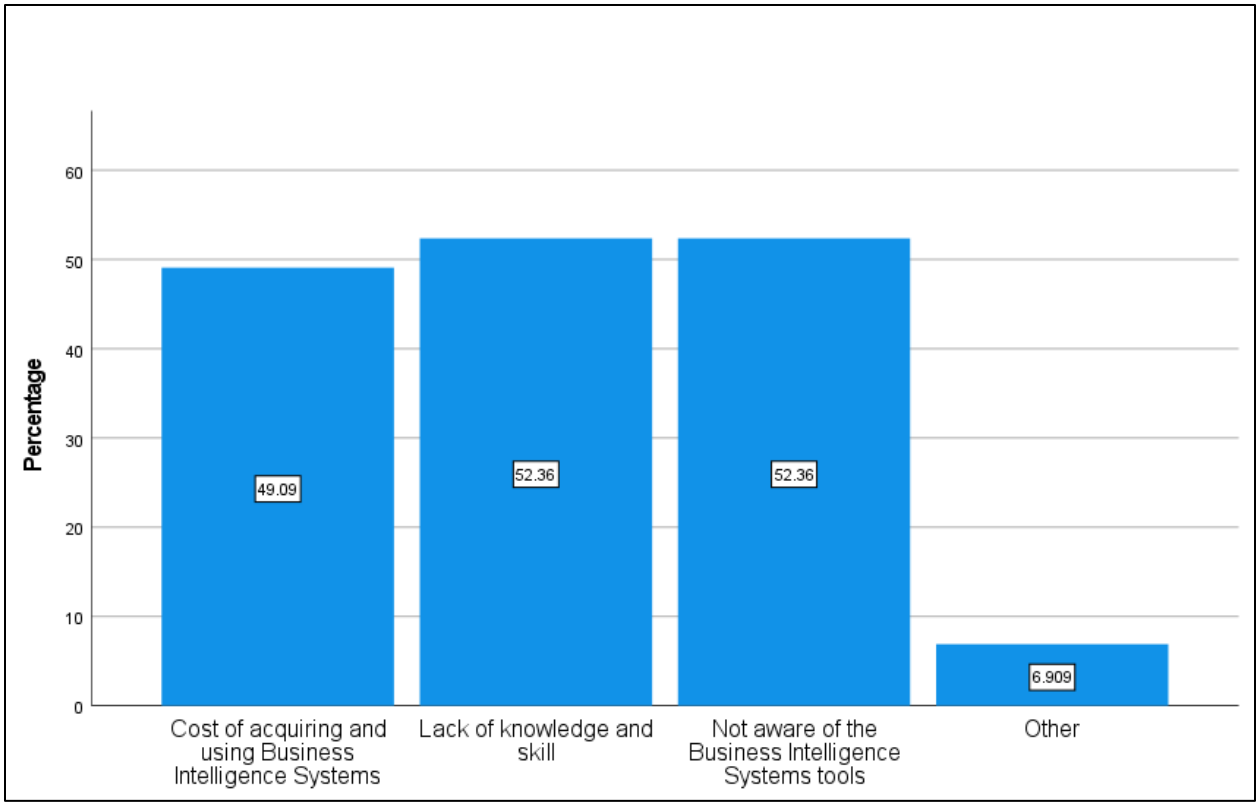

Figure 4. 9: Barriers faced in BIS adoption

Figure 4.9 shows that 49% of the respondents found BIS to be very expensive and complex to adopt. This was attributed to high set-up costs and pricing issues. Due to lack of funding, SMMEs are reluctant to adopt BIS as this could increase the operational costs. Also, the results (52%) show that the respondents did not have the skills or knowledge of making use of BIS. Otieno (2015) suggests that the lack of suitably skilled employees and managerial staff with enough knowledge on how to efficiently use BIS systems is a significant factor affecting the adoption and use of BI systems. This finding is in line with findings from previous studies which also found the same challenge faced by small businesses in BIS adoption (Shah, 2012; Venter, 2005, Gudifinsson & Strand, 2017). Again, 52% indicated that they were not aware of any BIS tools being used in their business operations. This finding concurs with findings of a study by Gudifinsson (2019) who also found that there is limited knowledge on how BIS can support business goals in most SMMEs.

4.4.2.4 Benefits of BIS adoption

To determine the benefits that SMMEs derive from the adoption of BIS, the respondents were asked to identify the benefits they derive from a list of options. Figure 4.10 represents the benefits that SMMEs derive from BIS adoption.

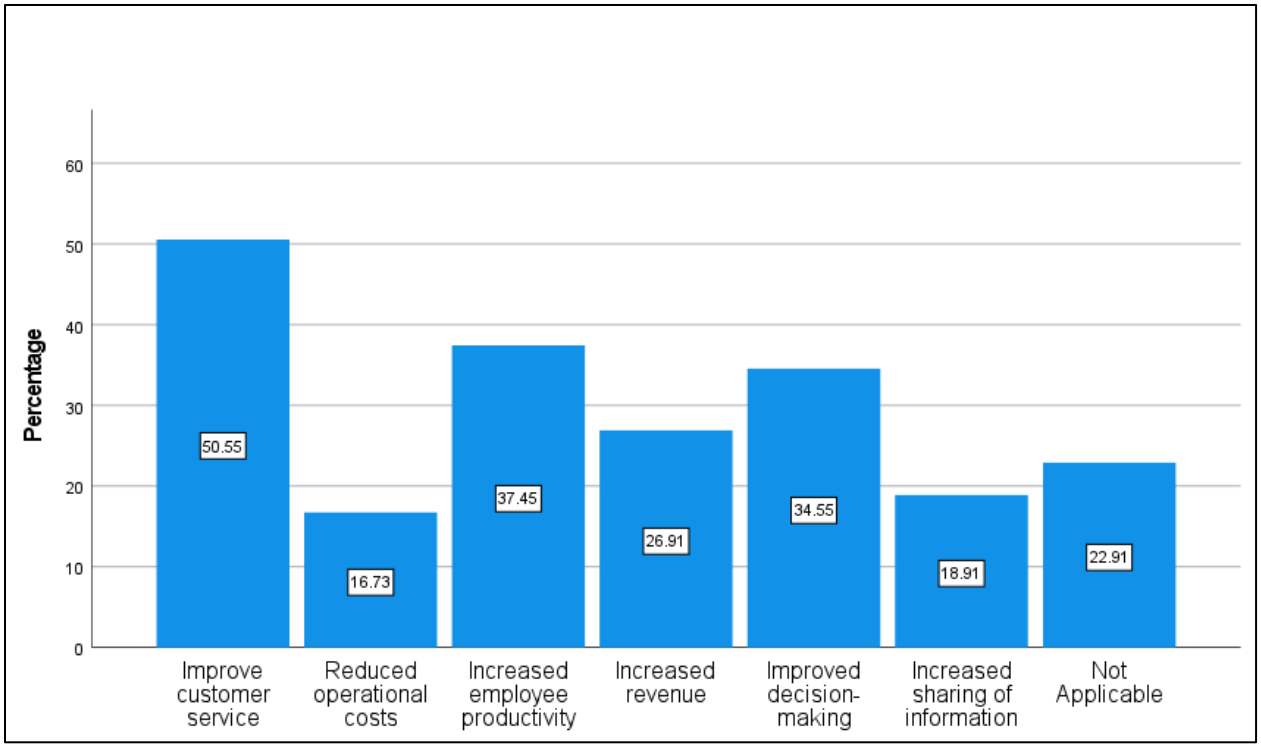

Figure 4. 10: Benefits of BIS adoption

Improve customer service

Customers are satisfied when companies fulfil their demands, hence, BIS helps to keep track of customer needs (Maharjan, 2019). Figure 4.10 shows that 50.55% of the respondents indicated that the use of BIS can improve customer service. Several studies (Richards, 2013; Thompson, 2004; Olexova, 2014) suggest that the use of BIS systems improves customer service.

