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Framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury.

Item Type	Thesis
Authors	Mashaphu, Thabang Shirley Mochelo
Publisher	Tshwane University of Technology
Rights	CC0 1.0 Universal
Download date	2025-05-21 07:51:08
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**FRAMEWORK FOR IMPROVING INTERNAL AUDIT EFFECTIVENESS IN SUPPLY
CHAIN MANAGEMENT FRAUD PREVENTION IN THE GAUTENG PROVINCIAL
TREASURY**

by

THABANG SHIRLEY MOCHELO MASHAPHU

A research thesis

submitted in fulfilment of the requirements for the degree of

DOCTOR OF BUSINESS STUDIES

in

Auditing

in the

FACULTY OF ECONOMICS AND FINANCE

at the

TSHWANE UNIVERSITY OF TECHNOLOGY

SOUTH AFRICA

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November 2023

DECLARATION

I declare that the thesis titled: *FRAMEWORK FOR IMPROVING INTERNAL AUDIT EFFECTIVENESS IN SUPPLY CHAIN MANAGEMENT FRAUD PREVENTION IN THE GAUTENG PROVINCIAL TREASURY*, hereby submitted to the Tshwane University of Technology, for the degree of Doctor of Business Studies, has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.



.....

SIGNATURE
(MS TSM MASHAPHU)

16 February 2024
.....

DATE

DEDICATION

This study is dedicated to my late maternal grandparents Ntebeng and Nchimeleng Mokonyama and to my parents, Mavis and Freddy Mashaphu. The success of this thesis is because of the care, love and support you have shown me throughout my life.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank God for granting me the strength, wisdom and courage to successfully complete this PhD journey.

Words cannot begin to describe the gratitude and joy I have in my heart for those who have been with me while completing this study. I am humbled by the support and encouragement I have received from numerous people throughout my PhD journey.

My appreciation goes to my amazing husband, Dr Ralph Mathekga, and to my beautiful children Gopakilwe, Golaotswe and Kwena. Thank you for understanding that Mommy had to work on the thesis when I could not be with you. You are my greatest blessings. Golaotswe and Kwena; you were not yet born when I started this PhD journey: I am grateful that I managed to complete the project even after you were born. Ralph, a great thank you for your support, words of encouragement and belief in me. You had faith in me and always assured me that I will get it right and that I can do it. Thank you for always being my pillar of strength.

To my mother, Mavis Mashaphu, my eyes are filled with tears of joy and gratitude when I think of your tremendous support throughout this journey: you prayed for me more than I prayed for myself. This achievement wouldn't have been possible without your prayers, to say nothing of your willingness to assist in looking after the children when I had to work on my studies. My siblings, Karabo and Odirile Mashaphu, I thank you for your support, love and prayers throughout this journey. It meant the world to me.

I would also like to extend my gratitude to my two supervisors, Dr KN Motubatse and Professor CC Ngwakwe. This achievement wouldn't have been possible without the two of you. Thank you for your support and guidance throughout. It was an absolute honour to know you both. Dr Motubatse, thank you for believing in me: even when I doubted myself, your encouragement is what kept me going. Thank you for allowing me to grow academically under your guidance. I have learnt a lot from you.

Mr. Mukhethwa Londani, thank you for your assistance and support during the data analysis stage of this study. Your guidance through the statistical analysis made me believe that I too, can do it just like the statisticians.

Lastly, but most importantly, I would like to thank the Gauteng Provincial Treasury for allowing me to conduct the study in the Department. Without you, this thesis would be incomplete. I am grateful. Thank you.

ABSTRACT

Amongst other roles, the internal audit function should provide assurance that the internal controls that are in place are adequate to mitigate fraud risk, and to ensure that the supply chain management goals in the public sector are met. However, the role of internal audit as a management control element in the public sector has not been thoroughly researched in current academic literature, and this has motivated the researcher to bridge this knowledge gap. Other studies have looked at the effectiveness of internal audit in the public sector on fraud prevention and detection. Thus, the objective of this study was to examine the extent of internal audit's effectiveness in curbing supply chain management fraud in the Gauteng Provincial Treasury. Its second aim was to contribute to the body of academic literature through the development of a framework for monitoring internal audit's effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury.

The study was carried out using a mixed-methods research approach and by following a sequential explanatory design. A survey questionnaire was used to collect both quantitative and qualitative data from the selected participants who were all internal auditors in the Gauteng Provincial Treasury. The study was conducted using a questionnaire, and the questions were a mix of closed-ended questions and open-ended questions, the open-ended questions being intended to allow respondents the chance to elaborate on their thoughts. The study targeted all 112 internal auditors in the Gauteng Provincial Treasury, but with a response rate of 36.6%, it meant only 41 participants returned completed questionnaires. The quantitative data was analysed using Statistical Package for the Social Science (SPSS), version 27.0. Both descriptive and inferential statistical analyses were carried out to understand whether demographic elements had a bearing on the results as well as perceptions of the role of internal audit in supply chain management fraud prevention in the Gauteng Provincial Treasury. Qualitative data was used to identify themes, and these were manually generated and then analysed. The findings that emerged from the descriptive statistics evaluating the effectiveness of supply chain management systems in the Gauteng Provincial Treasury, showed that the main contributing factors to fraud risk in supply chain management are associated with greed, bribery, poor controls and monitoring, and weakness in the system. Pressure, in this analysis, is political, and service delivery pressure and the opportunity to commit

fraud are the major weaknesses in the system. Upon examining the effectiveness of internal audit in detecting and preventing supply chain management fraud, the results indicate that internal audit is effective in identifying fraud in supply chain management. The results further indicate that participants agree and strongly agree that internal audit assists in the monitoring process for the supply chain management system and provides assurance to management with regard to controls intended to manage fraud risks in supply chain management. Exploratory factor analysis also confirms (with a significance level above 0.5) internal audit's effectiveness in SCM fraud prevention and detection in the Gauteng Provincial Treasury. These findings show that there is strong evidence to conclude that the majority of participants believe that internal audit is effective in detecting SCM fraud. Further, the Cronbach alpha coefficient also signifies the internal consistency of each of the identified factors (as suggested in the literature), at a level of 0.5 (acceptable). The results of the qualitative phase illustrated strong views that the internal audit function has the capability to detect and prevent fraud risks in supply chain management.

The study contributes to the literature from two perspectives: firstly, this is the first empirical study on the effectiveness of internal audit in minimizing supply chain management fraud in a government treasury department within the South African context. Secondly, the study's main contribution is the development of a new framework for measuring internal audit effectiveness in supply chain management fraud prevention. This framework offers a significant and useful tool for use in the public sector, and advances the academic theory underpinning internal audit, thus contributing to understanding of the role of internal audit in fraud prevention. Additionally, making use of the framework can identify improvements in internal audit's effectiveness in supply chain fraud prevention in the public sector environment, as well as identifying improvements to the framework itself.

As a result of conducting this research, the conclusions drawn and proposals put forward from this study show that SCM custodians should strive to be consistent in the application of regulations and should collaborate with internal audit to identify fraud indicators and thus trigger efforts to prevent fraud. It is worth remembering that the role of internal audit is not to investigate fraud, but to evaluate risks and provide reasonable assurance that the organisation has taken adequate

measures with regard to implementing internal controls, and that risks are therefore being mitigated and minimized.

After a close inspection of internal audit and its rules, and engaging with existing literature, plus analysis of questionnaire responses and respondent interviews, it is apparent that internal audit should be providing assistance through regular monitoring of the SCM process. Thus, robust internal audits within the supply chain should address aspects such as fraud investigations, and the evaluation of anti-fraud mechanisms, as well as providing training to the bidding committee members. The detection of fraud is a necessary first step to preventing future occurrences as management, with insights from internal audit, may be able to assess how to prevent the particular fraud in future. And, with successfully implemented preventions, the opportunities for fraud are reduced. The major role of internal audit in the prevention and detection of fraud is to understand the techniques and mechanisms by which fraud is manifested, and then to establish that the entity's evaluation of the risk of fraud, and its controls in mitigation thereof, are sufficient and performed at the right intensity. It is self-evident that internal audit is an anti-fraud control tool, and for internal audit to be more effective in fraud prevention and detection the entity must start by using common tools such as whistle-blower policies and fraud control policies more effectively and consistently, as well as maintaining an up-to-date record of already identified fraud risks.

Although the study used the Gauteng Provincial Treasury for the analysis, the framework that was developed could be used in all public sector environments. Further research on the framework should be done and the results shared, to increase the knowledge of internal audit's beneficial involvement in supply chain management, and thus to improve the practice of public sector auditing. Further studies are needed to expand the role of internal audit in improving the effectiveness of supply chain management systems in the public sector environment. Internal audit is able to provide business leaders with appropriate frameworks to develop an effective supply chain risk management programme. Additionally, internal audit could assess the likelihood that the risks identified in the supply chain will occur.

One of the limitations of the study relates to the uniqueness of the target population. Further research and replication of this study in a different sector could thus help provide additional

evidence in support of, and a beneficial comparison of the results. This would also help develop the framework guiding the role of internal audit in fraud prevention and detection in supply chain management. Existing theoretical frameworks were examined and served as a roadmap for this thesis. In other words, this thesis has grown out of earlier research, and as such, in future it will be necessary to reassess and expand the theory and revise the framework/model to address new theories as they emerge. It is also recommended that future studies address the effects of specific roles of internal audit in relation to new events and the emergence of new fraud risks, using the current study as their starting point.

Finally, the study recommends that the internal auditors should be involved in the entire supply chain management process, to work hand in hand with the custodians of the supply chain management process. This recommendation is made despite the fact that, under normal circumstances, the internal audit function would only become involved after management had already set up the operational aspects of the supply chain management process, in order to evaluate the processes for any possible fraud risks.

Keywords: Supply chain management, internal audit, fraud risk management, public sector, Treasury, fraud prevention and detection.

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CHAPTER 1

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

This chapter introduces the research undertaken to develop a framework for improving internal audit effectiveness in supply chain management fraud prevention, with specific reference to the situation in the Gauteng Provincial Treasury. The next sections address the background of the study, the problem statements, the aim of the study, its research objectives and the research questions, motivation for the study, and definitions of key concepts. The chapter concludes with a summary of the rest of the chapters in this study.

1.2 BACKGROUND TO THE STUDY

Supply chain management (SCM) has never been a more topical and important subject of debate in the public sector than it is today. It is a critical issue due to its vulnerability to fraud risks (Maharaj & Karodia, 2013; Mantaris, 2014; Mu & Carroll, 2016; Pillay, 2016; Odeku, 2018). SCM has been seen globally as a fast-growing business activity as it attempts to address supply shortages (Christopher, 2022), logistics issues (Bowersox et al., 2020), geopolitical events (Sodhi & Tang, 2021), skills shortages (Mafunisa, 2014), and cope with perpetual cost increases. It is a critical business activity, but vulnerable to external fraud risks and corruption (Maharaj & Karodia, 2013; Mantaris, 2014; Mu & Carroll, 2016; Pillay, 2016; Odeku, 2018).

Given that almost all of these risks can be present within the public sector's procurement systems, SCM becomes increasingly important in supporting government projects intended to achieve any service delivery objectives. In recent years, the South African public sector has been shaken by the growth of fraud and corruption (Tickner, 2017; Bhorat et al., 2017). The financial impact of fraud and corruption were recently reported by the Auditor General as "significant" (Auditor General South Africa, 2018). The major factors contributing to fraud in the public sector comprise the elements reported under the heading of irregular expenditure (Motubatse & Ngwakwe, 2020). Despite government (both national and provincial levels) trying to address fraud risks in the areas

of supply chain management more effectively, the Auditor General (2018) reported that government's irregular expenditure had already risen to billions of Rands across the country (Auditor General South Africa, 2018). The Auditor General (2018) states that irregular expenditure represents expenditure incurred towards procurement of goods and services without following prescribed processes. While the controls that should be in place in the procurement process are derived from the constitutional requirements of supply chain management, as set out in section 217 of the Constitution (Republic of South Africa, 1996), this does not seem to be happening effectively.

Internal audit is critical to the achievement of effective evaluation of internal control and risk management within financial management units in the public sector (National Treasury, 2009). The definition of internal audit itself shows that internal audit helps an organisation accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes (Institute of Internal Auditors, 2023c). Therefore, the internal audit function, if efficiently conducted, can be seen as the primary line of defence against fraud within public sector organisations by detecting and preventing fraud risks (World Bank, 2017). As acknowledged by Coram et al. (2006) and Jeppesen (2019), the internal audit function plays an important role in fraud prevention and detection. Petraşcu & Tieanu (2014) argue that the internal auditor's role in fraud prevention and detection can trace its origins almost to the dawn of recorded history as there have always been men making use of tricks, manipulation and deceit in order to acquire money, land, goods, or trust, with the overall objective of making better than normal profit. This situation provides evidence that internal audit has always had plenty of opportunity to add value to businesses through improving the control and monitoring environment within organisations by detecting fraud (Coram et al., 2006).

Given the global recognition of the role of internal audit in prevention and detection of fraud risks, the United Nations (2017) nevertheless reported that the common issue underlying fraud risk was with supply chain management where 42% of fraud was associated with non-compliance with procurement systems. Fraud prevention is thus a separate issue from the completed crimes. Fraud prevention takes place before the fraud can take place, while fraud detection takes place after the fraud has been carried out. This means that preventative controls must be in place if the business

entity is to reduce the risk of fraud. As fraud detection takes place after the fraud has been committed, the entity must put detective controls in place to mitigate fraud.

According to KPMG (2017), supply chain fraud can be committed by individuals or through collusion between several individuals and organisations. Furthermore, KPMG (2017) indicated that 65% of the frauds surveyed were perpetrated by the employees of the victim organisation, with only 35% being perpetrated by parties external to the organisation. While employees who commit fraud are usually able to exploit/distort records or to influence the operations of the organisation, external parties that commit fraud against an organisation may involve former employees, suppliers, or non-related external parties who have identified weaknesses in the internal controls of the organisation.

Organisations usually incur huge financial losses in cases where an employee has committed fraud. However, it may be very difficult to identify or detect fraud in instances where employees conspire with competitors or external parties. Generally, an organisation is at a higher risk of fraud when three (3) aspects of the so-called fraud triangle are present. The three (3) aspects are rationalization of fraud; opportunity to commit fraud, and pressure to commit fraud (Schuchter & Levi, 2016). Due to the complexity of supply chain operations, there are numerous opportunities for employees and/or external parties to commit fraud (Maharaj & Karodia, 2013; Mantaris, 2014; Mu & Carroll; 2016; Pillay, 2016; Odeku, 2018). The potential perpetrators may try to identify weaknesses in the supply chain which can occur at any/all phases of the process within the supply chain's process. The scope extends from the purchase of raw materials to the processing of inventory returns. Typical schemes of supply chain fraud include: kickbacks on the purchase of raw materials; improper utilisation of production assets; counterfeiting and sale of goods on grey markets; improper rebates; misappropriation of raw materials or finished goods; fraudulent disbursements and inventory fraud (KPMG, 2017).

As Mashele and Chuchu (2018) recognise, the regulatory universe includes anti-bribery and corruption provisions; child labour laws, import and export laws, and health and safety regulations: their collective aim is to mitigate misconduct in the supply chain's processes. However, organisations, as well as their external service providers, may try to bypass the regulations in order

to generate operational efficiencies or cost savings. The lack of compliance with regulations can have major effects on a supply chain such as manufacturing shutdowns; failure to meet customer demands; poor quality products and service; damage to brand and reputational loss, and loss of market share. Therefore, any irregular practices within the supply chain can easily distract management from their core business focus, as well as negatively affect the productivity of the organisation. It is thus important for organisations to understand the vulnerability of the supply chain to fraud, and to take proper actions to deter and detect fraudulent activities in the supply chain (Khoza et al., 2022).

As stated earlier, supply chains are vulnerable to fraud, and they are affected by changes in customer needs, supply and demand fluctuations, as well as local pricing issues and arbitrage opportunities within supplier networks. Most successful organisations take legitimate and responsible advantage of these factors as opportunities to enhance their businesses (KPMG, 2017). However, there will always be a risk of fraud due to the complex environment of the supply chain and the fact that internal controls are not always properly designed or enforced. KPMG's (2017) report further indicates that, since supply chain processes have evolved and become more complicated to meet the needs of global organisations, it has become more difficult to ascertain whether critical fraud controls are being effectively implemented throughout the entire supply chain.

According to KPMG (2017), in order to manage the fraud risks successfully within an organisation, it is crucial for the organisation to implement appropriate measures that monitor and control activities within its supply chain. This needs an integrated approach which combines fraud prevention elements, detection, and incident response, together with program maintenance. As Venter (2007) emphasizes, the high occurrence of supply chain management fraud requires the organisation's management, its risk manager and internal auditor to collectively address the fraud risks effectively, within the organisation's risk management framework and risk tolerance. The fraud risk management process may thus serve as a comprehensive framework for risk managers and internal auditors to mitigate the organisation's exposure to supply chain management fraud.

In the real world, while fraud detection and prevention have long been part of the internal audit function's responsibilities, internal auditors still do not have sufficient skills to demonstrate an understanding of the fraud risks relating to supply chain management in the public sector. This study thus aims to investigate the role of internal audit in fraud prevention and detection in supply chain management (Maharaj & Karodia, 2013; Mantaris, 2014; Mu & Carroll, 2016; Pillay, 2016; Odeku, 2018). Mukhamedjanova (2020) describes supply chain management as the combination of crucial business processes from the end-users through suppliers of products, services and information, that add value to customers and other stakeholders. Douglas (2008) states that, in order for supply chain management to be a success, it requires a cross-functional integration within the organisation, as well as across a range of organisations that make up the supply chain. The goal of an internal audit function in any organisation is thus to assess and enhance the processes of risk management: however, it does not coordinate the organisation's risk management efforts.

Management in an organisation is primarily accountable for risk management, while internal auditors are responsible for assisting in the development of the risk management process (Abiodun, 2020). While external audit focuses on providing an opinion on the fairness of financial statements, internal audit focuses on adding value and improving the organisation's operations as a whole. Kagermann et al. (2013), state that internal audit serves as a support system for management. This means in practice that internal audit enables management in large production systems to delegate its oversight function to the internal audit function. This is crucial, as there may be a rapid growth of the operating environment due to automated data processing, and there may be no resources to perform quality audits.

Jarah et al. (2022) argue that internal auditors do not prioritise supply chain risk sufficiently highly on their list of priorities; supply chain risk is routinely regarded and measured as low risk. Supply chains in which the risks are treated as high impact easily gain market share and thus the loyalty of their customers, create shareholder value and improve the strategic capability of their organisations.

Mageto (2021) indicates that supply chain integrity may be enhanced by developing a model or structured approach to guide ongoing risk identification and management. This would enable organisations to deal with supply chain risks proactively and systematically. This then would result

in a stronger organisation and ensure protection of the brand against supply chain risk. Pasula et al. (2013) further state that internal audit can support the organisation's success and security by accurately assessing and comprehending supply chain processes, including their advantages and disadvantages in both emerging and mature markets; validating monitoring programs; liaising with the organisation's supply chain experts to assist in developing an effective monitoring process; assisting in identifying which suppliers are crucial to operations, and evaluating which suppliers may be vulnerable to threats. Internal audit's evaluation of the supply chain is therefore able to assist an organization in finding solutions to critical questions relating to managing their supply chain, and so doing, to achieve business excellence.

According to Baharud-din et al. (2014), some of the weaknesses and irregularities associated with supply chain management involve serious violations of established financial management guidelines and procedures, such as poor planning of procurement. These irregularities may also include non-compliance with regulations and policies, and result in irregular expenditure because of these transgressions. Pasula et al. (2013) state that in order for supply chain management to be a success, it requires cross-functional integration within the organisation, as well as across the chain of organisations that make up the supply chain. According to Pasula et al. (2013), management is primarily accountable for risk management, while internal auditors are responsible for assisting in the development of the risk management process. In a similar way, the National Treasury (2015) states that accounting officers or authorities must refer irregular expenditure to internal audit units to establish the facts about the transaction and to obtain informed recommendations on the next steps to be taken, if they suspect fraudulent, corrupt, or criminal acts to have occurred. Therefore, according to Mathee (2005), such coordination efforts will ensure that the organisations benefit from enhanced protection against fraud risks. Pasula et al. (2013) also recognise that internal auditors are best situated to assess supply chain processes for effective internal controls intended to prevent, detect and correct non-compliance with legislation.

1.3 PROBLEM STATEMENT

Financial management policies such as the Public Management Finance Act (PFMA) (Act 1 of 1999) and the Municipal Finance Management Act (MFMA) (Act 56 of 2003) are the cornerstones of supply chain management in the South African public sector environment. However, the

realisation of fraud risk continues to undermine the financial management systems of all public sector entities (Rezaee, 2002; Kranacher & Riley, 2019; Hashim et al., 2020; Kassem, 2022), and this risk is often mismanaged by both executives and accounting officers (Ambe & Badenhorst-Weiss, 2012). Research indicates that, while both management and executive authorities are managing and overseeing the supply chain management systems (Ambe & Badenhorst-Weiss, 2012; Munzhedzi, 2016), factors such as poverty (Dorminey et al., 2012), greed (Kassem & Higson, 2012), bribery (Murray, 2014; Hashim et al., 2020), poor controls (Zakaria et al., 2016); weakness in the financial systems (Donelson et al., 2017), service delivery pressures (Powell, 2008), and political pressure (Levi, 2013; Mansor & Abdullahi, 2015) are very much present in the supply chain management ecosystem, and difficult to manage at that level. There is consensus in the research literature that supply chain management is inseparable from the risk of fraud (Dzomira, 2015), corruption (Liu et al., 2021; Kim & Wagner, 2021), and unethical practices (Simangunsong et al., 2016), with notable researchers even arguing that fraud risks are the most pervasive and intractable challenges in the public sector environment (Douglas, 2018). Moreover, the literature indicates that fraud risk is but another manifestation of unethical behaviours (Mazibuko & Fourie, 2017) and greed (Sarna, 2010; Kassem & Higson, 2012). Researchers in general are of the view that to have effective supply chain management, the internal audit function needs to be more proactive in the evaluation of controls (Agyemang, 2016), risk identification (Lam, 2014) and governance processes (Brown & Osborne, 2013). Supply chain management in the public sector environment is central to service delivery (Ambe & Badenhorst-Weiss, 2012), and is directly related to the quality of the services that the government provides. Supply chain management is dependent on fully functional and competent financial management (Lundu & Shale, 2015), and is the key mechanism enabling the government to implement policy (Ambe & Badenhorst-Weiss, 2012).

The role of internal audit is poorly understood (Byrne, 2014; Roussy & Perron, 2018), their expertise is poorly deployed, and their advice ineffectively executed, particularly across the public sector. Sibanda et al. (2020) point out that there is increasing evidence that the internal audit functions are not being effectively used as a management control instrument to evaluate the fraud risks in supply chain management. This is borne out by several recent accounting crises, and internal auditing has emerged as a major force in supporting effective controls and risk

management (Christopher, 2019; Jarah et al., 2022), despite being frequently ignored. At the same time, SCM has become a critical component of an organization's competitiveness and effectiveness (Yusnaini et al., 2020). Jarah et al. (2022) point out a significant correlation between recognising the importance of internal audit and effective supply chain management.

According to the World Bank (2017), maintaining internal controls is the best way public sector organisations can mitigate fraud. A number of literature reviews have highlighted the role of internal audits in fraud prevention and detection in the public sector (World Bank, 2017; Petraşcu & Tieanu, 2014; Coram et al., 2006). However, fraud and corruption remain prevalent in many public sector organisations in South Africa. This is mainly due to a lack of transparency in supply chain management, poor procurement processes, weaknesses in internal controls and a lack of decisive leadership. Leadership appears unable to address the underlying lack of accountability and is seen as reluctant to initiate disciplinary action against those who have flouted basic processes (Kakwezi & Nyeko, 2019). By some estimates, public organisations have experienced an almost 40% increase of irregular expenditure over the last three years. The main reason for this increase in irregular expenditure has been identified as the continued non-compliance with supply chain management legislation and widespread lack of accountability. In response to this situation, Othman et al. (2015), indicate that internal auditors in the public sector have an important role to play in the prevention and detection of fraud.

Despite the recognition of the role of internal audit in strengthening the governance, internal controls and risk management in the South African public sector (National Treasury, 2009), there is apparently still no research which (to the best of this researcher's knowledge) has empirically investigated how internal audit can prevent supply chain management fraud in the public sector. While the above problem has been identified, corruption still exists in supply chain management, even after considerable effort has apparently been expended on considering measures to prevent fraud and corruption. The solution to the above problem may perhaps be resolved by actually using internal audit's expertise (and not just as a knee-jerk, tick box exercise), by involving/embedding internal auditors in the entire supply chain management process, and working hand-in-hand with the custodians of the supply chain management process. This will assist in reducing the number and severity of findings at the end of each audit. Reducing the findings/problems is thus mainly

achieved by having a checker to check the checker. For example, when a bid to procure goods/services is being advertised, internal audit should be required to ensure that prescribed policies and procedures are complied with, before the bid is published/advertised. Under normal circumstances, an internal audit would only occur according to a specific, predetermined time frame, or in response to a fraud event. But, should this audit be done before a major process is finalised, (and out of step with the formally scheduled audits), the risks are more likely to be effectively mitigated. The objective of this study is therefore to address the apparent gap in the South African literature on the role of internal audit in preventing supply chain management fraud following a rigorous empirical means of emphasis. In addressing the identified gap in the literature, this study will develop a framework for using internal audit as a management control, to prevent incidents of fraud in supply chain management.

1.4 RESEARCH QUESTIONS

Arising from the problem statement above, the fundamental question upon which this research rests is this: how effective are supply chain management systems (including internal audit) in detecting and preventing supply chain management fraud in the Gauteng Provincial Treasury? The specific questions directing this research are therefore:

- How effective is the supply chain management system in the Gauteng Provincial Treasury?
- How effective is internal audit in *detecting* supply chain management fraud?
- How effective is internal audit in *preventing* supply chain management fraud?
- What possible framework can be developed for use by internal audit in fraud prevention and detection in supply chain management in the Gauteng Provincial Treasury?

1.5 RESEARCH OBJECTIVES

In line with the above research questions, the general objective of this research is to examine the effectiveness of supply chain management systems, including internal audit, in detecting and preventing supply chain management fraud in the Gauteng Provincial Treasury. Hence, the specific objectives of this research are:

- to evaluate the effectiveness of supply chain management systems in the Gauteng Provincial Treasury;
- to examine the effectiveness of internal audit in detecting supply chain management fraud;
- to assess the effectiveness of internal audit in preventing supply chain management fraud, and,
- to develop a framework to direct the role of internal audit in fraud prevention and detection in supply chain management.

1.6 RESEARCH AIM

The aim of the study is to develop a framework for enhancing internal audit's effectiveness in preventing fraud in supply chain management in the Gauteng Provincial Treasury. The study used the research questionnaire's results to develop a framework that should ultimately help to reduce incidents of fraud in supply chain management processes.

1.7 MOTIVATION FOR THE STUDY

The discussion so far shows that there is broad interest in the role of internal audit (specifically, its degree of effectiveness) in supply chain management fraud prevention, and its role in assisting management in detecting fraud risks in future. However, more research is needed to address the role of internal audit specifically in supply chain management. This thesis seeks to develop a framework to guide the role of internal audit in fraud prevention and detection in supply chain management. This study (and the framework that emerges from it) is seen as necessary and inevitable, especially since the National Treasury, as custodian of supply chain management and financial management policies in the government, remains under incredible pressure to make every Rand count, because government resources are seen to being depleted, and what is left is already fully committed through budget allocations. This study suggests that if supply chain management is not effective, there will be more challenges, and incidents of procurement fraud will become even more difficult to detect and prevent. Thus, the motivation for this doctoral thesis has three different drivers. First, to evaluate the effectiveness of supply chain management systems in the Gauteng Provincial Treasury. Then, to review statutory, legal and policy aspects intended to direct and control supply chain management processes and procedures. These policies seek to ensure a

competitive, fair, transparent, equitable and cost-effective manner to select service providers who are familiar with, and consistent in application of applicable legislation, including at least the Constitution of the Republic of South Africa; the Preferential Procurement Policy Framework Act (PPPFA); the Municipal Finance Management Act (MFMA), and the Public Finance Management Act (PFMA). Having reviewed literature on the effectiveness of the internal audit function, this study was motivated by the fact that internal audit does have a role to play in preventing fraud, and especially when the auditor has additional professional competence and expertise in evaluating and managing fraud-related risks. From a review of the literature it is obvious that internal audit has a role to play in assisting management to ensure that they have effective systems in place to detect and prevent fraud risks and corrupt practices within an organization. Thus, supply chain management has become more effectively integrated into management systems of internal control, as does internal audit in its support of these activities.

The study has also come about because, conventionally, it is not the role of internal audit to directly detect fraud or prevent fraud risks: that is the responsibility of the entity's management. However, given the ongoing incidents of fraud and theft, it is increasingly obvious that "management" needs all the help it can get in addressing this plague, beyond internal audit's reports that "this is risky". Hence, by allowing internal audit to take a proactive role in fraud risk management it could assist management in fraud prevention and detection efforts in supply chain management. Traditionally, internal audit provides assurance to management that the system of internal controls is operating effectively. This is also the purpose of audits of procurement and supply chain management. However, if internal audit were to undertake ongoing/more frequent audit engagements to evaluate the effectiveness of risk management, control and governance processes related to supply chain management fraud risks, this would go a long way in addressing the risks.

The findings of this study's empirical research component have been used to develop an audit framework which, together with ongoing training of internal auditors on identifying fraud risks in supply chain management, should benefit the internal audit profession as a whole. The study will also benefit the National Treasury (as policy custodians on supply chain management in the public sector), by enabling them to improve existing policies and to make more fully informed decisions, guided by the framework.

1.8 DEFINITION OF KEY CONCEPTS

Defining key concepts makes it clearer and easier to understand the meanings and context in which the concepts are used, and thus to avoid ambiguity. The definitions of key concepts that will be used in this study are provided below:

Fraud: Fraud includes activities such as theft, corruption, conspiracy, embezzlement, money laundering, bribery and extortion. Fraud therefore involves the use of deception to dishonestly make a personal gain for oneself and/or create a loss for another (Doody, 2009).

Fraud risk: This is the possibility that an organization could be subject to fraudulent activity (Huefner, 2011; Vona, 2012). According to Power (2013), the emergence of fraud risk arises from inadequate or failed internal control processes or systems, human errors or misconduct.

Fraud prevention: Fraud prevention is a primary control which should lower the likelihood of fraud occurring (Dai et al., 2017). The role of the internal control system in fraud prevention is to prevent all three pre-conditions for fraud to take place (thus, opportunity, rationalisation and pressure) from occurring (Dimitrijevic et al., 2015).

Fraud detection: This refers to a set of processes and analyses that allow businesses to identify and prevent unauthorized financial activity (Bierstaker et al., 2006; Abdallah et al., 2016).

Internal Audit: The Institute of Internal Auditors describes internal audit as an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organisation accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes (Institute of Internal Auditors, 2020). Internal auditors play an important role in holding public sector officials to account by providing independent, objective assessments of whether public resources are being managed effectively to achieve intended results (Saputra & Yusuf, 2019; Volodina et al., 2022). These assessments provide decision-makers with an unbiased perspective on the performance of programmes and policies, as well and emerging risks, and can

therefore help to improve operations (Nagy & Cenker, 2002). The role of the internal audit function in the public sector is to focus on transparency and accuracy of reporting and to increase citizens' trust in reported outcomes (Sawan, 2013).

Irregular practices: According to the English Oxford Dictionary (2010), 'irregular practices' refers to those events or activities which do not conform to the law or regulation.

Public sector: The Institute of Internal Auditors (2013) defines the public sector as a sector that includes government ownership or control of entities and includes organisations that are operated by the government. Van Wart (2016) states that these organisations provide services to their citizens and do not seek to generate profit.

Supply chain management: This refers to all stages that are directly and indirectly associated with meeting the needs of a customer (Mentzer et al., 2001). There are different role players within the supply chain, such as suppliers, manufacturers, distributors, retailers, and customers (Du Toit & Vlok, 2014; Farooque et al., 2019).

Effective internal audit: Internal audit is most effective when its resource level, competence and structure are aligned with organisational strategy, and follow IIA guidance (Institute of Internal Auditors, 2020). Internal auditors are effective when their qualifications, knowledge, skills and professional competencies help them to perform the functions of internal audits (Asiedu & Deffor, 2017). Strong support of management for the work of internal auditors and the audit process makes for the success of the internal audit function (Ta & Doan, 2022).

Provincial treasury: This refers to a treasury which is tasked with providing strategic leadership in financial and fiscal matters in a province, so as to ensure sustainable and inclusive social and economic development of the people of the province so that all may enjoy value-for-money services of the highest quality (Provincial Government of South Africa, 2022). In this research the term is used in reference to the Gauteng Provincial Treasury.

Public sector corruption: Martinez-Vazquez et al. (2007) describe it as a type of corruption in the public sector that begins to emerge where there is any kind of abuse of entrusted power for private gain and takes place within the government or government bodies. According to Koelble (2017), public sector corruption in South Africa is comparable to that found globally in both developed and developing countries.

1.9 CHAPTERS CLASSIFICATION

This study is divided into seven chapters, and a brief overview of the contents of each is provided next.

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

This chapter presents an introduction to the development of a framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. It contains references to literature relevant to supply chain management and the role of internal audit. The background of the study, problem statements, aim of the study, research objectives, research questions, motivation for the study, definition of key concepts, and classification of the chapters are presented.

CHAPTER 2: THEORETICAL FRAMEWORK – AUDITING AND SUPPLY CHAIN MANAGEMENT CONTEXT

This chapter emphasises the direction of the research work as it relates to the theoretical framework. The chapter focuses mainly on the theories underpinning the study. It gives an overview of the auditing philosophy underpinning the study, describes the history of supply chain management, and links the theories to internal auditing (agency theory, stewardship theory, and public interest theory). The chapter then reflects on the problems of conflicts between the theories, and the debates between academics in support of their preferred theories. The chapter concludes with a formal summary of the chapter.