Reduced operational costs and Increased revenue

The main goal of every business is to increase revenue and reduce operational costs. BIS provides the tools to assist the management in increasing efficiency, and results in profit and fewer expenses. Figure 4.10 shows that 18.9% of the respondents indicated that they attain increased revenue while 16.7% indicated that they experience reduced operational costs by making use of BIS. Olszak and Ziemba (2007) stated that BIS supports financial analyses that involve reviewing costs and revenues. This provides management with the right information for decision making on how to increase profits and reduce operational costs.

Increased employee productivity

Figure 4.10 shows that 37.45% of the respondents indicated that BIS has increased employee productivity. Employees can make use of BIS for their daily tasks to improve efficiency and productivity. Many businesses have realized the importance of BIS and its impact on the accurate performance of tasks.

Increased sharing of information

BIS provides tools that enable the sharing of information in organizations that have a great impact on business decisions. Figure 4.10 shows that 18.9% of the respondents indicated that BIS has increased the sharing of information in the organization. Through increased sharing of information, effective communication is achieved which enables great employee engagement.

Improved decision making

BIS enhances decision making (Gauzelin & Bentz, 2017) and this finding agrees with findings by Richard (2013) who mentioned that BIS enables management to make fact-based decisions quickly and improves the outcomes of their decisions. Well-informed business decisions can be a competitive advantage, that is, they expedite decision - making, as acting quickly and correctly on the information before competing businesses do (Ranjan, 2009). Figure 4.10 shows that 34.55% of the respondents indicated that BIS assists in improving decision making. Hannula and Pirttimaki (2003) conducted a study on SMME Finnish companies and found that improved decision making is one of the significant benefits of adopting and using BIS.

Not applicable

Respondents (22.91%) who indicated "not applicable" included some who were not making use of BIS at all; hence, no benefits were experienced. Some who might have been making use of BIS tools believed they were not reaping any benefits. The reason behind this could be due to not being able to use the BIS tools correctly. When BIS tools are not compatible with the task requirements, employees will not be able to perform their tasks efficiently; this was the case with most of those respondents who selected this option.

4.4.3 Section C – Task characteristics

Task characteristics refer to actions carried out by individuals in turning inputs into outputs (Goodhue & Thompson, 1995). This section determines task characteristics and how much they rely on BIS functions. Table 4.8 presents the findings on the task characteristics of the respondents.

Table 4. 8: Task characteristics

		Frequency	Percent	Valid Percent	Cumulative Percent
I need Business Intelligence Systems to assist with completing my tasks	Strongly Disagree	2	.7	.7	.7
	Disagree	0	0	0	0
	Neutral	63	22.9	22.9	23.6
	Agree	108	39.3	39.3	62.9
	Strongly Agree	50	18.2	18.2	100.0
	Total	275	100.0	100.0	

My decision tasks are dependent on me receiving accurate information from others	Strongly Disagree	5	1.8	1.8	1.8
	Disagree	48	17.5	17.5	19.3
	Neutral	14	5.1	5.1	24.4
	Agree	147	53.5	53.5	77.8
	Strongly Agree	72	26.2	26.2	100.0
	Total	275	100.0	100.0	
I frequently must coordinate my task activities with others	Strongly Disagree	8	2.9	29	2.9
	Disagree	94	34.2	34.2	37.1
	Neutral	44	16.0	16.0	53.1
	Agree	101	36.7	36.7	89.8
	Strongly Agree	28	10.2	10.2	100.0
	Total	275	100.0	100.0	

The findings in Table 4.8 show that most of the respondents (76%) need BIS to assist them in completing their tasks. This finding indicates that through BIS adoption, employees can improve their task efficiency and increasing productivity.

Similarly,76% of the respondents also indicated that they depend on receiving accurate information to make business-related decisions. BIS provides crucial information that enables management to make accurate business decisions making. This finding is in line with the finding of a study by Kinuda (2016) which highlighted the importance of receiving right information to make decisions.

Furthermore, 47% of the respondents agreed that they frequently coordinate their tasks with others. Most employees need to engage with team members to get their tasks done, thus, BIS provides the necessary tools that allow effective communication among employees, sharing of information, and tracking the progress of each task.

From the results in Table 4.8, the task characteristics of the respondents heavily rely on BIS use. This is consistent with the finding by Kinuda (2016) who also found a positive relationship between task characteristics and task-technology fit.

4.4.4 Section D - Business intelligence characteristics

In this study, business intelligence characteristics refer to BIS functions that aid individuals to carry out their daily activities. This section determines the BIS characteristics that the respondents were making use

of in their SMMEs leading to understanding the extent to which BIS assists users to accomplish their tasks much faster and efficiently. Table 4.9 presents the findings on BIS characteristics.

Table 4. 9: BIS Characteristics

		Frequency	Percent	Valid Percent	Cumulative Percent
Business Intelligence Systems increase my decision-making	Strongly Disagree	32	11.6	11.6	11.6
	Disagree	0	0	0	0
	Neutral	82	29.8	29.8	41.5
	Agree	125	45.5	45.5	86.9
	Strongly Agree	36	13.1	13.1	100.0
	Total	275	100.0	100.0	
Business Intelligence Systems allow information to be readily accessible	Strongly Disagree	25	9.1	9.1	9.1
	Disagree	0	0	0	0
	Neutral	85	30.9	30.9	40.0
	Agree	112	40.7	40.7	80.7
	Strongly Agree	53	19.3	19.3	100.0
	Total	275	100.0	100.0	
Business Intelligence Systems produce information of high quality	Strongly Disagree	7	2.5	2.5	2.5
	Disagree	0	0	0	0
	Neutral	137	49.8	49.8	52.4
	Agree	72	26.2	26.2	78.5
	Strongly Agree	59	21.5	21.5	100.0
	Total	275	100.0	100.0	
Business Intelligence Systems can flexibly adjust to meet new demands	Strongly Disagree	0	0	0	0
	Disagree	65	23.6	23.6	23.6
	Neutral	96	34.9	34.9	58.5
	Agree	51	18.5	18.5	77.1
	Strongly Agree	63	22.9	22.9	100.0
	Total	275	100.0	100.0	

Table 4.9 shows that most of the respondents (59%) agreed that BIS increases their decision making. In terms of BIS allowing information accessibility, 60% of the respondents agreed that BIS allows information

to be readily accessible. Furthermore, 48% of the respondents indicated that BIS produces information of high quality. With regards to the statement "*Business Intelligence Systems can flexibly adjust to meet new demands*", most of the respondents (41.4%) agreed that BIS flexibly adjusts to meet new demands.

The findings in Table 4.9 highlights the importance of BIS use by employees to carry out their task activities. BIS tools are most helpful to provide meaningful business information that could improve employee and organizational performance. When BIS capabilities are used to enhance task execution with ease and timely order, users will perceive such systems as meeting their needs while also driving value in decisions for task requirements (Kinunda, 2016).

4.4.5 Section E -Task Technology Fit

Task technology fit refers to the degree to which technology capabilities aid the individual task requirements (Goodhue & Thompson, 1995). Table 4.10 shows the findings on task technology fit.