CHAPTER 3: EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT SYSTEMS

This chapter discusses the effectiveness of supply chain management systems. It starts by describing the concept of a supply chain management system, and the key role players in relation to South African government supply chain management systems. The chapter then describes management regulations, policies and procedures relevant to supply chains. The risks faced by supply chain management are also discussed, together with the so-called pillars of supply chain management. This chapter thereafter focuses on the responsibilities of accounting officers, the international perspective on the supply chain management system, and the difference between public and private supply chain management. The chapter concludes with a formal summary of the chapter.

CHAPTER 4: EFFECTIVENESS OF INTERNAL AUDIT IN DETECTING AND PREVENTING SUPPLY CHAIN MANAGEMENT FRAUD

This chapter is divided into 2 sections in which the effectiveness of internal audit in *detecting* supply chain management fraud is examined, whereafter its effectiveness in *preventing* supply chain management fraud is discussed.

Section A starts by defining internal auditing, and evaluates the function's inherent effectiveness, its specific effectiveness in fraud detection in general, as well as specifically in supply chain fraud. It further identifies the signs of fraudulent activities and behaviour and presents strategies to mitigate these fraudulent activities.

Section B starts by assessing how supply chain fraud can be prevented by internal auditors, as the so-called third line of defence, and then evaluates the effectiveness of internal auditing, its fraud prevention efforts, as well as internal audit's abilities to detect supply chain fraud. It further presents the signs of fraudulent activities and behaviour and presents strategies to mitigate fraudulent activities. Lastly the chapter concludes with the summary of the chapter.

CHAPTER 5: RESEARCH DESIGN AND METHODOLOGY

This chapter presents the research design and methodology used to test the research questions outlined in Chapter 1 of the study. The chapter explains and justifies the research design and methodology chosen to evaluate internal audit's role and effectiveness in preventing and detecting supply chain management fraud in the Gauteng Provincial Treasury. The chapter then outlines the rationale for using a mixed method approach to the research. Lastly, a formal summary of the chapter is provided.

CHAPTER 6: DATA ANALYSIS AND INTERPRETATION OF THE RESULTS

This chapter presents the results and the empirical analysis thereof. The chapter analyses the data set from responses to the key research questions. The presentation of the results in this chapter is intended to develop a framework for assessing internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. This chapter then reports the results of the descriptive and inferential statistical analyses. The analysis of the results is presented in tables and graphs, in line with the research objectives. The chapter concludes with a formal summary.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

This chapter presents a summary of the findings from the statistical analysis discussed in Chapter 6 and indicates how these findings have met the objectives of this research – *to develop a framework for assessing internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury*. The chapter then presents the proposed framework for assessing the effectiveness of internal audit in supply chain management fraud prevention in the Gauteng Provincial Treasury, and then addresses the contribution this research has made to the body of knowledge on the topic. Finally, as is expected of a doctoral research study, the recommendations arising from this study are presented, and further research opportunities are identified.

CHAPTER 2

THEORETICAL FRAMEWORK – AUDITING AND SUPPLY CHAIN MANAGEMENT CONTEXT

2.1 INTRODUCTION

This chapter emphasises the direction of the research work as it relates to the theoretical framework. The chapter therefore focuses mainly on the theories and auditing philosophy underpinning the study. The chapter describes the history of supply chain management and then links the theories (agency theory, stewardship theory, and public interest theory) to internal auditing. Thereafter there is a reflection on the problems arising from conflicts between the theories and the debates between champions of the various theories.

2.2 THE PHILOSOPHY OF AUDITING

Mautz (1972) recognises that “philosophy” is a word with many interpretations, and the idea of a philosophy of auditing is theorised by Dennis (2015), with regard to professional business practice. Mautz and Sharaf (1961) record that the philosophy of auditing can be perceived as a field of knowledge built on a central core of abstract thought, including mathematics, logic and metaphysics. They found that auditing is based on philosophical foundations, including postulates, concepts, precepts, and practical applications. Thus, understanding these concepts as they apply to the practice of auditing promotes the development and practice of the art of auditing (Witrock, 1962). Cadotte (2015), in his reviewed of the legacy of Robert Kuhn Mautz (1915–2002), concluded that the scholarship in auditing philosophy has influenced the accounting and auditing profession for decades, providing the field with a robust foundation for contemporary research, education, and professional practice.

According to Littleton (1933), in general, auditing was designed to verify the honesty of persons charged with fiscal, rather than managerial, responsibilities:

One of the elements of accounting which definitely distinguishes it from bookkeeping is auditing. Ever since the double entry has been in use, textbook instructions have been given for checking the recorded data for error, and some of the earliest advice in this respect is still sound as far as it goes. However professional auditing is more than a search for errors in footings and omitted or incorrect postings from journal to ledger. According to modern practice, auditing is a critical examination of the records undertaken by the auditor to enable him to pass judgment upon the truth or falsity of the picture which the figures display. The procedures usually followed in verifying the truth of the facts presented reflect the accumulated experiences of several generations of men skilled in the varied technicalities of bookkeeping and business and carry the auditor at many points outside the account books themselves to complete his investigations (Littleton, 1933, p.259).

According to Miller (1962), the philosophy of auditing is about positioning auditing as an intellectual discipline, tasked with solving auditing problems and addressing critics from within and outside the profession. Mautz (1972) indicates that, in order to understand the philosophy of auditing, an emphasis should be made on the practical wisdom approach and personal philosophy of individual auditors, which defines their essential responsibilities. Despite Miller's (1962) opinion that Mautz and Sharaf have painted broad views about the philosophy of auditing, these broad views still point to the crucial questions about the responsibilities of auditors, and by extension, still question the broader role and effectiveness of internal auditors. With that in mind, Griffin and Wright (2015) argue that auditing's purpose is to support governance and management control reporting systems. This view arises from the fact that the auditing function, after having examined the final product of the accounting system, is then able to provide an opinion or audit outcome, based on the degree of reliability of the evidence they have gathered (Kumar & Sharma, 2015).

In the study conducted by Gustavson and Sundström (2018), on the effects of audit on society, they examined the effect of auditing on public sector corruption. The study found that good auditing has a positive effect on national perceptions of the levels of corruption in the public sector and concluded that auditing is organized according to principles that have the potential to contribute to well-functioning public administrations with an associated low degree of corruption.

This view echoes that of the Institute of Internal Auditors (IIA) (2012) that states that auditing is one of the pillars of good public sector governance. Similarly, the Supreme Audit institutions not only play a supervision role over public resources, but are also crucial promoters of governance to ensure each operational organisation within national and local government exercises full accountability (Mamidu et al., 2015). This role is filled by the AGSA in South Africa, and its duties and independence are mandated by the Constitution. The audits conducted by the AGSA are intended to ensure transparency and accountability in all government institutions, including local governments' service delivery efforts. The AGSA is thus accountable to the National Assembly for the accuracy and completeness of its reports on the audited information. Parliament and the provincial legislatures depend on the accuracy of the evaluation of financial statements by the AGSA, and their assessments of service delivery performances, and whether the local government resources are being utilised effectively (Republic of South Africa (RSA), 1996).

The focus of this study is essentially on internal audit. According to the Institute of Internal Auditors (2021), internal auditing has become more significant in organisations as it adds value and positively contributes to the organisation's performance: all this, in addition to identifying risks faced by the organisation (The Institute of Internal Auditors, 2021; Amoush, 2017). Internal audit acts as a defence against misappropriation and corporate misconduct; it also helps keep corporations and investors to remain safe from clandestine and unsanctioned acts either by rogue elements within the organisation, or by external criminal organisations targeting the entity. Internal auditors thus give more attention to addressing situations where organisations could suffer losses (Ramokwena, 2016) than simply tracking revenue stream flow. Ramokwena (2016) further emphasizes that auditing assists governments to enhance their performance and the transparency of their conducts, by ensuring accountability; auditing skills are essential in the fight against corruption and in promoting public trust, while helping reduce misappropriation of public resources.

Coetzee (2004) explains that internal auditors are able to make an important contribution to the organisation's efforts to achieve its objectives. The Institute of Internal Auditors (IIA) has aided internal auditors and internal audit functions in this task by publishing its Competency Framework for Internal Auditing (CFIA) and the Professional Practices Framework (PPF) as essential

guidelines. According to the IIA (2023a), internal auditors are grounded in professionalism, integrity, and efficiency. They make objective assessments of operations and share guidelines for best practices, provide counsel for improving controls, processes and procedures, performance, and risk management; they also identify ways to reduce costs, and improve revenues and profits; and they are also called upon to deliver consulting services, assurance, and facilitation services. Internal auditors are well-disciplined, highly competent in their craft, and subscribe to a professional code of ethics. They are diverse in their skill sets and innovative in their field. They are committed to growing and enhancing their skills (Buregeya, 2007).

Coram et al. (2006) observe that the significance of corporate governance has received immense public and regulatory attention over recent years, and that the internal audit function is an important part of an organisation's corporate governance. It has further been stated that the internal audit function is a crucial function that has added value to their businesses, and decreased the errors detected by external auditors. The objective is to improve the effectiveness of risk management, control and governance. Internal audit is thus also regarded as a crucial governance tool to protect organisations from risks such as internal criminal behaviour. Coram et al. (2006) also emphasize that internal audit is an important tool in detecting fraud and identifying when assets are being misappropriated by employees or outsiders.

The next section provides an overview of auditing in the public sector, with a focus on Gauteng Provincial Treasury. The experience of Gauteng Provincial Treasury here elucidates the state of internal auditing in the public sector in South Africa, as it is shown in the study.

2.2.1 Public Sector Auditing

According to Xhani et al. (2020), auditing in the public sector has evolved over the years to meet the needs of a constantly changing business environment. For example, in this study of the historical development of auditing in the public sector identifies that changes in national and international policies have necessitated that internal audits in the public sector devote increasing resources to evaluate the risks in the public sector environment.

Hay and Cordery (2018), in their research, state that public sector auditing is a large and expanding area of auditing practice that is complex and comparatively unexplored and has enjoyed only limited scrutiny or focused academic research. According to Banker et al. (1992), researchers in accounting have not been responsive to the problems and opportunities associated with developments in government accounting, and this statement is still relevant three decades later. Hay and Cordery (2018) further state that in many instances, auditors in the public sector are responsible for both value-for-money auditing (performance or effectiveness auditing), and financial statement auditing (expressing an opinion on the financial statements). The value of these types of audits is still frequently questioned and there are expectation gaps over what is and what can be achieved. While many studies of value-for-money audits view them as useful, they are also frequently viewed as problematic, because they depend on information that may not be reliable; depend on auditors knowing best practices, and on making value judgements about issues that are not captured in monetary terms (Adi & Dutil, 2018). In the opposing perspective, in conducting value-for-money audits, auditors are providing a service which is intended to be valuable and is thus a useful and rational management tool (Boardman & Hellowell, 2017). On the other hand, the most crucial contributor to the value of financial statement auditing is the reduction of agency costs. If there were no audits, some business transactions would not occur, because of the reluctances of principals to engage in activities where their resources were entrusted to agents. And if there were no audits in the public sector, fewer resources would be available for government agencies, according to Owusu and Weir (2018) and Hay and Cordery (2018).

2.3 HISTORY OF SUPPLY CHAIN MANAGEMENT

The history of supply chain management has its roots in the early 1900s (Biggs et al., 2017). According to MacCarthy et al. (2016), supply chain management has emerged to meet the diverse needs of human societies, to exploit natural resources and to enable humans to engage profitably in commerce and trade. The evolution of the supply chain as an initiative in dealing with internal risk control goes back to “early beginnings in the textile industry with the quick response program and later to efficient consumer response in the grocery industry. More recently a variety of companies across many industries have begun looking at the entire supply chain process” (Lummus & Vokurka, 1999). SCM has been around for a long time and can be traced back to the

advent of capitalism (Tsing, 2009). It continues to influence economic development (Ambe Badenhorst-Weiss, 2011) and the political landscape, through globalisation (Bentley et al., 2022; Fan et al., 2022).

The concept of supply chain management has its origins in the time when producers and merchants moved beyond the village common to acquire supplies and sell finished product, when they relied on horses, carts, and sailing ships to transfer raw materials and finished products from one place to another.

1900	<i>Local supply chains:</i> Prior to the first industrial revolution, supply chains were typically local and restricted to single regions. As the use of railroads increased, so did the distance that goods could be distributed cost-effectively.
1950	<i>Transportation Era:</i> During this decade, transportation was the main supply chain element. Thus, courses offered during this time only included transportation information, and omitted topics/concepts like logistics, supply chain, and physical sourcing. There was also not much discussion about the concept of the total cost of producing a good or service.
1960	<i>Physical Distribution:</i> The study of transportation evolved into the study of logistics during this decade. Transportation management remained the most crucial function of logistics, and professional logistics managers came to exist.
1970	<i>Physical Supply, Deregulation, and Logistics:</i> In the early 1970s, the physical supply component of the logistics system yielded its importance to the physical distribution and physical delivery aspects, which were by then combined. During this decade, the logistics concept was developed, and articles were published in industrial management journals, and emphasised physical distribution, adherence to regulation, logistics techniques, and more.
1980	<i>Transportation Deregulation, Physical Distribution, and Business Logistics:</i> In the 1980s, deregulation continued, and governments began reducing the stringent regulation of road freight rates and entry conditions. In the USA, the Staggers Rail Act of 1980 allowed the railways to operate with less supervision by the Interstate Commerce Committee. The term physical distribution also began to be replaced by the term logistics.
1990	<i>Business Logistics:</i> During the 1980s, business logistics continued to be a vital element — making companies see logistics as an integral part of their business strategies. Most companies realised it offered a significant opportunity for cost savings, through the

	implementation of systems and by negotiating with suppliers. During this decade, electronics and communication technologies were the two main factors affecting logistics.
2000	<i>Logistics and Supply Chain Management:</i> The early years of the 21st century saw a gradual evolution of emphasis from logistics to supply chain management in business and academia. Supply chain management has come to be seen as a chain consisting of all the activities involved in sourcing and converting raw materials into finished products.

Source: Evolution of supply chain management (REGENT Business School, 2023).

Today, supply chain management is the co-ordination of interactions between the supply networks. Competitiveness in supply chain management requires adopting the most advanced technology for driving enterprises’ digital transformation strategies, as well as acquiring the technologies that are able to transform supply chains’ efficiencies. The highest achievement in supply chain management was thus the ability to cut costs (Sabahi & Parast, 2023; Saragih et al., 2020).

2.4 LINKING THE SUPPLY CHAIN MANAGEMENT THEORIES TO INTERNAL AUDIT

In order to achieve the goal of linking the SCM theories to internal audit, the study reviews three key theories focusing on: (1) each theory's conceptualisation; (2) the relevance of the theory, and (3) criticisms of each theory and subsequent conceptual elaborations (Geels, 2020; Panda & Leepsa, 2017). Theories are the backbone of research regardless of the nature of the research, whether quantitative or qualitative, and provide a framework for understanding and explaining social phenomena (Risjord, 2018; Patty et al., 2021). The theories on which this study is based are agency theory, stewardship theory and public interest theory.

2.4.1 Agency Theory

Agency theory concentrates on the relationship between the organisation’s principal and its agents (Eisenhardt, 1989; Hill & Jones, 1992; Dharwadkar et al., 2000). It is important to understand what an audit means to stakeholders such as shareholders (principals), boards of directors (typically the agents), regulators and other third parties (Adams, 1994; Raimo et al., 2021). Kopp (2019) explains that in agency theory, the relationship is usually between shareholders as principals, and company

executives, as agents. According to Zu and Kaynak (2012), and Hannafey and Vitulano (2013), agency theory was initially conceptualised to understand the relationship between the principal and his/her agent. Thus, when the theoretical framework is applied to public sector entities, it differentiates between the agents and stewards, both often part of government. Agency theory is a useful economic theory of accountability (Chrisman, 2019), and it is well known that an audit is of value to a variety of stakeholders to ensure the trust and confidence placed in agents is justified (Hill & Jones, 1992; Dharwadkar et al., 2000; Raimo et al., 2021).

Lindqvst and Mijovski (2012) state that agency theory is a management and economic theory that tries to explain relationships and self-interest in business organisations. It thus determines the best way in which the relationship between one party (the principal) is managed to ensure the work another party (the agent) does is best performed on behalf of the principal. The theory is useful and relevant for this study in the sense that it explains the relationship between (outsourced) internal auditors and an organisation. In this relationship, the organisation determines the work (audit) and the internal auditors, as agents, perform the audit services. The theory presumes that the principal and the agent are similarly or equitably motivated by self-interest.

According to Bosse and Phillips (2016), agency theory is one of the most dominant theories of economic organisation and management. Agency theorists are however, continually faced with the challenge of fully explaining the global agency problem and being called on to determine how best to address it. The problem usually arises when one party (a principal) employs another (the agent) to create value. The critical features of the agency problem are that the interests of the principal and agent may diverge, and the principal usually has imperfect information about the agent's contribution. These features define the problem, and each manifestation of the problem results in additional/unforeseen costs and inefficiencies that are ultimately borne by society. While the costs to society are difficult to measure precisely, they are significant.

Sanders and Hambrick (2007), and Mio et al. (2020) explain that in agency theory, principals seek to influence agents in order to reduce costs. The theory has earned a place of prominence, based on the assumption that all parties are narrowly self-interested, all parties are rational, and agents are more risk-averse than principals. Agency theory is extensively employed in the accounting

literature to explain and predict the appointment and performance of external auditors. Agency theory also provides a useful theoretical framework for the study of the internal auditing function. The theory not only helps to explain and predict the existence of internal audit, but it also helps to explain the role and responsibilities assigned to internal auditors by the organisation; similarly, it predicts how the internal audit function is likely to be affected by organisational change. In conclusion, agency theory provides a theoretical basis for rich research which can benefit both the academic community and the internal auditing profession (Udeh, 2019).

The agency theory has, however, been criticised in the past; the focus was usually only on the agent side of the 'principal and agent problem'. It has been more recently emphasized that the problem may also occur from the principal side, acknowledging that the theory does not focus on the principals, who are as likely to deceive, avoid and exploit the agents as they are to be on the receiving end of such behaviours. The agents are unknowingly pulled into a risky working environment, without any recourse, should the principals act as unethically opportunistic.

Another criticism of agency theory is that it presumes that humans are very principled and work ethically for the best interest of the organisation (Panda & Leepsa, 2017). Panda and Leepsa (2017) further state that agency theory assumes the existence of a contractual agreement between the principal and the agent, for a specified future period, but where the future is uncertain. The theory assumes that a contract can eradicate the agency problem in that responsibility is shifted to the agent. However, the agency is just as likely to experience difficulties including fraud, and transaction cost fluctuations. The directors' roles in the organisation are usually limited to monitoring the managers, and even in this their roles are not clearly defined. The theory thus implicitly regards the managers as opportunistic and ignores their competence and contribution to the efficient running of the supply chain.

Chrisman (2019) states that, while agency theory highlights the relationship between the owners and management, research reveals that stewardship theory can provide an effective alternative explanation. Contrary to the agency theory, which presumes that people exhibit individualistic, opportunistic and self-serving economic behaviours, stewardship theory assumes people are collectivists, are pro-organisation and trustworthy. It can thus be argued that in agency theory, the

interest differences between the principal and the agent make it easier for losses for the principal to occur, due to opportunistic behaviour of the client/agent, if no control mechanisms are in place. Bertoncini (2012) argues that contrary to this, when management acts as stewards, they behave in a collective way, as they are trying to achieve goals that enhance the organization as a whole, rather than for the benefit of a single department or unit. Thus, when acting as stewards, efforts are directed at, for example, innovation and profitability. Stewardship theory is thus pertinent to this study as internal auditors are identified as collectively working towards a common goal - the prevention and detection of fraud in supply chain management.

According to agency theory, the effectiveness of internal audit can be assessed by viewing the internal auditor as an agent of an organisation. The independence of the internal audit department, and the level of authority to which the internal audit staff report, are the most crucial criteria that influence the objectivity of its work. Organisational independence is thus crucial to the effectiveness of internal auditors, as the higher up the hierarchy they report, the better it protects the internal auditor from pressure or threat and increases the objectivity of the audit work. Previous studies in some developed countries (Asiedu & Deffor, 2017; Trotman & Duncan, 2018; Paul et al., 2020), have indicated that lack of independence inhibits internal audit's performance. Many countries, including South Africa and the United States of America, recommend that internal audit functions should report to the highest level within the organisation, thus, to ensure that corrective action is taken to implement internal audit's recommendations. On the other hand, in South Africa there is concern over the absence of demonstrable independence of internal audit, particularly in the South African public sector. In particular, the research highlights concern regarding lines of communication and levels to which internal audit reports, and their implications for internal audit's independence. Internal auditors should thus strive to maintain a high level of independence so as to retain the confidence of those who rely on their reports (Khalid, et al., 2018).

Thus, internal auditors can be seen to act as agents for principals when performing an audit (Ali, 2020), and this has implications on trust (Sari et al., 2019). Auditors require a close working relationship with the board of directors of a company (Hill & Jones, 1992; Dharwadkar et al., 2000; Raimo et al., 2021) in order to be effective in their duties.

In the next section, the contrasting stewardship theory will be discussed, and the differences between agency theory and stewardship theory are explored.

2.4.2 Stewardship Theory

The concept of stewardship assumes that when managers are left to do their jobs, they will act in the best interests of their principals, making most effective use of the assets under management (Zu & Kaynak, 2012). Contrary to agency theory, which presumes that people exhibit individualistic and opportunistic economic behaviour, stewardship theory assumes people to be collectivists, pro-organisation and trustworthy (Schillemans & Bjurstrøm, 2020). While agency theory argues that shareholder interests require protection by separating the roles of board chair and CEO, the stewardship theory argues that shareholder interests are maximised when these roles are vested in a single individual (Davis et al., 1997). In stewardship theory, it is clear that the public have a keen interest in organisations and see the audit as a way of reinforcing that trust and confidence in reporting (Ali, 2020).

According to Schillemans and Bjurstrøm (2020), in stewardship theory, as in agency theory, an analysis is made on how to ensure accountability when a task is delegated from a principal to an executive. The only difference is in stewardship theory's view on the motivation of agents. Whether they are subordinates or executives, they are presumed to be motivated to act in the best interests of their principals, and they prioritize pro-organisational, collective behaviours. The steward simply wants to be a good and loyal steward and will thus put organisational goals above self-interest. The delegatee is viewed as a trustee, motivated more strongly by collective goals than individual goals (Chrisman, 2019; Schillemans & Bjurstrøm, 2020). Panda and Leepsa, (2017) argue that, contrary to stewardship theory, agency theory is usually concerned with two problems that may occur in the principal-agent relationship. Firstly, the conflicting interests between principal and agents, and secondly, how the principal can control what the agent is doing.

Stewardship theory emphasizes that when managers are left on their own, they act as responsible stewards of the assets they are entrusted to control (Kronberg, 2019). Some principles regarding the theory of stewardship tend to overlap with some underlying assumption of “agency theory,”

which indicates that tension exists between the risk propensity of principals and that of their agents since agents are seen to focus more on reducing their personal risk at their principal's expense. Stewardship theory (as an alternative to the agency theory), assumes that managers are guided by self-interest at the expense of shareholders in a similar way that agents are driven by self-interest. The contrast between the two theories here is interesting for this study.

Many institutional investors refer to stewardship as the actions that investment managers take to enhance the value of the companies in which they have invested their own clients'/investors' money. Most established organisations currently have published stewardship principles that guide institutional investors' own beneficial investors. The principles include those of stewardship, which aim to enhance the value of the organisation as well as demonstrating stewardship by institutional investors. Some institutional investors, such as socially responsible investment funds, might have goals other than enhancing financial value (Kronberg, 2019).

Furthermore, Kronberg (2019) states that stewardship, as practiced by institutional investors, includes three components: monitoring, voting, and engagement. Monitoring refers to the assessment of the operations, performance, and practices, as well as the governance decisions of portfolio companies. Voting involves shareholders electing directors to manage the corporation, proposing charter amendments, dissolutions and other critical changes in the organisation. Lastly, engagements include interactions between fund managers and their portfolio companies in ways other than voting; for example, by submitting shareholder proposals, nominating directors, and undertaking proxy contests (Bebchuk & Hirst, 2019).

Stewardship theory thus has more to do with actions taken by investment managers in order to enhance the value of the companies that they invest in on behalf of other investors. For the purposes of this study, this can be seen as similar to the way in which internal audits can add value in detecting fraud in any organisation. The study by Siopi and Drogalas (2017), and that of Bou-Raad (2000), found that value added by internal audit contributes to the accomplishment of the organisations' objectives, and enhances the quality of information for decision-making purposes. This theory is relevant to the study in the sense that internal auditors may be looked at as collectivists in the way they perform their services. This refers to the degree to which an internal

auditor's actions are directed by what is in the best interests of a group (the internal audit function), rather than the degree to which an internal auditor is self-sufficient or rooted in their groups (internal audit function) as explained by Onyango (2017).

Organisations that have in-house internal audit functions are more likely to detect fraud in the early stages of fraud's gestation. Organisations that solely rely on outsourcing the internal audit function are less likely to detect fraud than those that carry out at least part of their internal audit function themselves. This provides clear evidence that internal audit adds value through advising on the adequacy and effectiveness of controls, as well as by monitoring the environment within organisations to detect fraud. Furthermore, this also suggests that keeping the internal audit function within the organisation is more effective than outsourcing that function (Corama, et al., 2006). However, Khan et al. (2020), in their study argue that organisations may feel obliged to outsource their internal audit function because they need to have a better audit quality, or they are not able to run an in-house function. When an organisation outsources its internal audit function, the processes and activities may be impacted positively or negatively. Thus, outsourcing an internal audit function may provide a better experience/outcome as the outsourced firm may be better equipped to provide the services, and able to provide expertise on industry-wide practices. In-house internal auditors may also be able to better accept the recommendations made by an outsourced firm than those made by an internal division. Asiedu and Deffor (2017) established that the effectiveness of the internal audit function is significantly affected by the size of the internal audit department, its independence, as well as the rigor of implementation of company policies and procedures. All these determinants play a role in fighting fraud and corruption. Strict adherence to, and the implementation of laws and regulations, assist in fighting fraud and corruption.

This theory can thus be linked to internal audit as it is seen from the analysis above that, in an in-house internal audit function, the auditees are more open and receptive to the audit outcomes. They are also more willing to share the difficulties faced in their work processes, to ensure that enhancements can be made. In-house internal auditors are viewed as more trustworthy, and as agents who can help in making the necessary enhancements. By looking at the above, however, the inference cannot be avoided that there are also disadvantages to having internal auditors in-

house. One of the major disadvantages is that internal auditors may be swallowed into the internal politics of a company and fail to assert their independence simply because it is internal and dealing with colleagues. However, this is insignificant as compared to the advantages of having an in-house internal audit function (Corama et al., 2006; Khan et al., 2020).

According to Groff et al. (2016), internal auditing is gaining stature in corporate governance due to its ability to provide quality information on the execution of strategic plans with respect to better supervision of managerial decisions by governance bodies. It is also increasingly being seen as an important consulting body when corporate management is making decisions on strategic issues. The role of internal audit in corporate governance has been highlighted as supervisory boards and audit committees are becoming more and more involved in planning internal audits and acting on their reporting. The need for the internal audit function to become more independent represents a clear step away from stewardship theory, building on the premise that management cannot be trusted, and that management is driven by self-interest (as is presumed by agency theory), and thus is in need of independent internal control (Koutoupis & Pappa, 2018; Azizi & Bidgoli, 2018). According to Poltak et al. (2019), stewardship theory supports the effectiveness of audits as they are determined by the interest of the steward being aligned with the interests of the principal. Internal auditors play a role of steward in performing their activities aligned with the interests of the principal. This theory emphasizes that management's interests are aligned with the principal's interests. Management (as a steward) will prioritize the interests of the organisation, rather than of individuals, to achieve the organisational goals. Internal auditors as stewards will not focus on or be influenced by individual egos at the expense of the organisation.

Schillemans and Bjurstrøm (2020), in their research, indicate that stewardship theory has been criticized by Albanese et al. (1997) as it cannot be seen as an independent theory, but rather as a special case of agency theory, where the interests of the principal and the executive are aligned. Stewardship theory should thus be viewed as an addition to/subset of agency theory. Therefore, stewardship theory is relevant to this discussion as it considers the stewards view and embraces management interests and their ability to influence how organisations can manage their stakeholders (Löhde et al., 2021).

It is in this context that stewardship theory believes that public management and governance structures should exercise their authority in an efficient manner, and with accountability. Hence, it is important to understand the role of the accounting officers, as the management echelon with the same authority and executive and political powers in the public sector environment as that of the board of directors. In the principle of stewardship, the accounting officer's role is to facilitate the executive objectives, that they are empowered to execute. According to Schillemans and Bjurstrøm (2020), the stewardship theory is involved mainly in analysing the importance of trust-based relationships. Poltak et al. (2019), state that the stewardship approach encompasses commitment and trust to shared goals and desires exhibited by the principal and the manager, to align them with their organisational interests.

The theories stated above are opposite but have certain similarities. The next section will thus look into a different theory, that is public interest theory.

2.4.3 Public Interest Theory

Ferry et al. (2022) recognise that public sector audit is a vital activity within democratic states, as it underpins the relationship between the government and the governed, the executive and the legislature, and affects a variety of different parts of the government. Cordery and Hay (2020) describe audits in the public sector as having an essential role in serving the public interest as they are intended to strengthen accountability. Public interest theory believes that regulations exist to respond to public demand that inefficiency and lack of accountability amongst the key role players is corrected. This theory rests on the assumption that government regulation can improve/correct inefficiency and lack of accountability issues (Minto, 2020). Public interest theory assumes that national resources are allocated in the best possible way so as to achieve organizational goals, as well as personal goals. This theory argues that regulation is intended to promote the wider, general welfare, rather than the interests of well-organized stakeholders (Li et al., 2019).

According to the Body of Knowledge on Infrastructure Regulation (BoKIR) (2019), public interest theory refers to the government's intervention in markets, and to the associated regulatory rules that are promulgated in response to market failures and market imperfections. This theory

therefore argues that regulation promotes the general public's welfare, rather than the interests of well-organised stakeholders. As stated above, according to Craig (2006), in public interest theory legislators are simply doing what they believe will be best for the majority of society. This theory suggests that regulatory changes are brought about by regulators who are working for the best solutions for society as a whole. In this hypothesis, regulators pursue regulatory changes in response to a situation where societal efficiency is lacking. Johnston (2017) explains that public relations stems from cultural, social, legal and political structures in which there is public interest. Public relations will thus define the public interest in a way that will be accepted by society.

According to Shleifer (2005), public interest theory is centred on two assumptions: firstly, unrestricted markets fail repeatedly due to monopoly problems or externalities. Secondly, governments are willing to and capable of rectifying these market failures through regulation. This theory of regulation has been used both as a remedy to what governments should do, and as a description of what they actually do, (mainly in democratic countries). In this theory, governments are seen as institutions that control prices so that natural monopolies do not overcharge, enforce safety standards (to prevent accidents such as fires, and building collapses), regulate jobs (to counter the imbalance of power between employer's monopoly and employees), as well as regulating security issues in financial markets so that investors are not cheated. This theory has become the basis of modern public economics, as well as the standard for socialist and other particularly left-leaning politicians. It has also been utilised to justify the growth of public ownership and regulation at the expense of private/corporate ownership of goods and services through the twentieth century.

Shleifer (2005) points out that public interest theory has however been exposed to numerous criticisms. The criticisms progress in three intellectual steps. Firstly, markets and private organisations are able to take care of most market failures without any government intervention or regulation. Secondly, in instances where markets might not function perfectly, private litigation is able to address the arising conflicts that the market participants may experience. Lastly, even though markets and courts cannot perfectly solve all problems, involving government regulators would make things even worse as regulators are incompetent, corrupt and captured, and regulations seldom address the issues honestly or effectively.

This study may be linked to public interest theory as in specific instances regulation promotes good governance. In this study, internal auditors could be more effective where there are strong boards of directors. This means that it is not the internal auditors on their own who determine their effectiveness, but rather the organisation's corporate governance strength reflects that of the board of directors, who, in turn determine/promote the effectiveness of internal auditors. This is affirmed by Corama et al. (2006) who explain that an essential part of any organisation's corporate governance effectiveness is its internal audit function. Corporate governance involves oversight activities carried out by the board of directors and audit committee and is intended to ensure the integrity of the financial reporting process.

According to Van Mourik (2013), public interest theory of regulation explains these in general terms and seeks to protect and benefit the public at large. Shleifer (2005) explains that public interest theory is the *helping hand* theory of regulation which is based on the assumption that governments are caring and capable of correcting failures through regulations. Franco (2004) adds that this theory is interested in correcting the inefficiencies of markets that have ended in failures. Thus, this study will adopt public interest theory in the development of a framework to improve inefficiencies within the current supply chain management systems. It will do so by emphasising the common good as best realised through improvement in and of the community itself (Cochran, 1974).

There is a relationship between public interest and public relations. According to Johnston (2017), public relations stems from cultural, social, legal and political structures in which there is public interest. Furthermore, public relations will thus define/guide the public interest in a way that will be accepted by society. This study makes use of this theory as we can conclude that regulation promotes good governance. In this case, internal auditors could be more effective where they report to strong boards of directors. This means that it is not the internal auditors on their own who determine their effectiveness, but rather the design of the organisation's corporate governance structures (in terms of the strength of the board) that influences the effectiveness of internal auditors.

As the different theories have been explored above, the next section will introduce how the theories conflict with one another and how the conflicts may be resolved.

2.5 THE PROBLEM OF CONFLICTS BETWEEN THE THEORIES

Previous research indicates that conflicts exist between the theories (Schillemans & Bjurström, 2020). According to Hiebl (2015), over the past few years, the main focus of interest in finance and accounting research has been the relationship between the company owners (principals) and salaried managers (agents). It is almost impossible to avoid problems in this type of relationship because of the separation of ownership and operational control (in the hands of managers). The crucial area of interest has been to determine how to overcome conflicts of interest that arise between owners and managers. These conflicts were mainly caused by employed managers who do not pursue the intended goals of the owners when exercising managerial power over the owners' funds, but rather pursue goals that are more focused on self-interest. A typical self-interest-focused goal would be the approval of excessive compensation for themselves. This self-interest is known as agency behaviour (Conroy et al., 2017). Hiebl (2015) further states that there are ways to reduce this self-serving behaviour and to align the managers' and owners' interests. Jensen and Meckling (1997) show that it is possible to address the over-compensation issue, for example, by including strict monitoring and approval processes, and incentive payments linked to company performance. Monitoring entails defining and measuring the agent's behaviour, for example, by the principal requiring that the agent submits formal oral and written reports to governing bodies such as the board of directors. Incentive payments represent an attempt to align manager compensation with the business outcomes, to ensure that the level of manager compensation is a reflection of what the owner achieves (i.e., achieving the intended business outcomes attracts recognition in the form of bonus payments) (Drira et al., 2019). While salaried managers and CFOs do not necessarily have to act as self-serving, stewardship theory implies that managers pursue the long-term well-being of the company, rather than focusing exclusively on their own. Empirical studies indicate that managers do not necessarily pursue self-serving interests, but also behave (at least partly) in a steward-like manner (Davis et al., 2007).