Table 4. 10: Task Technology Fit

		Frequency	Percent	Valid Percent	Cumulative Percent
The capabilities of Business Intelligence Systems make the performance of my tasks to be easy	Strongly Disagree	17	6.2	6.2	6.2
	Disagree	0	0	0	0
	Neutral	75	27.3	27.3	33.5
	Agree	133	48.4	48.4	81.8
	Strongly Agree	50	18.2	18.2	100.0
	Total	275	100.0	100.0	
The capabilities of the Business Intelligence Systems are compatible with my task requirements	Strongly Disagree	0	0	0	0
	Disagree	0	0	0	0
	Neutral	81	29.5	29.5	29.5
	Agree	122	44.4	44.4	73.8
	Strongly Agree	72	26.2	26.2	100.0
	Total	275	100.0	100.0	
The functions of Business	Strongly Disagree	17	6.2	6.2	6.2
	Disagree	51	18.5	18.5	24.7

Intelligence Systems are very adequate	Neutral	111	40.4	40.4	65.1
	Agree	76	27.6	27.6	92.7
	Strongly Agree	20	7.3	7.3	100.0
	Total	275	100.0	100.0	
In general, the capabilities of Business Intelligence Systems are the best fit with my task requirements	Strongly Disagree	18	6.5	6.5	6.5
	Disagree	26	9.5	9.5	16.0
	Neutral	65	23.6	23.6	39.6
	Agree	115	41.8	41.8	81.5
	Strongly Agree	51	18.5	18.5	100.0
	Total	275	100.0	100.0	

The findings in Table 4.10 reveal that most of the respondents (66.6%) agreed that the capabilities of BIS make task performance to be easy. Regarding the capabilities for BIS being compatible with the task requirements, 70.4% of the respondents agreed that BIS capabilities are compatible with their task requirements. Furthermore, 34.9% agreed that the functions of BIS are very adequate for their daily task operations. With regards to the statement "*In general, the capabilities of Business Intelligence Systems are the best fit with my task requirements"*, most of the respondents (60.3%) agreed that in general, the capabilities of BIS are the best fit for their task requirements.

Overall, the findings depict a great impact of BIS tools in aiding an individual task requirement. Fit between tasks, individuals and technology makes workspace comfortable and increases the intention to use, thereby, reducing the complexity of work and preparing the employees to adopt new technologies (Daryaei, Shirzard, & Kumar, 2013). For technology to have a positive impact on individual performance, it must be utilized to support the tasks the individual is trying to achieve (Goodhue & Thompson, 1995).

4.4.6 Section F - Perceived ease of Business Intelligence Systems use

This section determines the degree to which individuals believe the BIS functions are easy to use for their task requirements. Table 4.11 presents the findings on perceived ease of use of BIS.

Table 4. 11: Perceived ease of Business Intelligence Systems use

		Frequency	Percent	Valid Percent	Cumulative Percent

Learning to use new features on the Business Intelligence Systems is easy	Strongly Disagree	42	15.3	15.3	15.3
	Disagree	87	31.6	31.6	46.9
	Neutral	39	14.2	14.2	61.1
	Agree	85	30.9	30.9	92.0
	Strongly Agree	22	8.0	8.0	100.0
	Total	275	100.0	100.0	
It takes too long to learn how to use Business Intelligence Systems to make it worth the effort	Strongly Disagree	25	9.1	9.1	9.1
	Disagree	94	34.2	34.2	43.3
	Neutral	15	5.5	5.5	48.7
	Agree	55	20.0	20.0	68.7
	Strongly Agree	86	31.3	31.3	100.0
	Total	275	100.0	100.0	
It is easy to interact with the Business Intelligence Systems	Strongly Disagree	17	6.2	6.2	6.2
	Disagree	79	28.7	28.7	34.9
	Neutral	26	9.5	9.5	44.4
	Agree	98	35.6	35.6	80.0
	Strongly Agree	55	20.0	20.0	100.0
	Total	275	100.0	100.0	
In general, Business Intelligence Systems is easy to use	Strongly Disagree	5	1.8	1.8	1.8
	Disagree	117	42.5	42.5	44.4
	Neutral	14.	5.1	5.1	49.5
	Agree	66	24.0	24.0	73.5
	Strongly Agree	73	26.5	26.5	100.0
	Total	275	100.0	100.0	

In terms of learning to use new BIS features, the findings in Table 4.11 show that most of the respondents (45.8%) find learning to use BIS not easy, while, 38.9% of the respondents agreed that learning to use new features of BIS is easy. Also, 43.3% of the respondents indicated that they can quickly learn to use BIS to

make it worth the effort. In terms of easy interaction with BIS, most of the respondents (55.6%) indicated that it is easy to interact with BIS. Furthermore, most of the respondents (50.5%) agreed that in general, BIS is easy to use.

These findings suggest that most of the respondents found it easy to make use of BIS tools; it indicates a positive attitude towards BIS use. The more the innovation is viewed as easy to use, the more it is likely to be adopted. This finding is consistent with a study by Kikawa et al. (2019), in which they found a positive relationship between perceived ease of use and BIS acceptance.

4.4.7 Section G - Perceived Business intelligence Systems usefulness

In this section, questions were asked to determine the extent to which respondents believe whether BIS is useful to their business entities. Table 4.12 presents the findings on perceived BIS usefulness.

Table 4. 12: Perceived Business intelligence Systems usefulness

		Frequency	Percent	Valid Percent	Cumulative Percent
Using Business Intelligence Systems will improve company performance	Strongly Disagree	1	0.4	0.4	0.4
	Disagree	0	0	0	0
	Neutral	14	5.1	5.1	5.5
	Agree	183	66.5	66.5	72.0
	Strongly Agree	77	28.0	28.0	100.0
	Total	275	100.0	100.0	
Using Business Intelligence Systems will improve employee`s performance	Strongly Disagree	0	0	0	0
	Disagree	0	0	0	0
	Neutral	14	5.1	5.1	5.1
	Agree	111	40.4	40.4	45.5
	Strongly Agree	150	54.5	54.5	100.0
	Total	275	100.0	100.0	
Using Business Intelligence Systems would	Strongly Disagree	0	0	0	0
	Disagree	0	0	0	0
	Neutral	60	21.8	21.8	22.9

improve the quality of the job	Agree	122	44.4	44.4	67.3
	Strongly Agree	93	33.82	32.7	100.0
	Total	275	100.0	100.0	
In general, I would find Business Intelligence Systems useful in my company	Strongly Disagree	0	0	0	0
	Disagree	1	.4	.4	.4
	Neutral	0	0	0	0
	Agree	122	44.4	44.4	44.7
	Strongly Agree	152	55.3	55.3	100.0
	Total	275	100.0	100.0	
Using Business Intelligence Systems helps to accomplish tasks more quickly	Strongly Disagree	2	.7	.7	.7
	Disagree		0	0	0
	Neutral	36	13.1	13.1	13.8
	Agree	120	43.6	43.6	57.5
	Strongly Agree	117	42.5	42.5	100.0
	Total	275	100.0	100.0	

Most of the respondents (94.5%) revealed that using BIS improves company performance. Moreover, 94.9% of respondents believe that BIS use improved employee performance. Furthermore, 78.2% agreed that BIS use would improve the quality of the job. Most of the respondents (99.7%) indicated that they would find BIS useful to their company. Also, 86.1% of the respondents revealed that using BIS assists to accomplish tasks more quickly.

These findings suggest that most respondents perceived BIS as useful in carrying out their task requirements, and overall, the company performance. This suggests a positive correlation between perceived usefulness and adoption. The main reason could be that SMMEs with limited resources in terms of financial and personnel SMMEs are willing to adopt new technology only if it will benefit the organizations (Ong, Teh, Kasbun & Mahroeian, 2020). This is in line with a study by Potiwanna and Avakiat (2017) who also found that perceived usefulness has a positive impact on adoption. This finding was, however, not consistent with a study by Kikawa et al. (2019) which found that perceived BIS usefulness has no impact on BIS acceptance.

4.4.8 Section H -Trialability

Trialability refers to the degree to which an innovation may be experimented with on a limited basis. BIS can be easy to adopt if it can be tried out temporarily. Table 4.13 presents the findings of trialability.