James (2000) describes public interest theory as the pursuit of interests of individuals, promoted by free markets, in which there is a voluntary exchange of goods and services with no market distortions. The key concept is that of the parties pursuing the interests: public interest theory excludes the involvement of privileged groups. Regulation thus corrects distortions or market failures, which prevent markets from operating in the public interest, and such correction is seen as a desirable activity in these circumstances. There is another form of conflict that arises within the theories, and specifically in the public interest theory. This conflict or problem may arise in response to regulatory failures regardless of theory the theories being applied. James (2000) observes that alternative economic models suggest that introduction of business regulations, far from being a solution to market failures, precipitate failures of their own. Regulatory failures come in different types. There are failures that suggest that the benefits of regulation do not accrue to service users and taxpayers, but to regulators or regulated bodies instead (Borges, 2017; Kraft & Furlong, 2019). Another type of failure suggests that regulation is a costly enterprise, even if attempts are being made to pursue the public interest. Resources will tend to be consumed in “cat and mouse” games between the regulator and regulated bodies and will be taken up by institutional structures designed to try and prevent regulation from reflecting narrow sectional interests. The failures are not mutually exclusive, particularly in principal-agent theories that point to benefit the regulators and regulated bodies from collusion against the public interest (James, 2000).

The public interest justification has been severely criticised in the literature on the regulation of business. Alternatives to the public interest theory suggest there are different types of regulatory failure. Regulations may reflect the interest of regulated bodies, and regulators’ interests may dominate regulatory systems. Plus, there are high costs associated with operating regulatory systems (both for regulators and the regulated businesses) and this may offset any gain, despite the fact they are primarily geared to promote the public interest (Craig, 2016). Park et al. (2020) and Craig (2016) recognise that in public interest theory, regulators frequently make changes to maximize a specific, narrowly defined form of public welfare.

This is at odds with the idea that regulatory changes occur in an effort to find the best solution for society as a whole, and not necessarily to pursue a narrow goals or to benefit only a few in society.

Regulations may bring about institutional shifts and leads to broader public welfare and proper distribution and allocation of resources in society, as it will be shown in the study.

2.6 DEBATES ON THE THEORIES

The study by Hu and Alon (2014) indicates that there are very few studies that engage in debate on the relative merits of the agency and stewardship theories. This section attempts to rectify this, and presents the different analyses of agency theory, stewardship theory and public interest theory. Pouryousefi and Frooman (2017) clarify that some “agency optimists” view agency theory as a cautionary tale; that it is not possible to conduct successful economic engagements without reference to moral norms and principles. In this view, moral obligations that arise out of agency engagements are unilateral. This means they involve internal constraints adopted by agents to counterbalance risks to principals. Furthermore, by taking a closer look at the relation between morality and economic engagements or interactions, it is clear that this view describes self-interested individuals as motivated to follow rules of morality and justice because each is vulnerable to the opportunistic advances of others, and each stands to benefit from cooperative arrangements.

This cautionary-tale view is vulnerable to two criticisms. Firstly, its unilateral focus betrays a limited understanding of social interaction structure in principal-agent relationships, Secondly, the cautionary-tale theorists formulate moral obligations unilaterally, as internal constraints on the part of one player (the agent), against posing risks to another (the principal). However, by attending to the moral obligations of only one player in a two-player principal-agent relationship, the cautionary-tale view overlooks the bilateral moral considerations relevant to such a social interaction. This two-part criticism makes up what is called the problem of unilateralism in agency theory (Pouryousefi & Frooman, 2017).

Over the years, various analysts have argued that stewardship theory provides an alternative way of conceptualizing the principal/agent relationship, and it has been applied to board members and company managers. This theory refutes the existence of the problems identified and focused on by agency theory. Stewardship theory strives to explain the role and behaviour of the director in

achieving organizational goals. If stewardship theory applies in a corporate governance setting, and it can explain and conceptualize the role and behaviour of directors, then it may result in one asking whether it is logical to make any provision for boards to be accountable. Is accountability only relevant when the directors and their approach to their functions and roles are conceptualized within the view of agency theory? Is accountability only about ensuring that directors do not abuse their positions and cause loss to their companies and, if so, is accountability of no importance if stewardship theory accurately explains how boards of directors will behave in their management of companies (Jaffar, 2016).

Jaffar (2016) explains that public interest theory emphasizes that economic regulation is supplied in response to public demand that their interests are protected from the impact of misconduct and malpractices in the market as a result of unbalanced market power, information irregularities and other external factors. It is encouraged by market players' behaviour in the free market in the form of agency problems. Jaffar (2016) further states that these market players pursue objectives that are unfavourable to the shareholders and the public interest. A government is thus expected to interfere, via structured regulation, to ensure that the pursuit of self-interest by the regulated entities does not negatively impact on that of the public. According to the theory, regulations should be designed to ensure that the public interest is hedged against imperfect completion, unbalanced market operations and unfavourable market results. Jaffar (2016) is of the opinion that public interest is by far the most appropriate theory to have been applied to financial regulations and has been utilised to justify the imposition of capital-based regulations. Regulators justify their intervention in the banking sector through capital-based regulations to protect the depositor's money in the banks.

2.7 SUMMARY OF THE CHAPTER

This chapter provided a detailed description of the theoretical frameworks applicable to auditing and supply chain management. Agency theory argues that shareholder interests require protection, achieved by separation of the roles of board chair and CEO, while the stewardship theory argues that shareholder interests are maximised when these roles (board chair and CEO) vest in a single person. And public interest theory emphasizes the government's intervention in markets (using

legislation and associated regulatory rules) as responses to market failures and market imperfections.

It is evident that all three theories can co-exist in any organisation. The three theories share common aspects. The common aspects indicate the organisation's relationship with something other than just internal audit. However, a good (effective and insightful) internal audit function is ultimately dependent on good corporate governance to be fully effective, where good corporate governance includes allowing internal audit space to do its job, and follows up effectively on their recommended remediations. The three theories can be compared by highlighting their key differences, as follows. In agency theory, the relationship referred to above can be deduced from the definition which evaluates the relationship between the principal and its agent. The theory not only helps to explain and predict the existence of and need for internal audits, but it also helps to explain the role and responsibilities assigned to internal auditors by the organisation. Good corporate governance, in this theory, can be seen in the internal audit function's relationship between outsourced internal auditors and those employed within the organisation itself. In this relationship, the organisation determines the work (audit) and the internal auditors as agents perform the audit services.

Secondly, in stewardship theory, as previously explained, additional emphasis may be placed on the internal audit function's ability to add value by detecting fraud in any organisation. Good corporate governance is evident in that, as many studies have indicated, those organisations that have internal audit functions are more likely to detect fraud. This goes back to the concept explained above, that a good/effective internal audit function is dependent on good corporate governance.

Lastly, in public interest theory, it is held that regulation promotes good governance. In this case, internal auditors could be more effective where the board of directors is strong. This means that the effectiveness of internal auditors is amplified by the organisation's adherence to sound corporate governance practices, in that it is the strength of the board in their support of internal audit that determines the effectiveness of internal auditors. The next chapter discusses the effectiveness of supply chain management systems.

CHAPTER 3

EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT SYSTEMS

3.1 INTRODUCTION

This chapter discusses the effectiveness of supply chain management systems. It starts by describing the concept of supply chain management systems, and the key role of payers in relation to South African government supply chain management systems. The chapter then describes relevant supply chain management regulations, policies and procedures. The risks of supply chain management are also discussed along with the pillars of supply chain management. This chapter further considers the responsibilities of accounting officers, the international perspective on the supply chain management system, the difference between public and private sector supply chain management and concludes with the summary of the chapter.

3.2 CONCEPT OF SUPPLY CHAIN MANAGEMENT SYSTEMS

Effective supply chain management entails managing the flow of goods and services in an efficient manner. An effective supply chain thus provides an organisation with better negotiating power to obtain the best possible rates and products in the shortest time possible. This in turn decreases inventory costs and improves the overall planning and efficiency of operations (Copacino, 2019; Ngeno & Kinoti, 2017). Supply chain management has thus become more crucial and achievable due to globalisation and the power of information technologies (Kumar, 2018). Supply chain management is described as a well-known management strategy which attempts to satisfy its customers by adding value to customer service, to improve competitive advantage through integrating the main business process into the supply chain (Laari et al., 2017; Behzadi et al., 2017; DuHadway et al., 2019). Organisations are thus no longer competing as individuals, but rather as supply chains (He et al., 2019; Saveleva et al., 2020).

Kwak et al. (2018) conducted a study focused on investigating the relationship between supply chain innovation, risk management capabilities and competitive advantage in global supply chains. Their study found that innovative supply chain management has a direct relationship with

management capabilities, which in turn enhances competitive advantage. This provides evidence for the importance of supply chain innovation and risk management capabilities in supporting competitive advantage. This is further supported by the study of Liao et al. (2017) in which they examined the relationships of supply chain collaboration value innovation, supply chain capability, and competitive advantage in selected firms in the Taiwan networking communication industry. The results show that the relationships between supply chain collaboration value innovation, supply chain capacity and competitive advantage can have a positive impact on the supply chain management (Liao et al., 2017).

Supply chain members include all organisations with which the principal organisation engages, directly or indirectly, through its suppliers or customers, from the point of origin to the point of consumption of services (Kohl et al. 2021). Various studies have shown that no organisation can survive without receiving the necessary supplies required for providing goods and services (Kohl et al., 2021; Çankaya & Sezen, 2019; Jabbarzadeh et al., 2018). This therefore means that supply chain management is vital for any organisation (Aboutalebi, 2016).

Aboutalebi (2016) further explains that the key aspect to the success of effective supply chain management is having the right strategies. Proper supply chain strategies can result in a better performance of those engaged in supply chain management. This is supported by the study of Luthra and Mangla (2018), which indicates that there is a growing concern for adopting sustainable supply chain management strategies. An analysis thereof was thus conducted, which found that management involvement, support and commitment are top drivers of effective supply chain management. Inappropriate supply chain management strategies can harm innovation in an organisation. The strategies suggested are aimed at achieving efficiency and responsiveness. The nature of products, either functional or innovative, will determine the nature of a suitable supply chain management system.

Kurniawan et al. (2017) state that organisations that operate within highly integrated supply chains are often susceptible to disruptions caused by natural or man-made disasters. Risks and uncertainty exist during each stage of the supply chain process where it is required to purchase products and services in order to deliver final output to customers. Unforeseen and unexpected disruptions may

occur during purchasing, manufacturing or shipment, which may affect the organisation's ability to serve its consumers. The impact of risks and uncertainty should be expected, and mitigation efforts aimed at maintaining overall business continuity should be undertaken. Carbonara and Pellegrino (2018) stated that supply chain effectiveness represents the direct and indirect effects of the adoption of the mitigation strategy. Connecting the mitigation strategy with supply chain effectiveness is a crucial dimension associated with supply chain performance. The effectiveness of the supply chain shows how well an organisation achieves its financial and operating goals in the supply chain. These goals are achieved when the operations of a supply chain have the capability to balance cost and effectiveness (Gouda & Saranga, 2018; Gandhi et al., 2017). Adopting the appropriate mitigation strategy enables an organisation to manage operational risk effectively, sustain supply chain operations and recuperate from disruptions. These aspects enable the operations of the supply chain to be more responsive to customer needs, while holding less inventory and at lower cost (Gouda & Saranga, 2018; Boon-Itt et al., 2017).

Mathee (2005) explains that supply chain management is the focus of a crucial section of procurement reform in the Republic of South Africa. According to best practice, supply chain management has been accepted as a methodology towards achieving effective, efficient and economic utilisation of public resources in South Africa. In addition, the (re)construction of supply chain management is directly related to the use of preferential procurement to achieve the broad-based economic empowerment of previously disadvantaged South Africans. This is intended to ensure a better life for all. Currently, it is of vital importance that clients receive good quality products and services. This is a competitive advantage in the market as customers are continuously in need of quality products and services within a short turnaround time. This therefore requires building good relationships with suppliers and distributors (Mathee, 2005; El Wali et al., 2021).

The above is further substantiated by Ahmad et al. (2017) who state that the quality of a product is a crucial aspect that affects supply chain management. Producing products of low quality in the market may result in failure in their operational mode. This in turn affects the trust of customers in the organisation and creates a bad reputation for the organisation in the market. All this may eventually result in a huge financial loss for the organisation.

Mentzer et al. (2004) explain that uncertainties in the market are a result of the global orientation, increased competition, economic conditions, and new technology. These uncertainties necessitate greater flexibility from individual companies and their distribution channels. This in turn necessitates more flexibility in channel relationships. These factors make the supply chain important to any organisation. Ahmad et al. (2017), further emphasize that the supply chain comprises a network of facilities and distribution options that perform the functions of procurement of materials, conversion of these materials into intermediate and finished products, as well as the distribution of these finished products to customers. According to Thun (2005) and Ayyildiz and Taskin Gumus (2021), the process of the supply chain comprises all stages that are directly and indirectly associated with meeting the needs of a customer. This involves the manufacturer, suppliers, transporters, warehouses, retailers and customers.

Xue et al. (2021) further state that the objective of supply chain management is to mitigate the risks and uncertainties in the supply chain process that affect the inventory levels, cycle time, customer services and business processes. Agrawal and Lee (2016) argue that consumers hold companies responsible for not only the products they sell but for all other organizations that they are associated with during their products' production stages. Therefore, when consumers demand increased company transparency, they are also demanding transparency of the supply chain.

Dickinson and Yates (2021) explain that the government, similarly to the private sector, is usually challenged with deciding whether to manufacture or provide a service themselves or whether to outsource the function to an external vendor. The decision is made using a cost-benefit analysis to identify cases when it is not cost-effective to manufacture or provide a service themselves. The government is the biggest buyer in the country and is required to ensure that the procurement policy supports and achieves its overall goals and objectives. According to Ambe (2019), the state procurement policy is an important tool to leverage government expenditure in order to meet socio-economic goals.

Globally, societies expect more from businesses, while simultaneously losing trust in the industrial processes. This problem could be solved by transparency. Transparency involves companies taking

responsibility for events that occur at any point in their supply chain. These events can be upstream, or closer to the supplier, or downstream, closer to the consumer (Agrawal & Lee, 2016).

3.3 KEY ROLE PLAYERS IN SOUTH AFRICAN GOVERNMENT SUPPLY CHAIN MANAGEMENT

The National Treasury is one of the key role players in South African government supply chain management. Naidoo et al. (2018) recommend that the National Treasury develops both a procurement law to regulate and clarify the procurement process to be followed by procuring institutions in South Africa, and a policy framework for the execution of open contracting in the South African public sector procurement system. According to Mazibuko and Fourie (2017), the disadvantage for the administration of supply chain management in the South African public sector has always been a concern that it undermines the public's confidence in the procurement environment. Public procurement is the link between the public and private sectors and as such is vulnerable to procurement fraud and corruption. The National Treasury regulations remain one of the key elements that help to mitigate these issues (National Treasury, 2015).

Mazibuko and Fourie (2017) examined the manifestation of unethical procurement practices, tracing non-compliance with legislation, uncompetitive bids, awards to employees and family members, procuring fewer than three quotations, inadequate contract management and internal control, poor leadership, as well as irregular expenditure. This is further supported by Ebil (2019), who also examines the role of unethical procurement practices on the quality of government projects and indicates that unethical practices such as collusion, bribery, conflict of interest and bid rigging can impact the quality of government projects. Due diligence should thus be done on companies involved in the government's supply chain. Ambe and Badenhorst-Weiss (2012) explain that supply chain management workshops and training were conducted in 2004 across various government spheres, as part of the national treasury's strategic planning. The main objective of the workshops and training was to provide guidelines for the implementation of supply chain management.

The Table below identifies the key role players in South African government supply chain management and their functions.

Table 3.1: The key role players in South African government SCM and their functions

Key role players	Functions
National Treasury	Introduces and oversees the implementation of SCM; develops treasury regulations; issues guidelines, general conditions of contract and bid documents to accounting officer; sets minimum reporting standards; monitors policy outcomes.
Provincial Treasuries	Assist departments with the implementation of SCM; support departments by providing advice and building capacity; coordinate training in the province; monitor policy outcomes.
Accounting officer/ chief executive officers	Establish a SCM unit under the direct supervision of the Chief Financial Officer; compile and implement a SCM policy; adhere to guidelines and supporting documents for implementation, issued by the national treasury; develop internal procedures and processes; ensure that officials are trained adequately skilled; report to national treasury; comply with ethical standards.
Chief financial officer/ SCM units	Exhibit recruiting, selecting, developing and managing skills to build and maintain an effective SCM unit; employ training skills and resources to develop managers and supervisors to operate and manage varieties of SCM activities, facilities and networks.

(National Treasury, 2005)

The supply chain management process begins with a customer placing an order and ends when a customer concludes the process by making payment for the goods or services. The critical success factors in supply chain management are thus delivering the right product at the right quality and quantity, at the right place and time for the right price (Khan & Bae, 2017; Ben-Daya et al., 2019; Boon-Itt et al., 2017).

Regulations, policies and procedures governing supply chain management are described below.

3.4 LEGISLATIVE FRAMEWORK

3.4.1 Legislative requirements in respect of supply chain management

According to Naidoo et al. (2018), supply chain management policies are very complex and have a significant impact on the effective operation of the government and its competitive position. Public policy regarding supply chain management is influenced by several variables and large amounts of information. Political representatives will only be able to make informed and intelligent decisions if there is a proper legislative framework in place. The legislations that guide the supply chain management include the following:

3.4.1.1 Public Finance Management Act (PFMA) (Act No. 1 of 1999)

The Public Finance Management Act No.1 of 1999 (PFMA) is one of the most crucial pieces of legislation passed by the first democratic government in South Africa. The PFMA promotes the objective of good financial management in order to maximise the delivery of services through the efficient and effective use of resources. The PFMA aims to revolutionise the financial management system in the public sector; enable public sector management to manage and simultaneously be held more accountable; ensures that quality information is provided in a timely manner; and eradicates waste and corruption in the use of public assets.

The PFMA states that in a supply chain management system, the accounting officer or authority of an institution must develop and implement an effective and efficient supply chain management system for both the acquisition of goods and services and the disposal and letting of state assets, including the disposal of goods no longer required. This supply chain management system must be fair, equitable, transparent, competitive and cost effective; be consistent with the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000); and provide for at least the following: (i) demand management; (ii) acquisition management; (iii) logistics management; (iv) disposal management; (v) risk management; and (vi) regular assessment of supply chain performance. A supply chain management unit must be established within the supply chain management system mentioned above. Any official within this unit that becomes aware of a breach

of, or failure to comply with, any aspect of the supply chain management system must immediately report the breach or failure to the accounting officer or accounting authority, in writing. This will assist in identifying fraud within the supply chain management unit, without having to wait for an audit and to rely on their assessment of the unit (Ambe & Badenhorst-Weiss, 2012).

The PFMA further states that officials implementing the institution's supply chain management system should be trained and deployed according to the requirements of the Framework for Minimum Training and Deployment issued by the National Treasury. This is a key aspect that will assist in ensuring an effective supply chain management system.

Compliance with ethical standards is of vital importance in any organisation. All role players in a supply chain management system must comply with the highest ethical standards to encourage mutual trust and respect and create an environment where business can be conducted with integrity and in a fair and reasonable manner. Furthermore, the National Treasury's Code of Conduct for Supply Chain Management Practitioners must be adhered to by all officials and other role players involved in supply chain management. These role players must acknowledge and disclose any conflict of interest that may arise; treat all suppliers and potential suppliers fairly; not utilise their position for private gain or to improperly benefit another person; ensure that they do not compromise the credibility or integrity of the supply chain management system through the acceptance of gifts; be trustworthy in their use of public property; and assist accounting officers or accounting authorities in fighting corruption and fraud in the supply chain management system. Internal auditors can assess supply chain processes for effective internal controls to prevent, detect and correct non-compliance with legislation (Oussii & Taktak, 2018; Sambo, 2017; Jayaraman et al., 2019; Naskar et al., 2020).

The PFMA further stipulates that accounting officers may aid internal auditors in assessing supply chain processes by ensuring that the supply chain management system is not abused. This can be done by

- a) taking all reasonable steps to: prevent abuse of the supply chain management system
- b) investigate any allegations against an official or other role player of corruption, improper conduct or failure to comply with the supply chain management system, and - when justified

- (i) take steps against such official or other role player and inform the relevant treasury of such steps, and
- (ii) report any conduct that may constitute an offence to the South African Police Service;
- c) check the National Treasury's database prior to awarding any contract to ensure that no recommended bidder, nor any of its directors, are listed as companies or persons banned from doing business with the public sector;
- d) reject any bid from a supplier who fails to provide written proof from the South African Revenue Service that that supplier either has no outstanding tax obligations or has made arrangements to meet outstanding tax obligations;
- e) reject a proposal for the award of a contract if the recommended bidder has committed a corrupt or fraudulent act in competing for the particular contract;
- f) or cancel a contract awarded to a supplier of goods or services -
 - (i) if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract or
 - (ii) if any official or other role player committed any corrupt or fraudulent act during the bidding process or the execution of that contract that benefited that supplier (Public Finance Management Act No.1, 1999).

3.4.1.2 Preferential Procurement Policy Framework Act (PPPFA) (No. 5 of 2000)

The Preferential Procurement Policy Framework Act (PPPFA) (No. 5 of 2000) was approved by parliament to conform to the constitutional requirements on procurement of goods and services by organs of state. The Act aligns the procurement process regulations to the February 2022 Constitutional Court judgement. It comprises a framework to be used in applying the preferences in the public sector bidding system. Any department of the state implementing the preferences policy may only do that within the framework of the Act. The Preferential Procurement Policy Framework Act and the related regulations promote historically disadvantaged individuals (HDIs) and development objectives by allocating preference points to these various policy objectives (Preferential Procurement Policy Framework Act (PPPFA) (No. 5 of 2000)). This Act thus permits the National Treasury to make regulations or issue instructions applicable to all institutions to which the Act applies concerning the determination of a framework for an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost-effective (Watermeyer, 2011; Mahlangu & Mofokeng, 2018).

Selomo and Govender (2016) state that the South African government's supply chain management is weakened by mismanagement, including a lack of good governance and a procurement system that is not fair, justifiable, transparent and cost-effective. Susanty et al. (2018) consider the performance of supply chain management in the various government departments to be effectively a management responsibility. However, some departments are faced with challenges during the implementation of supply chain management processes and procedures (Mangla et al., 2018; Oncioiu et al., 2019; Aghapour et al., 2017; Susanty et al., 2018).

Furthermore, Selomo and Govender (2016) stress that procurement planning is inadequate and needs to be improved. These findings need to be understood in the context of the government's efforts to ensure effective supply chain management, which would in turn influence service delivery to its citizens. The South African government transitioned from managing public procurement using a procurement system that was rule-driven to using a supply chain management system predicated on establishing and implementing best practices. These best practices comprise: the need for achieving value for money; effective monitoring and reporting; developing the key procurement staff; and integrated procurement processes to focus on whole-life costs and benefits. The objectives with regard to good governance are to enhance effective procurement systems to enable the government to deliver quality services on time; attain continuous improvement in the value for money based on benefits and costs; and improve the competitiveness of suppliers by developing world-class procurement systems (Green Paper on Public Sector Procurement Reform in South Africa, 1997).

Taking all the above into account with regard to the Preferential Procurement Policy Framework Act and the successful implementation thereof will result in an effective supply chain management system. The existence of such does, however, not imply infallibility, but may significantly reduce the occurrence of irregularities (Akenroye et al., 2019).

3.4.1.3 Broad-based Black Economic Empowerment Act (BBBEE) (Act 53 of 2003)

The Broad-based Black Economic Empowerment Act (BBBEE) (No. 53 of 2003) creates a charter to enhance Black Economic Empowerment and provides codes of practice that may include the qualification criteria for preferential procurement and other economic activities (Ambe &

Badenhorst-Weiss, 2012). According to Shai et al. (2019), research has indicated that public procurement in the context of BBBEE in South Africa has achieved its objective of promoting economic transformation. However, there is a lack of effective monitoring and reporting systems, data, and comprehensive research to measure the implementation of BBBEE. Nevertheless, it is evident that there have been deliberate shifts in the evolution of BBBEE and its related instruments to enhance its implementation. The critical shifts have focused on the policy alignment, legislation and regulations, while also shifting the broader definition of empowerment away from the limited focus on ownership. Furthermore, research has indicated that the effectiveness of the intervention has been undermined by several challenges, which highlight the incoherence of several organs of state when implementing BBBEE policy. These challenges include fronting, non-compliance and corruption, empowerment of the politically connected individuals and wealthy black individuals at the expense of the targeted groups, and constraints relating to black-owned qualifying small entities. The Act should thus be implemented with due care and avoid unfair treatment of the different entities affected by it (Van Niekerk, 2019; Hoskins, 2020; Kithatu-Kiwekete & Vyas-Doorgapersad, 2020).

3.5 RISKS ASSOCIATED WITH SUPPLY CHAIN MANAGEMENT

The risks associated with supply chain management emerge from various industrial trends, which include outsourcing, supply base reduction, just-in-time inventory systems as well as shorter product life cycles. These risks may arise from natural disasters or man-made problems and may have major implications such as financial or operational challenges for organisations, which may possibly result in business discontinuity. Supply chain risk management has thus become a key area of academic interest (Fan & Stevenson, 2018; Craighead et al., 2007; Ravi & Venkata, 2015).

Waqas et al. (2019) highlighted that, although risk management is a crucial aspect in the research of supply chain management, there is still a lack of understanding of the concept of risk when applied to supply chains. The risks facing supply chains are increasing due to business uncertainties such as the difficulties inherent in connecting multiple outsourced partners. Organisations are experiencing serious challenges to cope with supply chain risks and have to develop effective supply chain risk management to mitigate these risks.

In the study cited above, supply chain risks are broken down into five categories, namely: supply risk, process risk, demand risk, financial risk, and environmental risk (Chen, 2013; Louw & Jordaan, 2016; Nyamah et al., 2017; Samvedi et al., 2013).

- *Supply risk* – Most organisations are dependent on outsourcing and as a result, rely on suppliers. Suppliers therefore play a very important role in the supply chain. Supply failures demonstrate supply risks, which increase the risk of poor-quality products, delays, product validity, market turbulence, etc. Organisations therefore need to rely on multiple suppliers to avoid such risks.
- *Process risk* – This risk is internal, results from within the organisation, and includes risks such as technology failure, machinery failure, logistics and infrastructure failures, management decisions, labour protests as well as quality assurance measures (Prakash et al., 2017).
- *Demand Risk* – This risk is typically associated with the product requirements in the market. For example, the potential risk from the supply of products from the manufacturer to the end user. It may also include the risk of product shortages when the demand for the product is higher than the supplier is able to meet (Nyamah et al., 2017).
- *Environmental risk* – These are external risks that can affect one rank/link individually or the entire supply chain. Examples include natural disasters, terrorism, political instability, cultural grievances, and economic crises. Such disasters greatly impact the supply chain depending on where they attack (Kumar & Bhat, 2014).
- *Financial Risk* – Financing is crucial at every level of the organisation. For example, investment is needed in inputs and to enhance production processes, however, funds are not always available or affordable. Producers can thus not accept the financial risk of borrowing to upgrade except in cases where the premium market is guaranteed. The risks are mostly concerned with the decisions to borrow, as there are only a few organisations that are able to repay the loans. As a result, financial risk could thus impact production, market access or purchasing of inputs (Nyamah et al., 2017).

According to the National Treasury (2004), fraud and corruption are yet another risk faced by supply chain management. The Government's policy on supply chain management stipulates that contractors are required to observe the highest standard of ethics during the selection and execution

of contracts. Corruption refers to the offering, giving, receiving or soliciting of anything of value to influence the public official's action in the selection process or in the execution of a contract. Fraud, as distinguished from corruption, refers to the misrepresentation of facts in order to influence the selection process or the execution of a contract to the disadvantage of the accounting officer, and includes collusive practices among bidders/contractors (prior to or after submission of proposals) designed to establish prices at artificial, non-competitive levels and to deprive the accounting officer of the benefits of free and open competition (Kohler & Dimancesco, 2020). The accounting officer must thus decline a proposal for an award if he determines that the supplier recommended for that award has engaged in corrupt or fraudulent activities in competing for the contract in question (Fazekas & Kocsis, 2020). The accounting officer may also insist that the contract include a provision where contractors permit the accounting officer to inspect the contractor's accounts and records regarding the contract performance as well as have the contractor audited by the appointed auditors (National Treasury, 2004; Akani & Ogbeide, 2017; Kohler & Dimancesco, 2020; Fazekas & Kocsis, 2020).

3.6 PILLARS OF SUPPLY CHAIN MANAGEMENT

Public procurement plays a crucial role in the economy and the country's public expenditure, and as a central aspect of public service delivery it can be viewed as a critical indicator of government effectiveness. Appropriate and successful government procurement is reliant on specific core behavioural principles, namely the five pillars of procurement. Without one of the pillars, the procurement system will break down (National Treasury, 2014; Fourie & Malan, 2020). These pillars are described below.

3.6.1 Value for Money

According to the General Guidelines of the National Treasury (2014), value for money is a crucial test in which a department substantiates a procurement outcome. Accepting the lowest price offer that meets all mandatory requirements does not necessarily mean that an organisation will obtain the best value for money, as price alone is not always a reliable indicator. The best value for money can be obtained when the best available outcome is achieved when considering all relevant costs

and benefits throughout the procurement cycle. It is also the responsibility of the procurement function to provide value for money and operate in a cost-effective way. According to Odoom et al. (2021), value for money in procurement is of vital importance to ensuring the optimal use of budgetary resources, given the limited resources available to the government institutions. Odoom, et al. (2021) investigated contract packages as an antecedent of value for money and competitive procurement as a mediating role. The study revealed that no relationship exists between contract packages and value for money. The study also found that competitive procurement does not have a significant influence on contract packages and value for money. It was thus recommended that a proper procurement process in the public sector is required to generate wealth, enhance transparency and accountability, encourage consistent procurement procedures and reduce corruption. Through this, it is possible to achieve value for money (Penyalver et al., 2019; McArdle & Gunning, 2018; Guarnieri & Gomes, 2019).

3.6.2 Open and Effective Competition

According to the General Guidelines of the National Treasury (2014), every contractor should have an equal chance to respond to a request for quotation or bid. Departments thus need to apply considerable care to achieve the best possible outcome from the market, by ascertaining that: prospective suppliers have reasonable access to procurement opportunities; departments recognise the fact that in some instances due to market circumstances, competition is limited and use alternative procurement methods; sufficient and timely information is provided to suppliers to enable them to bid; there is no favouritism or bias; and costs incurred in promoting competition are in line with benefits received. The above thus indicates that government entities must advertise their request for quotations and bids in a manner that a reasonable business organisation will be able to respond to coherently (National Treasury, 2014).

Competition is an approach to demonstrate that value for money is achieved when procuring goods or services. However, the preparation of quotations and tenders can have a significant cost implication for the industry. The minimum contract establishment method, described in procurement policies, has been designed to promote competition while minimising the cost to the

industry (Shai et al., 2019; Government of Western Australia, 2020; Fourie, 2017; Mazibuko, 2020).

3.6.3 Ethics and Fair Dealing

The General Guidelines of the National Treasury (2014), stipulate that in procurement, if all parties comply with ethical standards, they can deal with each other on a basis of mutual trust and respect and conduct their business in a fair and reasonable manner, with integrity. Fourie's study (2017) indicates that public trust and good governance are strengthened by public servants exhibiting ethics and integrity and by supporting public servants' responsibility to exercise stewardship and to utilise all resources in the most economical, efficient, and effective way. A comprehensive ethical framework results in a public sector environment that encourages high standards of professional ethics and integrity in public procurement. Abul Hassan et al. (2020), and Mazibuko (2020), indicate that in applying procurement practices the public's confidence can be impacted by unethical public procurement practices, as it is predominantly at the initial phase of a tender planning procedure. It is thus crucial that leadership should value professionalism in the procurement environment. Officials in the procurement environment should conform to the official code of conduct. This includes not following suppliers during the bid phase, providing suppliers with identical information during the solicitation phase, linking the specification to function and to performance, and not permitting individuals having a personal or financial interest with suppliers to be involved in the process (Wu, 2020; Ahsan & Kumar, 2018; Pillay, 2021).

3.6.4 Accountability and Reporting

According to the General Guidelines of the National Treasury (2014), this pillar involves ascertaining that individuals and organisations are accountable for their plans, actions and outcomes. An essential element of accountability is transparency in administration, through public reporting. The responsibilities of management in the public sector within the procurement framework are as follows:

- Heads of departments are accountable to their ministers for the overall management of procurement activities;
- Heads of procurement and senior procurement directors are accountable to heads of departments for high-level management and coordination activities;
- Individual procurement officers are accountable to heads of procurement, and to their clients, for the services they provide; and
- All people exercising procurement functions are accountable to management (National Treasury, 2014).

Accountability and reporting are thus two-way streets. A potential supplier must be able to account for their actions and plans as well as ensure that there are good reporting techniques built into the bid. Government departments must report to their superiors and be held accountable for their actions in relation to procurement (National Treasury, 2014; Kohler & Dimancesco, 2020; Aboojee, 2019; Enweremadu & Ifejika, 2017).

3.6.5 Equity

The General Guidelines of the National Treasury (2014), stipulate that the main objective of this pillar is to support businesses benefitting previously disadvantaged individuals (PDIs). A good procurement policy will address equity as a main feature in the procurement process. This pillar is crucial to public sector procurement in South Africa. It ensures that the government is dedicated to economic growth by implementing measures to support the industry and especially to promote the development of small, medium and micro enterprises (SMMEs) and previously disadvantaged individuals (National Treasury, 2014; Alkadry, Trammell & Dimand, 2019; Syme, 2017).