Table 4. 13: Trialability

		Frequency	Percent	Valid Percent	Cumulative Percent
I want to use Business Intelligence Systems on a trial basis to see what it can do for me	Strongly Disagree	0	0	0	0
	Disagree	69	25.1	25.1	25.1
	Neutral	45	16.4	16.4	41.5
	Agree	129	46.9	46.9	88.4
	Strongly Agree	32	11.6	11.6	100.0
	Total	275	100.0	100.0	
I have had the opportunity to test the Business Intelligence Systems and found it interesting	Strongly Disagree	65	23.6	23.6	23.6
	Disagree	27	9.8	9.8	33.5
	Neutral	39	14.2	14.2	47.6
	Agree	86	31.3	31.3	78.9
	Strongly Agree	58	21.1	21.1	100.0
	Total	275	100.0	100.0	
I want to try to make use of Business Intelligence Systems for at least one month	Strongly Disagree	0	0	0	0
	Disagree	37	13.5	13.5	13.5
	Neutral	43	15.6	15.6	29.1
	Agree	149	54.2	54.2	83.3
	Strongly Agree	46	16.7	20.0	100.0
	Total	275	100.0	100.0	
I enjoy learning new technology	Strongly Disagree	6	2.2	2.2	2.2
	Disagree	61	22.2	22.2	24.4
	Neutral	36	13.1	13.1	37.5
	Agree	110	40.0	40.0	77.5

	Strongly Agree	62	22.5	22.5	100.0
	Total	275	100.0	100.0	

Results in Table 4.13 show that 58.5% of the respondents were interested in using BIS on a trial basis. Also, 52.4% of the respondents revealed that they had an opportunity to try BIS and found it interesting. Furthermore, most of the respondents (70.9%) indicated that they would like to try BIS for at least one month. This will lead to greater chances of BIS adoption if they are given a chance to try out using it in their daily operations. In addition, most of the respondents (62.5%) indicated that they enjoy learning new technology.

Overall, the results in Table 4.13 depict that most of the respondents had a positive attitude towards learning new technology which could lead to BIS adoption. Ramdani, Kawalek and Oswaldo (2009) found trialability as a significant factor influencing the adoption of technology by SMMEs. The availability of BIS tools on a trial basis can assist SMMEs in their decisions to adopt the BIS. Kikawa et al. (2019), who conducted a study on South African SMEs, did not, however, find a relationship between trialability and BIS adoption.

4.4.9 Section I - Observability

Observability describes the extent to which an innovation is visible to the members of a social system and the benefits that can be easily observed and communicated (Rogers, 2003). The visibility of the results of innovation also influences individual and community perceptions. Table 4.14 presents the findings on observability.

Table 4. 14: Observability

		Frequency	Percent	Valid Percent	Cumulative Percent
I have seen the use of Business Intelligence Systems outside the company	Strongly Disagree	89	32.4	32.4	32.4
	Disagree	17	6.2	6.2	38.5
	Neutral	106	38.5	38.5	77.1
	Agree	106	38.5	38.5	77.1
	Strongly Agree	63	22.9	22.9	100.0
	Total	275	100.0	100.0	

I can see the effect of Business Intelligence Systems in my company	Strongly Disagree	0	0	0	0
	Disagree	39	14.2	14.2	14.2
	Neutral	97	35.3	14.2	35.3
	Agree	80	29.1	29.1	78.5
	Strongly Agree	59	21.5	21.5	100.0
	Total	275	100.0	100.0	
I can think of several people who have invested time and money in Business Intelligence Systems	Strongly Disagree	0	0	0	0
	Disagree	136	49.5	49.5	49.5
	Neutral	16	5.8	5.8	55.3
	Agree	90	32.7	32.7	88.0
	Strongly Agree	33	12.0	12.0	100.0
	Total	275	100.0	100.0	
It takes a long time to learn using Business Intelligence Systems	Strongly Disagree	16	5.8	5.8	5.8
	Disagree	72	26.2	26.2	32.0
	Neutral	83	30.2	30.2	62.2
	Agree	60	21.8	21.8	84.0
	Strongly Agree	44	16.0	16.0	100.0
	Total	275	100.0	100.0	

Based on the results in Table 4.14, most of the respondents (61.4%) indicated that they have seen the use of BIS outside the company. The more the individuals can easily observe the advantages of BIS on others, the higher the chances of BIS adoption. Also, 50.6% of the respondents revealed that they can see the effects of BIS in their business. With regards to the statement "*I can think of several people who have invested time and money in Business Intelligence Systems"*, 44.7% indicated that they know several people who have invested in BIS. Most of the respondents (37.8%) agreed with the statement "it takes a long time to learn using BIS" while 32% of the respondents disagreed with the statement.

The results in Table 4.14 depicts that most of the respondents know the capabilities and benefits of BIS to businesses. Visibility is a factor that stimulates peer discussion of new ideas (Al- Rahmi et al., 2019). Observability has a great impact on BIS adoption. If there are observable positive outcomes from the implementation of the innovation, then the innovation is more adoptable (Scott et al., 2008). Closely related

to trialability, observability has been named as an attribute that has a huge impact factor on innovation adoption (Kikawa, et al., 2019). Several studies indicated a positive correlation between observability and BIS adoption (Kikawa et al., 2019; Hatta, Abdullah & Miskon, 2017).

4.5 Hypothesis testing

Regression analysis was used to statistically test the hypothesis proposed in Chapter 2 of this study.

Determining the model fit

The model summary (Table 4.15) provides R, R-squared, adjusted R-squared, and the standard error of the estimate, which can be used to determine how well a regression model fits the data.

Table 4. 15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.685[a]	.470	.456	.68263

In this case, R is the multiple correlation coefficient which measures the quality of the prediction of Business Intelligent adoption. A value of 0.685 indicates a good level of prediction. The R-square represents the coefficient of determination, which is the proportion of variance in the dependent variable that can be explained by the independent variables. The value of 0.470 implies that independent variables explain 47% of the variability of the dependent variable, business intelligence adoption.

Statistical Significance

The F-ratio in the ANOVA (Table 4.16) tests whether the overall regression model is a good fit for the data. Table 4.16 shows that the independent variables were statistically significant in predicting the dependent variable, $F(7,267) = 33.778$, $p<0.0005$, that is, the regression model is a good fit for the data.

Table 4. 16: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	110.180	7	15.740	33.778	.000[b]
	Residual	124.417	267	.466		
	Total	234.596	274			

Estimated model coefficients

Table 4.17 indicates how much the dependent variable varies with an independent variable when all other independent variables were held constant. Unstandardized beta (B) value includes the values for the regression equation for predicting the dependent variable from the independent variable. A standardized beta coefficient compares the strength of the effect of each independent variable to the dependent variable, the higher the value of the beta coefficient, the stronger the effect (Glen, 2016). The Significant column is used to determine the statistical significance of an independent variable to the dependent variable. If the significance level is less than 0.05, the independent variable is statistically significant.

Table 4. 17: Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.226	.498		-4.466	.000
	Task characteristics	.050	.089	.038	.555	.579
	Business intelligence characteristics	.214	.100	.178	2.149	.033
	Task technology fit	.145	.101	.120	1.434	.153
	Perceived ease of BI	-.251	.091	-.186	-2.755	.006
	Perceived BI system usefulness	.464	.116	.212	3.998	.000
	Trialability	.302	.081	.275	3.718	.000
	Observability	.205	.093	.155	2.201	.029

Dependent variable: Business intelligence adoption

Using the standardized coefficients, we can determine and compare the significant effect of each independent variable to the dependent variable. Table 4.17 shows that trialability has the most impact on business intelligence adoption with a standard coefficient of 0.275, a *t*-value of 3.718, significant at 0.000. This is in line with Hair, Black, Babin and Anderson (2018) who suggest that for any variable to be significant, its t-value should be equal to or above 1.60, and significance (sig.) value equal to or less than 0.05. The results also show the perceived BIS system usefulness, with a standard coefficient of 0.212, which means that it has a significant effect as indicated by a t-value of 3.998 and a p-value of 0.000. In terms of business intelligence characteristics, the t-value is 2.149 which is greater than 1.60, and sig is 0.033 which is less than 0.05. This indicates that the variable has a significant effect on business intelligence adoption. Furthermore, considering the effect of an independent variable, the standardized coefficient for observability is 0.155, this means that it has a significant impact as indicated by a t-value of 2.201 and a

significant factor of p-value = 0.029. In terms of Task technology fit, the standardized coefficient is 0.120 which indicates that it does not have any influence on business intelligence adoption as indicated by the non-significant factor p-value=1.434. Similarly, the results show that task characteristics do not have a significant effect as indicated by a t-value of 0.555 and a p-value of 0.579. A t-value of -2.755 and a p-value of 0.006 demonstrate that perceived ease of BIS use has a significant impact on business intelligence adoption in SMMEs groceries sector in the Tshwane Metropolitan Municipality, South Africa.

Determining the correlation between task characteristics, BIS characteristics, and task technology fit

Model summary

On the model summary (Table 4.18), the R-square represents the coefficient of determination, which is the proportion of variance in the dependent variable that can be explained by the independent variables. The value of 0.542 implies that independent variables explain 54.2% of the variability of the dependent variable, task technology fit. This is an acceptable fit in line with Hair et al. (2018) who establishes that a model is acceptable if it explains more than 50% of the dependent variables.

Table 4. 18: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.737[a]	.542	.539	.51914

a. Predictors: (Constant), Business_intelligence_characteristics, Task_characteristics

b. Dependent Variable: Task_technology_fit

Estimated model coefficients

Based on the results in Table 4.19, the results also show the BIS characteristics with a standard coefficient of 0.844, which means that it has a significant effect as indicated by a t-value of 17.642 and a p-value of 0.000. Task characteristics have a t-value of -0.298, which is greater than 1.60 and the sig. is 0.006, which is less than 0.05. This means that task characteristics have a negative influence on task technology fit.

Table 4. 19: Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.

		B	Std. Error	Beta		
1	(Constant)	1.782	.182		9.790	.000
	Task_characteristics	-.324	.052	-.298	-6.227	.000
	Business_intelligence_characteristics	.840	.048	.844	17.642	.000

a. Dependent Variable: Task_technology_fit

4.6 Addressing the proposed hypotheses

This section discusses the seven hypotheses proposed for the study.

$H1_{0:}$ Observability does not influence BIS adoption.

$H1_{1:}$ Observability will positively influence BIS adoption.

The results in Table 4.14 indicate that observability positively affects BIS adoption with a significant level of 0.029. This is not consistent with a study done on SMEs by Ramdani et al. (2009) who found observability to be an insignificant factor in SMEs adoption. Their study also indicated that in the context of small business, observability is not positively related to IS innovation's` adoption. However, with evidence provided, it is enough to support the proposed hypothesis. Therefore, the **alternative hypothesis is accepted**, while the null hypothesis is rejected**.**

$H2_{0:}$ Trialability does not influence BIS adoption.

$H2_{1:}$ Trialability will positively influence BIS adoption.

With a significance level of 0.000 as displayed in Table 4.14, trialability is found to have a significant effect on BIS adoption. This is consistent with a study done by Olexova (2014) on the retail chain, which confirmed that trialability influences BIS adoption. The evidence is enough to support the proposed hypothesis, therefore the **alternative hypothesis is accepted**, while the null hypothesis is rejected.

$H3_{0:}$ Perceived ease of use of the BIS does not influence BI adoption.

$H3_{1:}$ Perceived ease of use of the BIS positively influences BI adoption.

The results in Table 4.14 show that perceived ease of use of the BIS has a significant effect on BIS adoption with a significance level of 0.006. This is consistent with a study by Kikawa et al., (2019), in which they found a positive relationship between perceived ease of use and BIS acceptance. Therefore, the **alternative hypothesis is accepted** while the null hypothesis is rejected.

$H4_{0:}$ Perceived usefulness of BIS does not influence BIS adoption.

$H4_{1:}$ Perceived usefulness of BIS positively influences BIS adoption.

The results in Table 4.14 indicate that the perceived usefulness of BIS has a significant level of 0.000. This evidence implies that perceived usefulness has a significant effect on BIS adoption. Perceived usefulness has a direct impact on attitude toward the use of BIS and enhances individual job performances (Davis, 1989). The results are consistent with a study by Daryaei et al. (2013) which also found the positive impact of perceived usefulness on the adoption of BIS. Therefore, the **alternative hypothesis is accepted** while the null hypothesis is rejected.

$H5_{0:}$ BIS characteristics have no influence on task- technology fit.

$H5_{1:}$ BIS characteristics will positively influence task- technology fit.

The results in Table 4.16 established that BIS characteristics have a significant effect on task technology fit, with a significant value of 0.000. This is consistent with the study by Kinuda (2016), which also found a positive relationship between BIS characteristics and task-technology fit. Enough evidence is provided to reject the null hypothesis. Therefore, the **alternative hypothesis is accepted** while the null hypothesis is rejected.

$H6_{0}$: Task characteristics do not influence task-technology fit.

$H6_{1}$: Task characteristics will positively influence task-technology fit.

The results in Table 4.16 established that task characteristics have a significant effect on task technology fit, with a significant value of 0.000. This provides enough evidence to support the proposed hypothesis, therefore, the **alternative hypothesis is accepted** while the null hypothesis is rejected.

$H7_{0:}$ Perceived Task-BI fit does not influence BIS adoption.

$H7_{1:}$ Perceived Task-BI fit will positively influence BIS adoption.

The regression analysis test found that perceived Task-BI fit has no significant effect on BIS adoption. This is because of the significance level of 0.153 which is greater than 0.05. This could be due to respondents who did not find the BIS capabilities easy or compatible with their task requirements. This is determined by not being able to use the BIS tools correctly. This was, however, is not consistent with the study done by Daryaei et al. (2013) which found task-technology fit to positively impact on BIS adoption. Therefore, the **alternative hypothesis is rejected** while the null hypothesis is accepted.

4.7 Final research framework

The final tested framework represents the constructs and their significance value to BIS adoption. Figure 4.11 demonstrates that observability, trialability, perceived BIS ease of use, and perceived BIS usefulness are all positively correlated to BIS adoption. Furthermore, the framework also shows that BIS characteristics and task characteristics positively influence task technology fit. However, the framework shows that task technology fit does not influence BIS adoption (as demonstrated by the dotted line).