Thai (2017) states that public procurement continues to grow both conceptually and organizationally. Most governmental entities in numerous countries are facing challenges of budget constraints; government downsizing; public demand for increased transparency in public procurement; and greater concerns about efficiency, fairness and equity.

3.7 RESPONSIBILITIES OF ACCOUNTING OFFICERS

According to the National Treasury (2004), accounting officers should ascertain that bid evaluation committees are provided with a formal set of delegations which should be made up of at least three members, where at least one should be a supply chain custodian. For example, the National Treasury (2004) requires that, where it may be necessary, independent experts may be appointed to a bid evaluation committee in an advisory capacity. It is crucial for accounting officers or authorities to exercise due care to ensure that standard bid documents are used for all standard procurement of goods and services. The responsibility lies with the Supply Chain Management Office in the National Treasury to provide the latter documents. In instances where the standard bid document cannot be used, the accounting officer/authority should provide written approval for the deviation, and such should be documented for audit purposes (National Treasury, 2004). The accounting officer must also take all reasonable steps to ascertain that the necessary tools are in place to mitigate the likelihood of fraud, corruption, and favouritism. The overall responsibility for the implementation of the supply-chain management policy lies with the accounting officer (Munzhedzi, 2021; Sewpersadh & Mubangizi, 2017).

In terms of sections 62 and 95 of the Municipal Finance Management Act (No. 56 of 2003), accounting officers are fully responsible and should be held accountable for any expenditures relating to supply chain management within their line of responsibility. Any expenditure that is incurred should be based on appropriate regulations and accounting officers' directives and procedures. However, to ensure consistency within the supply chain management system, guidelines issued by the National Treasury will provide the necessary parameters. It is the responsibility of each accounting officer to implement the supply chain management policy adopted by the council. The accounting officer may develop an implementation plan to assist with managing the implementation of the supply chain management policy (National Treasury, 2005). According to municipality policy, a supply chain management unit should be established. It is the responsibility of the accounting officer to ascertain that the supply chain management unit is staffed appropriately. As supply chain management is an integral part of financial management, the supply chain management unit should preferably operate under the direct supervision of the Chief Financial Officer. Municipalities should thus ensure clear lines of authority and

accountability, as well as performance criteria, that will contribute towards mitigating risk, improving sourcing procedures and processes, and improving asset and inventory management (National Treasury, 2005).

Chu et al. (2017) indicate that top management within the supply chain plays a significant role in securing financial and personnel resources. Management also has an essential role in promoting changes, which is crucial in adopting the organisational commitment to new values. The support by top management has been analysed in various business sectors, including customer relationships, product development, information systems and project success. Chu et al. (2017) further state that when top management values organisational learning, and when it is shared through the organisational routine, infrastructure and culture, the knowledge will result in high performance. Top management is thus the essential driver of the supply chain management system.

3.8 INTERNATIONAL PERSPECTIVES ON THE SUPPLY CHAIN MANAGEMENT SYSTEM

Borson (2017) indicates that the World Bank is undergoing a critical restructuring of its procurement policy which governs the procurement processes of projects that are financed by the Bank. This restructuring is a critical move from how the Bank used to function. It is a move from a one-size-fits-all-all technique to a fit-for-purpose technique. The bank usually provides financial assistance for the development of projects, and its policies relating to procurement are crucial for the development of the community, more specifically those developing countries that depend on the Bank for financial assistance to establish major development projects. This new approach explained above is highlighted in the Bank's procurement framework, which presents five key principles, namely: fit for purpose, value for money, integrity, transparency, and fairness. Rappleye and Un (2018) indicate that the new approach reveals that wealth could be generated by investing in universities to make them more innovative so they can capitalise on knowledge creation and the use thereof. This is irrespective of where a country is located, what natural resources it has or what macroeconomic policies might be in place (Yukins & Williams-Elegbe, 2018; McLean, 2017).

Meriton and Graham (2017) emphasize that globalisation intensifies the risks associated with the supply chain since the resulting dependencies might lead to risks on the demand side as well as the supply side. Based on the strategic importance of supply chains, disruptions and the related financial and operational risks exemplify the major concern that competing organisations face in the global marketplace. Research has proven that supply chain disruptions are costly in nature, for example, during mega-disasters, such as the Great East Japan Earthquake and the Thailand floods; interdependencies in supply chains caused substantial economic damage (Haraguchi & Lall, 2015). This is further illustrated by the port explosions at Beijing's maritime gateway that affected most organisations with offices in Tianjin, where the automobile division took the hardest hit (Ponis & Koronis, 2012). It is thus crucial that international supply chains are resilient in order for organisations to overcome their vulnerabilities, effectively respond to disruptions and improve competitiveness. An international supply chain that is resilient has the ability to manage disruptions by enabling the supply chain to bend rather than to break and thus enhances the sustainable competitive advantage of organisations (Ambulkar et al., 2015; Mladenow et al., 2016; Meriton & Graham, 2017).

3.9 DIFFERENCES IN APPROACH IN THE PUBLIC AND PRIVATE SECTOR SUPPLY CHAINS

Research indicates that viewpoints of public procurement professionals and their private sector counterparts are different with regard to supply chain management. In order to comprehend these differences, it is crucial to understand the concept of public procurement (Li, 2011; Gelderman et al., 2017; Islam et al., 2017; Guarnieri & Gomes, 2019). According to Starzyńska (2019), public procurement is a powerful tool for promoting the economic policies of individual countries, and the value of all the examples of public procurement is estimated to be 13% to 20% of the world's GDP. Public procurement as a tool of economic policy in various countries is significant in a multitude of areas. The public spending process, which includes public procurement, may be intended to accomplish several goals. The main purpose is awarding the contract for the good or service required. Secondary effects may entail the promotion of contracting organisations' behaviours focused on accomplishing social and economic goals. Awarding a public procurement contract enables the government, without additional spending, to influence the behaviour of the

contracting organisations (Uyarra et al., 2020; Grandia & Voncken, 2019).

Li (2011) states that in public works and government service, billions of dollars are spent each year on the provision of goods and services to agency and departmental initiatives. Part of the biggest expenditure in South Africa is the public sector procurement and it is decentralised within a strictly controlled legislative environment, where processes are prescribed, and the relevant norms and standards are continuously monitored. Li (2011) further argues that not only in South Africa but around the world, many practitioners still consider the terms supply chain management and procurement to be interchangeable. However, numerous academics and industry professionals have distinguished between the two terms (Zhu et al., 2018; Gelderman et al., 2017). Supply chain management entails the management of interlinked activities within a value-adding chain; while procurement management is an element within a supply chain which primarily focuses on the sourcing and purchasing of goods and services within the supply value chain (Zhu et al., 2018). The interlinked activities within a value-adding chain stated above include, but are not restricted to, planning, procurement, manufacturing, distribution and customer service. Procurement is thus an activity to plan, implement and control the sourcing and purchasing of tangible or intangible goods.

McCue and Pitzer (2005) explain that public and private procurement professionals are basically different in their fundamental goals and practices. Public sector practitioners are governed by legislative authorities, laws and regulations, while private sector practitioners are governed by boards of directors and business plans. Public entities generate revenues from taxes and fees and use these funds to serve the public. Private companies on the other hand generate revenue by selling goods and services in order to make a profit (Rouhani et al., 2018). McCue and Pitzer (2005) further state that strategic supply chain management has redefined private sector purchasing. However, the public sector remains unable to establish strategic supply chain partnerships due to rules and regulations constraints. In the South African public sector, the National Treasury is the head of the supply chain management unit. It develops laws, policies and regulations governing the implementation of supply chain management. Several characteristics have been described for public sector purchasing, including the following: perceived lack of interest in expenses and other inventory carrying costs; lack of traffic and transportation expertise;

lack of confidentiality when dealing with suppliers; and emphasis on competitive bidding in the procurement process.

According to Migiro and Ambe (2008), the main aim of supply chain management is to add value at each stage of the process from the demand phase to the acquisition of goods and services, management of the logistic process, and after use. However, various studies have indicated that the implementation of supply chain management practices is far from being satisfactory. This is caused by a lack of staff members with the required skills, knowledge and experience to implement supply chain management effectively as per the supply chain management policy in several departments and municipal entities (Abualrejal et al., 2017; Singh, 2020; Aich et al., 2019). Supply chain management from the public sector perspective is described as a tool of procurement that integrates the entire procurement process strategically; contrary to this, from the private sector perspective, Mason-Jones (2004) argues that procurement is an important central element of supply chain management and supply chain management involves all functions throughout organisations, from marketing and production to procurement. Private sector procurement is more receptive to entrepreneurship and innovation while public procurement is based on legislation, policy and process. Public sector procurement accommodates a wider range of stakeholders, and the emphasis is on accountability and transparency (Giuffrida & Rovigatti, 2018).

3.10 SUMMARY OF THE CHAPTER

This chapter evaluated the effectiveness of supply chain management. It is indicated that organisations must adopt strategies to enhance their ability to respond quickly and cost effectively to unforeseen disruptions such as natural disasters, man-made disasters and financial disasters. It is thus crucial for management to be knowledgeable and fully comprehend the risks associated with supply chains. The realization of one risk may lead to several other disruptions and negatively affect the supply chain management effectiveness. The key role players of the South African government supply chain management and their functions were explored as well as the respective policies and procedures and regulations.

Supply chain management policies are very complex and have a significant impact on the effective

operation of the government and its competitive position. The making of policy in support of supply chain management is influenced by several variables and large amounts of information. Political representatives will only be able to make informed and intelligent decisions if there is a proper legislative framework in place.

In the South African public sector, the supply chain management system is mainly (but not exclusively) governed by the Public Finance Management Act (PFMA), the Broad-based Black Economic Empowerment Act (BBBEE) and the Preferential Procurement Policy Framework Act (PPPFA). By contrast, private sector governance in South Africa is mainly guided by the King Reports on Corporate Governance.

Supply chain management enables organisations to reduce costs and improve quality and the effectiveness of the organisation. The main differences between supply chain management in the public sector and the private sector are that in the private sector, supply chain management is more profit-driven while minimising production costs, whereas in the public sector, it is used as a tool to improve quality service delivery to the public.

The chapter also emphasizes that appropriate and successful government procurement is reliant on specific core behavioural principles, namely the five pillars of procurement. Without one of the pillars, the procurement system will break down. The responsibilities of accounting officers were also analysed. The accounting officers should ascertain that the bid evaluation committees are provided with a formal set of delegations which should be made up of at least three members, where at least one should be a supply chain custodian. Lastly, the chapter provides an international perspective on the supply chain management system, it is emphasized that globalisation intensifies the risks of the supply chain since resulting dependencies might lead to risks on the demand side as well as the supply side. Based on the strategic importance of supply chains, disruptions and the related financial and operational risks exemplify the major concern that competing organisations face in the global marketplace.

CHAPTER 4

THE EFFECTIVENESS OF INTERNAL AUDIT IN DETECTING AND PREVENTING SUPPLY CHAIN MANAGEMENT FRAUD

4.1 INTRODUCTION

This chapter is divided into two sections examining the effectiveness of internal audit in detecting supply chain management fraud and the effectiveness of internal audit in preventing supply chain management fraud. **Section A** starts by defining internal auditing and evaluates the effectiveness of internal auditing and fraud detection as well as supply chain fraud. It further presents the signs of fraudulent activities and behaviour as well as strategies to mitigate fraudulent activities. **Section B** starts by assessing how internal auditors can function as a third line of defence in preventing supply chain fraud and evaluates the effectiveness of internal audit in this role. Lastly the chapter concludes with the summary of the chapter.

4.2 SECTION A

4.2.1 Defining Internal Auditing

The Institute of Internal Auditors defines internal auditing as an independent, objective assurance and consulting activity designed to add value and improve an organisation's operations. It helps an organisation accomplish its objectives by bringing a systematic, disciplined approach to evaluating and improving the effectiveness of risk management, control, and governance processes (Institute of Internal Auditors, 2012).

Al-Akra et al. (2016) explain that an objective activity, in the definition described above, is not necessarily established within the organisation but can also be provided by an external party. This means that quality internal audit services can be obtained through outsourcing. The responsibility to provide assurance and consulting activities requires that internal auditing be pro-active, and customer driven, as well as concerned with crucial issues in control, risk management and governance. Highlighting that internal audit is designed to add value and improve the

organisation's operations, simply emphasises the crucial contribution or role that internal audit plays in any organisation (Zou, 2019). Furthermore, by considering the whole organisation it becomes clear that internal audit has a broad mandate to assist the organisation in achieving its overall objectives. The IIA definition assumes that controls are only in place to assist the organisation with risk management and to enhance effective governance. It is not a big step to include addressing SCM fraud and fraud risk to expand its working domain to include risk management, control and governance processes (Ganesan et al., 2017; Zou, 2019; Tamimi, 2021).

Ramamoorti (2003) states that information provided by internal auditors enhances both internal and external decision-making, thereby enhancing the effective and efficient deployment and use of scarce organisational and economic resources. Internal audit is a crucial part of modern business as it plays a very important role in achieving the organisational objectives by bringing a systematic and disciplined approach to evaluating and improving effective risk management, control and governance processes.

From the above explanation of internal auditing, it is evident that internal auditing has evolved over the years and has gained a crucial role within organisations. With this development of internal auditing, the internal audit function has a wider responsibility towards the organisation itself and its stakeholders. By providing extended assurance and consulting services to the organisation, particularly to the audit committee and executive management, the internal audit function effectively contributes to improved organisational governance (Jones et al., 2017; Raiborn et al., 2017). Mupini (2018) argues that the lack of an internal audit function has led to the collapse of many large organisations in recent years. This necessitates the need for regular internal audits with clearly defined scopes. However, it is also crucial that internal audits are planned in such a way that they provide appropriate and timely information and assurance, assisting management in taking corrective measures in instances where irregularities or shortcomings are highlighted during the internal audit. The prevalence of fraud in many organisations demonstrates the need for effective internal controls. Identifying the role of internal audit in enhancing effective governance and managing risk allows this research to assess the ability of internal audit to address fraud. This chapter will thus analyse whether detection of fraud is positively influenced by the effectiveness of internal audit or the responsibilities of internal auditors.

The next section will analyse the effectiveness of internal auditing with regards to fraud detection.

4.2.2 The Effectiveness of Internal Auditing and Fraud Detection

The effectiveness of the internal audit function can improve the quality of the organisation (Coram et al., 2006; Bananuka et al., 2018; Ar'Reza et al., 2020). For example, Drogalas et al. (2017) conducted a study to explore the relationship between fraud detection and internal audit's effectiveness, responsibilities, and training, using a survey of companies listed in the Athens Stock Exchange. The results show that audit effectiveness, auditor responsibility and auditor training positively and significantly affect fraud detection successes. It further reveals that the importance of internal audit in detecting fraud requires organisations to invest in internal audit processes and training in order to achieve the organisational objectives.

Fajar et al. (2000) agree that internal auditors have the responsibility to detect fraud. Their study on the Competence and Workloads of Internal Auditors' Fraud Detection Ability, using a qualitative method through interviews, indicated that in detecting fraud, internal auditors should demonstrate good abilities, necessary competence, and the appropriate level of education, training and experience.

The role of internal auditor in detecting fraud thus depends on the internal auditor's abilities and professional training (Drogalas et al., 2017). Krambia-Kapardis and Papastergiou (2016) highlight that, although research indicates that it is not the formal responsibility of internal auditors to detect fraud, internal audit still plays a major role in detecting fraud. Cohen and Sayag (2010) further state that internal audit has become an essential tool for management to achieve effective internal control in both public and private organisations. Control mechanisms refer to those processes that monitor, direct and promote or restrain the various activities of an organisation to ensure the organisational objectives are met. The detection of weaknesses in management operations by internal audit provides a basis for rectifying deficiencies that have avoided the first line of defence, before these deficiencies become difficult to control, or are exposed in the external auditor's report (Fathalipour & Abdollahi, 2020).

According to Drogalas et al. (2017), while the detection of fraud is quite complex it is not impossible. It is thus more effective for any organisation to deter fraud first through management, then by creating a positive control environment and lastly by recruiting individuals who are fit for purpose and trustworthy in the internal audit department. These individuals are trained and will implement preventative methods through several processes to help identify fraud in a simpler way. Drogalas et al. (2017) further states that an effective system of internal control should be implemented in order identify and reduce wrongdoing and fraudulent activity. An effective system of internal control can also be enhanced through a good relationship between internal audit, external audit and the audit committee. This will ensure the smooth operation of business and effectively contribute to fraud detection and fraud management (Salleh & Suryanto, 2019; Mui, 2018). Monisola (2013) has indicated in his research that the existence of an internal audit department in an organisation increases the control of corporate errors, irregularities, and fraud. Organisations that have established internal audit functions detect fraudulent activities more easily than organisations that do not have internal audit functions. Further research indicates that the main goal directing the behaviour of auditors with regard to creative accounting practices affecting financial assets, is not only to detect fraud and irregularities, but to assess the effectiveness of internal audit and making recommendations that aim to prevent and track fraud and irregularities (Umobong & Ironkwe, 2017; Karim et al., 2017).

Drogalas et al. (2017) emphasize that when an internal auditor becomes aware of fraud, it is crucial that they gather all the necessary information to identify the parameters and circumstances under which the fraudulent activity has taken place, and to obtain a complete overview of the incident. Furthermore, for internal audit to be more effective, it requires constant development of internal auditors through training. An internal auditor is an individual that has a high-level of knowledge, skills and abilities, and by following international internal audit standards, ensures a more effective control (Mui, 2018).