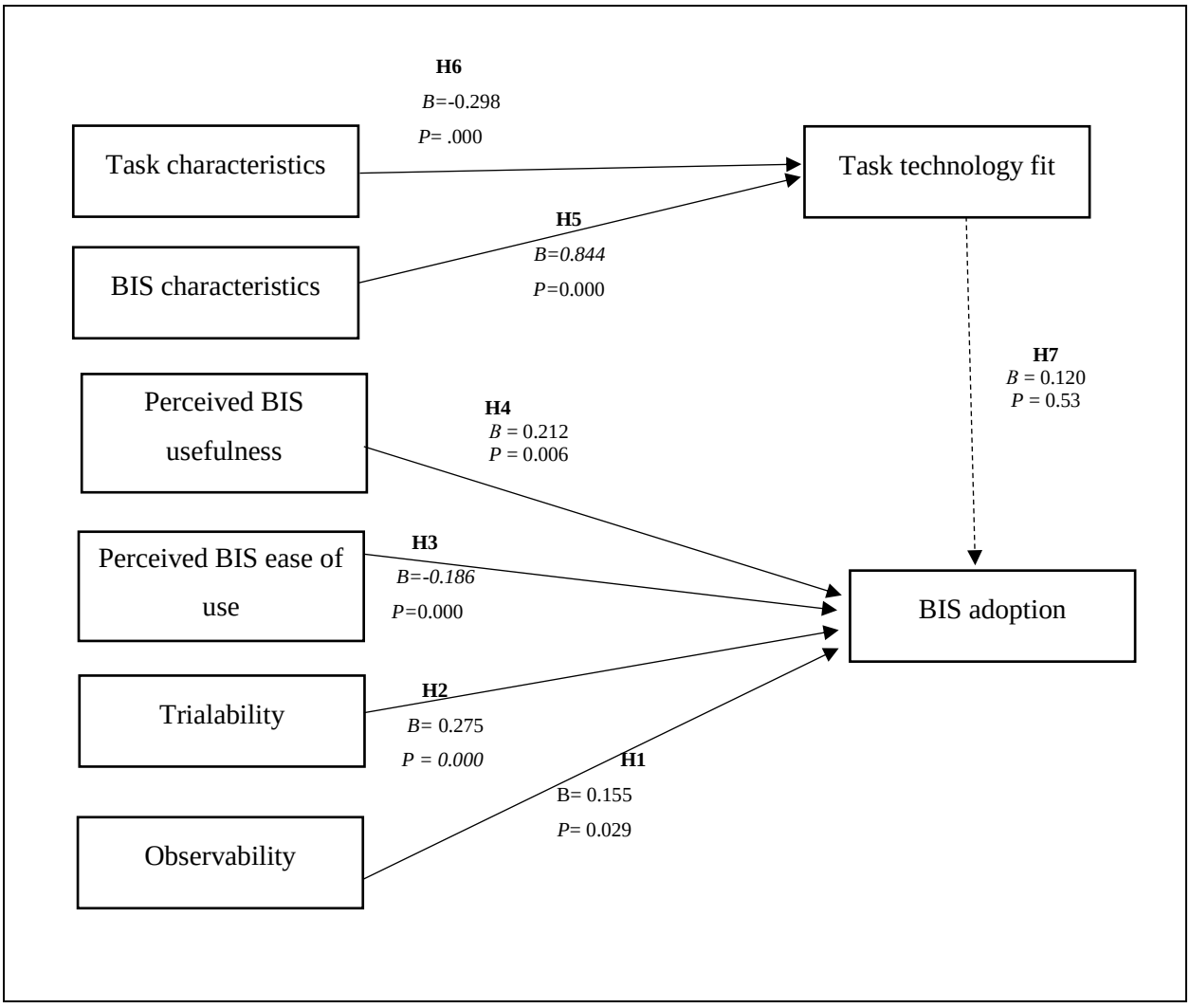

Figure 4. 11: Final research framework

Key

Significant path

Non-significant path

4.8 Chapter Summary

This chapter presented an analysis and interpretation of the empirical data collected from the SMMEs groceries sector in the Tshwane Metropolitan Municipality, South Africa. Reliability analysis was conducted to measure the reliability of the framework. The framework constructs achieved a Cronbach's Alpha score above 0.70 which demonstrated good reliability. The data were presented in the form of graphs and descriptive tables to ensure effortless understanding. Regression analysis was used to test the proposed hypotheses. Multiple regression was run to test the proposed hypothesis. The variables, that is, observability, trialability, perceived BIS ease of use, and perceived BIS usefulness added statistically significantly to BIS adoption. Also, task characteristics and BIS characteristics were found to significantly affect task technology fit. A final research framework was developed depicting the constructs and their significant value to BIS adoption.

Chapter 5: Conclusion and Recommendations

5.1 Introduction

This chapter provides a summary of the research study, recommendations on how to overcome the barriers faced by SMMEs in BIS adoption. Contributions, limitations of the study, recommendations, and chapter summary for future research are also provided in this chapter.

5.2 Aim of the study

This study aimed to establish the factors that influence the adoption of BIS by SMMEs in the grocery retail sector in South Africa. Perceived BIS usefulness, perceived ease of BIS use, observability, and trialability were established as the factors that influence BIS adoption as discussed next.

Perceived BIS usefulness

The study found that perceived BIS usefulness has a positive significant impact on BIS adoption. This could be attributed to the fact that SMMEs with limited financial and personnel resources were willing to adopt new technology only if it benefits their organizations. This finding is in line with findings of similar studies that establish PU as a strong positive predictor of BIS adoption (Sandema-Sombe, 2019; Boonsiritomachai, 2014). Similarly, if the technology is found to be useful, it will have a positive effect on the intended user`s attitude, and this can consequently increase the user intention towards technology adoption and foster positive adoption behaviour (Boonsiritomachai, 2014).

Perceived ease of BIS use

The study found perceived ease of BIS use as having a negative significant effect on BIS adoption. This finding shows that most of the respondents found it easy to use BIS tools, which indicates a positive attitude towards BIS use. The more the innovation is viewed as easy to use, the more it is likely to be adopted. However, as users become familiar with the BIS system, perceived ease becomes less significant in influencing adoption, hence, the negative association between perceived ease and BIS adoption. Several studies have supported the impact of PEOU on technology adoption (Kinunda, 2016; Nkuna, 2011). Teo et al. (1999) suggest that information systems users who perceive BIS as easier to use and less complex, are most likely to adopt and use BIS systems. Similarly, if the user perceives that little effort is required to use BI systems, it will encourage BIS usage, whilst, if more effort is perceived, it will discourage BI systems usage.

Observability

The study found observability as having a positive significant influence on BIS adoption. This finding revealed that most of the respondents knew the capabilities and benefits that BIS brings to businesses. The literature review confirmed observability as having a positive impact on the adoption of BIS as it encourages communication among individuals as peers often ask for innovation evaluation information (Kikawa et al., 2019; Hatta, Abdullah & Miskon, 2017). This means that when individuals see the visibility of the results of BIS, they are most likely to adopt BIS for their business.

Trialability

Trialability had a positive significant influence on BIS adoption. The study showed that most of the respondents were interested in making use of BIS, hence, depicting a positive attitude towards BIS adoption. Prior studies also confirm trialability as being positively correlated with the rate of adoption (Sahin, 2006; Al- Rahmi et al., 2019). This implies that the more the SMMEs get a chance or an opportunity to try making use of BIS technologies, the more their chance of BIS adoption increases.

5.3 Summary of the research study

This study aimed to establish factors that influence the adoption of BIS by SMMEs in the grocery retail sector in Tshwane Metropolitan Municipality, South Africa, and to propose a framework to guide the adoption of such systems in SMMEs. In this ever-changing business environment, retailers must have complete insight into how actual results compare to set goals, revenue by store, product line, and other factors. Through a review of the literature, this study explored the importance of BIS in the retail sector. Business intelligence systems provide the ability to collect and analyse a huge amount of data about customers, vendors, markets, internal processes, and the business environment (Gujrati, 2016). Due to these data analysis capabilities, businesses will be able to keep up with consumer trends, gain competitive advantage, achieve internal business processes efficiencies, and make well-informed business decisions. However, SMMEs are facing numerous challenges when trying to adopt and use BIS systems, that is, lack of knowledge and skills, and cost of acquiring and implementing such systems.

Through a review of the literature, the study explored the importance of BIS adoption in SMMEs. BIS platforms help management to truly understand its customer base and predict customer demands. Retailers need to frequently analyse their data and access a real-time BI solution that will enable them to respond to changes promptly and remain competitive in a very tough industry (Panintelligence, 2019). Three technology adoption models were adopted for this study, that is, the technology acceptance model, task-

technology fit mode, and diffusion on innovation model. These models were integrated to develop a conceptual framework for the study. The premise for combining the models is that they capture different aspects of users` choices to adopt BIS. Dishaw and Strong (1999) aver that the result of combining two or more models is that it provides a better model of IT utilization than either an attitude or a fit model separately. The conceptual framework was developed to provide an understanding of the factors that influence BIS adoption in retail organizations.

The study adopted a quantitative research approach, which is an approach for testing objective theories by examining the relationship among variables (Creswell, 2013). In total, 300 close-ended questionnaires were distributed to SMMEs owners/managers around Pretoria. The data collected were analysed using the IBM SPSS version 27 software. The data were presented in the form of graphs and descriptive tables to enable effortless understanding. Multiple regression analysis was used to test the seven proposed hypotheses and to determine the statistical significance of each hypothesis. The final tested framework demonstrated that observability, trialability, perceived BIS ease of use, and perceived BIS usefulness are all positively correlated to BIS adoption. Furthermore, the framework also showed that BIS characteristics and task characteristics positively influence task technology fit. However, task technology fit was found not to influence BIS adoption. Table 5.1 presents a summary of the hypotheses testing.

Table 5. 1: Hypotheses summary

Hypothesis	**Beta and Significance level**	**Result**
H1: Observability will positively influence BIS adoption	B= 0.115; p = 0.029	Supported
H2: Trialability will positively influence BIS adoption	B = 0.275; p = 0.000	Supported
H3: Perceived ease of use of the BIS positively influences BI adoption	B = -0.186; p = 0.006	Supported
H4: Perceived usefulness of BIS positively influences BIS adoption	B = 0.212; p = 0.000	Supported
H5: BIS characteristics will positively influence task-technology fit	B = 0.844; p = 0.000	Supported

H6: Task characteristics will positively influence task-technology fit	B = -0.298; p = 0.000	Supported
H7: Perceived Task-BI fit will positively influence BIS adoption	B = 0.120; p = 0.153	Not Supported

5.4 Contributions to the study

This section focuses on the contributions of the research in three spheres of theory, policy formulation, and managerial practices as discussed next.

5.4.1 Contributions to the theory

The study contributes to the understanding of factors that influence BIS adoption in SMMEs grocery retails sector. A comprehensive research framework was developed by integrating three adoption models which are: TAM, DOI, and TTF. This was drawn to determine the relationship between the five determinant factors and BIS adoption. Thus, the findings of the study suggest that the following four factors should be taken into consideration when adopting BIS: observability, trialability, perceived ease of use, and perceived usefulness. The researcher believes that the study will also add to the broader body of knowledge on BIS adoption in grocery small businesses.

5.4.2 Contributions to policy formulation

Policymakers could identify the factors in this study with a policy aspect, which may lead to an increase in BIS adoption by SMMEs grocery retail stores. The results indicated that most of the respondents had a positive attitude towards learning new technology. This can offer guidance to the government bodies to make available BIS tools to assist SMMEs in their decisions to adopt the BIS.

5.4.3 Contributions towards managerial practices

The unique findings of this study can offer guidance to management who attempt to use BIS technologies in their business. The study found that some respondents who might have been making use of BIS tools believed they were not reaping any benefits. The reason behind that was that most managers were unable to effectively use the BIS tools in their businesses. This could encourage the management in acquiring BIS

tools that are most compatible with the task requirements to improve task performance efficiency. The success of a business depends on the decisions made by management. This study revealed the importance of BIS in assisting to make fact-based decisions and improving the outcomes of the decisions. This would also encourage the management to adopt BIS for improved business decision-making.

5.5 Recommendations

Overall, this study established that BIS adoption has a great value to business operations. However, SMMEs in the grocery retailers in Gauteng Province have partially adopted or not adopted BIS at all.

Based on the findings of this study, the following recommendations are made for SMMEs:

1. There is a need for SMMEs management to invest in IT projects by allocating enough budget for technology purchase and implementation. The study found that most of the SMMEs only make use of retail point of sale (POS), but other tools could also benefit the retail organizations such as the enterprise resource planning (ERP) system, which is rarely used.
2. Most firms are reluctant to invest in BIS due to a lack of knowledge and skills. Sponsored IT support programs could enable SMMEs to increase their knowledge regarding the latest technologies they could adopt for their business. Committed support and sponsorship have been widely acknowledged as the most important factors for BIS implementation in most SMMES (Yeoh & Koronios, 2010).
3. SME managers should be able to build a culture that is complementary to technology and innovation. This can be done by developing and aligning business strategies with BIS. Yeons and Koronois (2010) established that if the business vision is not clearly understood, it would eventually impact the adoption and outcome of the BIS.
4. SME managers should engage in strategic collaboration with other major business players to enhance learning experiences about BIS technologies. Sinfree and Gul (2013) suggest that although firms are constrained by a lack of expertise and government policy, there are examples of strategic impact in the form of collaboration.

5.6 Research Limitation

The study only focused on SMMEs in the Tshwane Metropolitan Municipality (Pretoria). The study could be richer if it covered SMMEs grocery stores at a larger scale to get broader insights. Some managers/owners were not willing to participate in the study which made it difficult to collect data from all 300 respondents as proposed.

5.7 Suggestions for future research

The study only focused on SMMEs in Tshwane Metropolitan Municipality. To get a more holistic view of BIS adoption on SMMEs, future studies could be based on a bigger sample. There is a need for future studies to also include BIS tools currently used by SMMEs. This study explained BIS adoption using TAM, DOI, and TTF models. Future studies can explain BIS adoption from other model theories' perspective. It is recommended that future research should be carried out to investigate how the government can play a role in BIS adoption by SMMEs.

5.8 Chapter summary

To achieve the aim of the study, the research objectives were identified. The first objective was to identify the challenges that are currently experienced in BIS adoption. The second objective was to identify why BIS is vital to a business' success. The third research objective was to propose a conceptual framework suitable to the South African context to guide the adoption of BIS in the SMMEs grocery retail sector. The fourth research objective was to refine the proposed framework based on the findings of this study.

From this study, it was found that the cost of acquiring BIS, lack of knowledge and skill, and lack of awareness of BIS tools were challenges faced by SMMEs in adopting BIS. Small businesses are faced with challenges of high costs in purchasing, implementing, and maintaining the BIS. The study also found that some businesses are aware of BIS, but they simply cannot afford it. The lack of suitably skilled employees and managerial staff with enough knowledge is a significant factor that determines the adoption and use of BI systems (Otieno, 2015). Furthermore, SMMEs are not well-informed on the recent technologies and the benefits thereof.

The study found that BIS is vital to business success by improving customer service, reducing operational costs, increasing revenue, increasing employee productivity, improving decision making, and increasing sharing of information. BIS provides tools that enable the sharing of information in organizations, which in turn, impact greatly business decisions. Through increased sharing of information, effective communication which enables great employee engagement is achieved. Furthermore, BIS enables management to make fact-based decisions quickly and improves the outcomes of their decisions. Employees can make use of BIS for their daily tasks to improve efficiency and productivity. BIS provides the tools to assist the management in increasing efficiency, resulting in profit and fewer expenses.

A conceptual framework for this study was developed by integrating DOI, TAM, and TTF. The general argument for combining the models is that they capture different aspects of users` choices to adopt BIS. The conceptual framework aims to provide an understanding of the factors that influence BIS adoption in SMMEs retail organizations. The conceptual framework included 7 constructs which are: observability,

trialability, perceived BIS ease of use, perceived BIS usefulness, task characteristics, BIS characteristics, and task technology fit. Multiple regression was used to test the proposed hypothesis. The refined proposed framework illustrates that observability, trialability, perceived BIS ease of use, and perceived BIS usefulness are all positively correlated to BIS adoption. Furthermore, the framework also shows that BIS characteristics and task characteristics positively influence task technology fit. However, task technology fit was found to not influence BIS adoption.

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Annexure A: Proposed work plan

Tasks	**DATES**																		
	2019								2020										
	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Writing proposal																				
Submission of proposal and corrections																				
Proposal presentation																				
Correction of the research proposal																				
Writing chapter 1 and making changes																				
Writing chapter 2 and making changes																				
Writing chapter 3 and making changes																				
Data Collection																				
Data analysis																				
Writing chapter 4 and making changes																				
Writing chapter 5 and making changes																				
Review and editing all chapters																				
Proofreading and editing																				
Finalization of the dissertation																				
Final Submission																				

Annexure B: Letter of consent

Statement of Agreement to Participate in the Research Study:

- I……. hereby confirm that I have been informed by the researcher, ASHLYN ENNIE STUBBS MULEYA, about the nature, conduct, benefits, and risks of this study - Research Ethics Clearance Number:
- I have also received, read, and understood the above-written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my gender, age, and level of education will be anonymously processed in the dissertation.
- Given the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I am free at any stage, without prejudice, to withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare that I am prepared to participate in the study.
- I understand that significant new findings developed during this research which may relate to my participation will be made available to me on request.

Full Name of Participant Date Time Signature

……. …… …… ……..

I, ASHLYN ENNIE STUBBS MULEYA, herewith confirm that the above participant has been fully informed about the nature, conduct, and risks of the above study.

Full Name of Researcher Date Time Signature

……. …… …… ……..

Full Name of Witness (if applicable) Date Time Signature

……. …… …… ……..

Annexure C: Participant letter of information

My name is **ASHLYN ENNIE STUBBS MULEYA**, a postgraduate student doing Master of Commerce in Business Information Systems at the University of Venda in South Africa. I am currently conducting a study entitled: "A business intelligence systems adoption model for the small, medium and micro-enterprises grocery retail sector: A case of Tshwane Metropolitan Municipality". This study is aimed at coming up with a framework that could be used by SMMEs in the grocery retail sector in South Africa to improve their efficiencies and service delivery. This research reviews the concept of business intelligence systems (BIS) in the SMMEs grocery retail sector, the current state of BIS adoption, use, potential benefits and challenges of BIS adoption, BIS capabilities, currently used BIS technologies and techniques in this sector. I am therefore kindly inviting you to participate in this study as a respondent.

The following ethical conditions and procedures (together with those in the consent letter below) will be followed: permission to conduct this study was sought from the University of Venda Research Ethics Committee; a consent letter will be presented to all participants of this study as they are required to familiarize themselves with the scope and purpose of the study and their rights before participation. Also, note that your participation in this study is voluntary and valuable to its successful completion. Please note that this is an academic research and that there are no financial rewards for participation. Should you feel that you are unable to continue for some reason, you may withdraw at any time. The data being collected is anonymous and will be treated with a high degree of confidentiality. All data being collected contributes towards the right-up of the final dissertation and will be presented generically and anonymously.

If you agree to participate, please answer the research questions on the questionnaire. On average, this questionnaire will take between 15-20 minutes to complete. I thank you for your participation in this study and for making it a success. If you have any concerns, you are free to contact me or my research supervisor on the details below:

Researcher name: ASHLYN ENNIE STUBBS MULEYA
Email: ashymuleya@gmail.com
Phone: 082 062 0610
Research Supervisor: Dr W. Munyoka
Email: Willard.munyoka@univen.ac.za

Annexure D: Research questionnaire

Research Questionnaire

My name is Ashlyn Muleya, a Master's student at the University of Venda, in the Department of Business Information Systems. I am conducting a study titled **"A BUSINESS INTELLIGENCE SYSTEMS ADOPTION FRAMEWORK FOR THE SMALL, MEDIUM AND MICRO-ENTERPRISES GROCERY RETAIL SECTOR: A CASE OF TSHWANE METROPOLITAN MUNICIPALITY"**.

This study is aimed at coming up with a framework that could be used by SMMEs in the grocery retail sector to improve their efficiencies and service delivery.

Please note that your participation is voluntary and valuable to the success of this study. Also, note that this is an academic research and that there are no financial rewards for participation. Should you feel that you are unable to continue, you may withdraw at any time. The data being collected is anonymous and will be treated with a high degree of confidentiality. All data being collected contributes to the right-up of the final dissertation. Thank you for your assistance in this important endeavour.

For each item below, please show your best and honest response applicable by making a clear cross (X) on the circle provided next to your response (Please choose only one alternative).

Section A – Demographic Information

1. **What is your gender?**

☐ Male

☐ Female

2. **What is your age group?**

☐ 20 – 29

☐ 30 – 39

☐ 40 - 49

☐ 50 and above

3. **Which of the following describes your role in the organization?**

☐ Owner

☐ Manager

☐ Both

☐ Other (please specify) ……

4. How many years of experience do you have in using the Business Intelligence System?

☐ 2 years or less

☐ 2 – 5 years

☐ 5 years or more

☐ No experience

5. How many employees are employed in your organization?

☐ 1 - 10

☐ 10 – 30

☐ 31 – 50

☐ 50 and above

6. What is your highest qualification?

☐ Matric

☐ Diploma

☐ Degree

☐ Post-graduate

☐ None

Section B – Business Intelligence System adoption and usage

7. Are you knowledgeable about Business Intelligence Systems?

☐ Yes
☐ No

8. To what extent does your business use business intelligence systems?

☐ Not at all

☐ Very little

☐ Average

☐ Very much

9. **What barriers/challenges is your business facing when adopting business intelligence systems? (Select all that applies)**

☐ Cost of acquiring and using Business Intelligence Systems
☐ Lack of knowledge and skills
☐ Not aware of the Business Intelligence Systems tools
☐ Other (please specify) …….

10. **What benefits is your company deriving from business intelligence adoption? (Select all that applies)**

☐ Improve customer service

☐ reduced operational costs

☐ increased employee productivity

☐ increased revenue

☐ improved decision-making

☐ increased sharing of information

☐ not applicable

For the following Sections, please indicate your level of agreement with the following statements.

(*Where: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree*)

Section C - Task characteristics

Number	Statement	SD	D	N	A	SA
11	I need Business Intelligence Systems to assist with completing my tasks					
12	My decision tasks are dependent on me receiving accurate information from others					
13	I frequently must coordinate my task activities with others					

Section D - Business intelligence characteristics

Number	Statement	SD	D	N	A	SA
14	Business Intelligence Systems increase my decision-making.					
15	Business Intelligence Systems allow information to be readily accessible.					
16	Business Intelligence Systems produce information of high quality.					
17	Business Intelligence Systems can flexibly adjust to meet new demands.					

Section E -Task technology fit

Number	Statement	SD	D	N	A	SA
18	The capabilities of Business Intelligence Systems make the performance of my tasks to be easy.					
19	The capabilities of Business Intelligence Systems are compatible with my task requirements.					
20	The functions of Business Intelligence Systems are very adequate.					
21	In general, the capabilities of Business Intelligence Systems are best fit with my task requirements.					

Section F - Perceived ease of Business Intelligence Systems use

Number	Statement	SD	D	N	A	SA

22	Learning to use new features on the Business Intelligence Systems is easy.					
23	It takes too long to learn how to use Business Intelligence Systems to make it worth the effort.					
24	It is easy to interact with the Business Intelligence Systems.					
25	In general, Business Intelligence Systems are easy to use					

Section G -Perceived Business intelligence Systems usefulness

Number	Statement	SD	D	N	A	SA
26	Using Business Intelligence Systems will improve company performance.					
27	Using Business Intelligence Systems will improve employee`s performance.					
28	Using Business Intelligence Systems improves the quality of the job.					
29	In general, I find Business Intelligence Systems useful in my company.					
30	Using Business Intelligence Systems helps to accomplish tasks more quickly.					

Section H – Trialability

Number	Statement	SD	D	N	A	SA
31	I want to use Business Intelligence Systems on a trial basis to see what it can do for me.					
32	I have had the opportunity to test the Business Intelligence Systems and found it interesting.					

33	I want to try to make use of Business Intelligence Systems for at least one month.					
34	I enjoy learning new technology.					

Section I – Observability

Number	Statement	SD	D	N	A	SA
35	I have seen the use of Business Intelligence Systems outside the company.					
36	I can see the effect of Business Intelligence Systems in my company.					
37	I can think of several people who have invested time and money in Business Intelligence Systems.					
38	It takes a long time to learn using Business Intelligence Systems.					

Thank you for completing this questionnaire.

Annexure E: Ethics approval certificate

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Ms AES Muleya

STUDENT NO:
15003923

PROJECT TITLE: **A business intelligence systems adoption model for the small, medium and micro-enterprises grocery retail sector: a case of Tshwane metropolitan municipality.**

PROJECT NO: SMS/20/BIS/05/0807

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr W Munyoka	University of Venda	Supervisor
Prof A Kadyamatimba	University of Venda	Co - Supervisor
Ms AES Muleya	University of Venda	Investigator – Student

Type: Masters Research
Risk: Minimal risk to humans, animals or environment
Approval Period: July 2020 – July 2022

The Research Ethics Social Sciences Committee (RESSC) hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- The project leader (principal investigator) must report in the prescribed format to the REC:
  - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project
  - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, .the project leader must apply for approval of these changes at the REC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project,
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately,
  - New institutional rules, national legislation or international conventions deem it necessary

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE
Date Considered: July 2020

Name of the RESSC Chairperson of the Committee: Mashau Takalani Samuel

Signature:

Director Research and Innovation

Signature: .....

UNIVERSITY OF VENDA
OFFICE OF THE DIRECTOR
RESEARCH AND INNOVATION
2020 -07- 28
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