Fraud is very difficult to trace. One main reason for this may be that internal auditors may not have adequate experience in identifying falsified financial data. Fraud training entails simulation of fraud cases, which helps internal auditors gain exposure to key experiences, enhance their performance and improve their ability to detect evidence that indicates fraud. Drogalas et al. (2017)

indicated that auditors who attend specialised fraud training are more likely to detect fraud than those who attend a standard auditing course (Mui, 2018; Westhausen, 2017; Hazami-Ammar, 2019).

Fraud has a major effect and it is therefore of vital importance for organisations to have effective internal control systems. Due to the significance of internal audit, the development of many fraud mitigation practices, unpredictable financial management practices and organisational resources have since increased (Umar et al., 2019). Poor management of internal controls is likely to be correlated with high levels of fraudulent activities (DeZoort & Harrison, 2018; Umar et al., 2019). Employees are more likely to commit fraud if they believe they can take advantage of poor internal control systems. Fraudulent activities may take a while to be detected due to not having an adequately staffed and skilled internal audit function.

Salameh et al. (2011) indicate that research has revealed that internal audit functions are perceived to be effective in preventing fraud. Furthermore, in-house internal audit functions are perceived to be more effective in fraud prevention than outsourced internal audit functions. One of the main reasons for the latter is that the in-house internal audit functions are more knowledgeable about the organisational culture, policies and procedures than outsourced auditors. Internal auditors should undergo detailed training programs to obtain sufficient knowledge in fraud prevention and detection. Coram et al. (2006) states that, although the internal audit function is an important and effective part of an organisation's corporate governance, there remains a major public concern about the occurrence of fraud within organisations. Studies have been conducted to evaluate whether organisations with internal audit functions are more likely to detect fraud than those that do not have an internal audit function (Coram et al., 2006, Bananuka et al., 2018). It was found that organisations with their own internal audit functions are indeed more likely to detect fraud than those without. Furthermore, organisations that outsource their internal audit function are less likely to detect fraud than those that have their own in-house internal audit function. This therefore suggests that internal audit adds more value through the improvement of control and monitoring the environment within the organisation to detect fraud. Having an internal audit function within the organisation is thus more effective than entirely outsourcing the function (Bananuka et al., 2018).

The next section will focus on supply chain fraud with regard to how it unfolds and how it can be limited through internal audit and other measures.

4.2.3 Supply Chain Fraud

Salameh et al. (2011) describe fraud as any intentional deception to deprive another person of their property or right, whilst the Institute of Internal Auditors (2023b) defines fraud as any intentional act or omission designed to deceive others, resulting in the victim suffering a loss and/or the perpetrator achieving a gain. There are two techniques in which a material misstatement could occur regarding fraud: misappropriation of assets and fraudulent financial reporting. Misappropriation of assets refers to the theft of company assets that may result in the company's financial statements being materially misstated (American Institute of Certified Public Accountants, 2008).

According to Lacefield (2017), supply chain fraud may include corruption, bribery, kickbacks, or instances where the supply chain manager provides preferential treatment to one supplier over others. Other examples of supply chain fraud include non-compliance with contract terms by suppliers, over-pricing from suppliers, suppliers over-stating the hours worked or invoicing for material that was not delivered. Most organisations realise only at a later stage when there is a financial loss that they have in fact been victims of fraud. Supply chain analytics are very important as the software can identify patterns of risk or trouble spots before money has been paid; as an example, there may be instances where one supply chain manager is more likely to sole source a contract than other procurement managers who are working on similar projects; or some contractors might be favoured where they receive payments earlier than others. This could be an indication of fraud, although there might be valid reasons why that is happening. Thus, a report from the analytics software may be used as a tool to alert the organisation that it needs to take a closer look at what is happening.

Lacefield (2017) further reveals that most organisations are using analytics as a method to detect fraud, and this indicates that supply chain fraud is being taken seriously. One of the major concerns is that even though recent research indicates that a third of the respondents have been victims of

supply chain fraud, supply chain fraud does not receive as much attention in the enterprise risk management process as other risks. This could be because organisations are aware of fraud risks, but make the mistake of believing it could happen elsewhere and not necessarily in their own organisations. Organisations could benefit a great deal if they could consider the types of fraud they may be susceptible to and learn from past fraud that has taken place within the organisation as that will enable them to strengthen their internal controls (DuHadway et al., 2020; Patterson et al., 2018; Yan et al., 2020).

Looking at the above examples of supply chain fraud, it is clear that the usual perpetrators are procurement/supply chain officials and/or vendor companies and vendor employees. McNamee (2016) explains that supply chain officials understand how auditors operate and know exactly what auditors look for when they try to detect fraudulent activities. Supply chain officials are usually trusted employees and can cover their misconduct very well. Contractors that work with government agencies are usually repeat customers. They usually know how the procurement process works as they have previously worked with supply chain officials and in most cases have built relationships with them. McNamee (2016) further states that some fraudulent activities are easily carried out as technology enables the perpetrators to falsify documents with relative ease (UI-Hameed et al., 2019; LeBaron et al., 2017; Westhausen, 2017).

By taking the above into consideration regarding supply chain fraud, it is important to determine how proactive the government may become in combating supply chain fraud. The complexity of supply chain fraud means that expert skills are required to detect and combat it. The amount of damage that may be caused by such fraud means that such expertise will typically provide value for money.

According to McNamee (2016), auditors and investigators in the various government organisations should be encouraged to acquire the Certified Fraud Examiners (CFE) credential. Certified fraud examiners are properly trained in fraud prevention and deterrence through strengthening of internal controls, strengthening policies regarding fraudulent conduct, and creating training programs to properly train employees on avoiding fraudulent conduct (Bekiaris & Papachristou, 2017; Bishop et al., 2017; Bunn et al., 2019). Encouraging employees to acquire the CFE credential will benefit

both the employees and the organisation. Those who obtain the CFE credential are required to complete continuing education points, which will keep them abreast of current techniques and strategies through conferences, classes and other educational methods. They will thus be able to provide assistance to organisations in strengthening internal controls, implementing ethics programs and policies with the latest standards and practices (Bishop et al., 2017). Personnel with the CFE credential can greatly assist with the prevention and detection of supply fraud. Organisations could capitalize by training their internal auditors not only in the established audit procedures but also in developing their sense of responsibility regarding the internal audit procedures (Drogalas, et al., 2017).

Taking the above into consideration, we can see that internal audit on its own cannot fully prevent and detect fraud. However, it plays an important role in helping with fraud prevention and detection. Should internal auditors wish to become fraud experts, they may enhance their knowledge, skills and experience by obtaining the Certified Fraud Examiners credential. Another way of enhancing the effectiveness of internal audit in detecting supply chain fraud is through information technology (Anders, 2020; Westhausen, 2017).

The next section will focus on recognizing the signs of fraudulent activities as well as the behaviour there-of.

4.2.4 Signs of Fraudulent Activities and Behaviour

According to Patterson et al. (2018), it is of vital importance for management to recognize the signs that may indicate a fraudulent activity. These red flags may be grouped as follows: behavioural, transactional, systems and corporate. Behavioural red flags may be seen when an individual's behaviour starts changing unexpectedly. For an example, should an employee start living a luxurious life while still receives the same salary, this may indicate that there is another external source of income stemming from the fraudulent behaviour. Possible indications of fraud may be the purchase of expensive cars, jewellery, houses and vacations. Another example of a behavioural red flag may be when a person does not go on annual leave or refuses to take time off work. This indicates that the individual wants to be continuously present in order to hide/protect

their fraudulent activities.

The next category is transactional red flags, which refers to unusual employee behaviour regarding external relationships or business transaction documentation. These actions may entail conducting business with organisations/intermediaries that only have a few employees and/or no physical office locations. Furthermore, such organisations/intermediaries may be located in traditional tax havens, or only have a post office box number as its address. The buyer may also insist on doing business with a specific supplier and not be willing to consider other suppliers without any valid explanation for that preference.

Patterson et al. (2018) explain that the systems category relates to the misuse of IT anti-fraud systems. These red flags may involve actions such as a key employee disabling audit logs or financial controls to prevent the automatic review and detection of potentially fraudulent activity. Other examples include when an unauthorised employee fraudulently logs on to the system as another individual who is an authorised user, or an individual may have several failed login attempts in a short space of time. These are all examples of systems red flags.

The last category of signs of fraudulent behaviour is corporate red flags. These involve excessive pressure being placed on management, employees or contractors to commit fraud in order to meet performance goals. This pressure may result from mergers or acquisitions that have not undergone a proper due diligence process. Managers often exercise their individual authority, making decisions about certain suppliers, thus circumventing the normal supplier selection process. All this can give rise to fraudulent activities (Baader, 2018; Sandhu, 2020; Patterson et al., 2018).

Coenen (2012) argues that supply chains across the world can unintentionally create a laissez-faire culture regarding the detection of fraud as well as effective management as a result of lack of transparency and visibility. This complacency attitude may allow fraud to often continue with very little chances of being detected. In many occasions, perpetrators are detected through anonymous tip offs regarding suspected fraud. When these tips are evaluated, the organisation needs to thoroughly investigate the possibility of fraud, as well as identifying and remediating the underlying gaps in its policies and procedures. Organisations can lessen their exposure to potential

fraud through an establishment of an organisation-wide fraud awareness culture (Coenen, 2012; Shepherd & Button, 2019; Lukmanjaya, 2019).

The next section will focus on how fraudulent activities and behaviour, once identified, may be mitigated.

4.2.5 Strategies to Mitigate Fraudulent Activities

According to Patterson et al. (2018), organisations may be aided in mitigating potentially fraudulent activities through control mechanisms, namely prevention and detection. Preventative controls include management tools such as the corporate culture, specialised programmes/techniques, development programs, as well as establishing pre-emptive programs. These activities should be visible so that all supply chain custodians (such as employees, contractors and suppliers) are fully alert to fraud and aware of what will happen should the organisation discover fraudulent activities.

Fraud detection and mitigation strategies are described as control mechanisms that require top management to develop systems of policies intended to prevent fraud and detect fraudulent activities as early as possible (Hamdani & Albar, 2019). Predominantly, procedures should be drafted to ensure that there is proper segregation of duties in place, whereby no one individual is allowed to access both a transaction and the approval thereof (Olatunji & Adekola, 2017). Some procedures for fraud reporting allow anonymity to prevent possible retribution. However, management should ensure that the culture in the organisation is not hostile, and that employees and contractors are not micromanaged.

Detection controls function behind-the-scenes and focus on early detection of fraud and potentially fraudulent activity patterns prior to escalation. Detection controls highlight monitoring of routine and ad-hoc processes and include activities such as document reconciliation, cycle counting and an effective and thorough approval process. Lastly, an organisation should develop a system of routine internal audits that will highlight any activity that may be susceptible to manipulation (Olatunji & Adekola, 2017; Hamdani & Albar, 2019; Mangala & Kumari, 2017).

Table 4.1: Detection and mitigation strategies

<i>Examples of detection Controls</i>	
<p>Monitoring routine and ad-hoc processes through:</p> <ul style="list-style-type: none"> • Reconciliation of documents • Inventory count • Comprehensive approval process 	<p>Updated systems such as</p> <ul style="list-style-type: none"> • Warehouse management systems • Transportation management • Enterprise resource planning system • Routine electronic auditing systems
<p>Conducting routine audits on</p> <ul style="list-style-type: none"> • Inventory • Contractual terms • Receiving processes • Return processes 	<p>Red flags include:</p> <ul style="list-style-type: none"> • Supplier’s contact details match those of an employee; • No approved purchase order, no good received note, no indication of received service for an invoice that was paid

(Adapted from Patterson et al., 2018)

According to Petraşcu and Tîeanub (2014), management of the organisation should be aware of the different warning signs of fraud, such as changes in behaviour or lifestyle of employees. This enables them to set up a sound support systems such as family counselling, addiction counselling or financial counselling for the employees, which may reduce the incentive for employees to commit fraud. As explained above, a crucial step in preventing and detecting fraud is the development of a sound internal control system that aims to: 1) consider the principle of proper segregation of duties (this means that no function should allow an employee to process a whole cycle of transactions: for example, front and back office transactions); 2) evaluate employees on their qualifications, competence and education; and 3) investigate employees as well as third parties, specifically in cases of employees in positions of authority in the process of financial reporting. This means that proactive data analysis regarding fraudulent activities in order to identify connections between different individuals may assist to detect potential fraud and professional irregularities that may go unnoticed by management (Ibrahim et al., 2017).

Another aspect that may assist in fraud prevention is the organisation’s attitude towards the perpetrators of fraud. It is thus crucial to create a culture of intolerance towards fraud by acting consistently when contravention of financial controls is discovered. This will enable employees to

thoroughly understand what the consequences of fraud are and that detection is certain (Ibrahim et al., 2017; Agbenyo et al., 2018).

Applying all the above, in an attempt to prevent or mitigate fraud, will result in an organisation that has limited fraud through effective internal control systems.

4.3 SECTION B

4.3.1 Internal Audit as a Third Line of Defence

According to the Institute of Internal Auditors (2013), internal audit provides assurance on the effectiveness of governance, risk management and internal controls. This scope of assurance is reported to senior management and the governing body and entails the following: (1) comprehensive objectives which include efficiency and effectiveness of operations; safeguarding of assets; reliability and integrity of reporting processes; and compliance to laws and regulations, policies, procedures and contracts. (2) Elements of risk management and internal control framework including internal control environment; elements of the organisation's risk management framework (identification and assessment of risk and risk response); information and communication; and monitoring. (3) The overall organisation, subsidiaries, operating units and functions (Institute of Internal Auditors, 2013; Braam & Peeters, 2018).

It is thus important for every organisation to establish a professional internal audit activity. This is not only important for large and medium entities but also equally important for small entities as they may also be involved in complex environments; they may be equipped with less formal and robust organisational structures to ensure effectiveness of its governance and risk management processes. Internal audit adds value to effective organisational governance by fostering its independence and professionalism. This can be achieved by having an internal audit function that acts in accordance with the recognised International Standards of Internal Auditing, reporting to the highest level in the organisation, thus, to perform its duties independently, and having an effective reporting line to the governing body (Institute of Internal Auditors, 2013; Kabuye et al., 2017; Raiborn et al., 2017).

Assurance is also provided by external independent bodies such external auditors and other external bodies. While internal audit is more familiar with an organisation than the external bodies are, these external bodies can bring new and valuable viewpoints. The external status is evident to third parties, and this indicates that they are not just independent but are also seen as independent. Every line of defence is important and can provide robust assurance, and no one line of defence is necessarily of better quality than another (Institute of Chartered Accountants in England and Wales, 2020; Maroun, 2019).

Internal audit has been classified as a third line of defence by the Institute of Internal Auditors. According to Westhausen (2017), internal audit has been by far one of the strongest anti-fraud controls in recent decades. He further states that internal audit quality and its effectiveness rest on its willingness to adopt new analytical methods, specialised software tools and professional certifications, and this has led to almost continuous improvements over the years. However, all these efforts are hardly reflected in statistical or research data, particularly not in the top sources of fraud detection. The ACFE-Fraud Report (2016) has indicated that internal audit currently holds second place amongst the initial detections of occupational frauds (such as financial statement fraud, corruption and asset misappropriation) across the world. Internal audit as a third line of defence ensures that the governing body as well as senior management is provided with a broad and detailed assurance based on the highest level of independence and objectivity within the organisation. This high level of independence will not be found in the second line of defence. Internal audit provides assurance in the manner and to the degree in which the first and second lines of defence achieve risk management and control objectives. This also includes providing assurance on the effectiveness of governance, risk management and internal controls (Institute of Internal Auditors, 2013; Roussy & Rodrigue, 2018).

According to Hazami-Ammar (2019), the increasing complexity of organizations means that the function of financial auditing is no longer limited to an external mission but is rather a complex process integrating the work of internal audit services. The expansion and multiplication of fraud types motivate us to consider internal auditors' ultimate determinants to investigate for fraud, even if we are conscious that the exact motive leading to fraud will not be known by internal auditors, since they are primarily required to identify opportunities for fraud and to understand fraud

schemes and scenarios. It is thus important for organisations to understand the relation between the internal audit function and organisational variables, as well as internal audit's self-initiated investigation about fraud and other irregularities. This assists organisations to perform better regarding the detection of fraud and maintaining an effective control system (Hazami-Ammar, 2019; Ciocîrlan, 2017).

4.3.2 The Effectiveness of Internal Audit and Fraud Prevention

According to Monisola (2013), the existence of internal audit in an organisation serves as a method of controlling the occurrence of errors, irregularities and fraud. As previously explained, one of the main roles and responsibility of internal auditors is the prevention and detection of fraud. Monisola (2013) further emphasizes that the internal auditor is “the eyes of management” and ensures that the organisation's policies are strictly complied with, to ensure that there is proper authority for the purchase or disposal of an asset, to evaluate the system of internal control and to also ensure that there is compliance with the internal control system in the organisation (Purnomo, 2017).

Munteanu et al. (2017) indicate that actions that are taken by management and internal audit in preventing and detecting fraud will only be effective when they are complemented by an organisational culture that is based on ethics and transparency to give priority to financial information and internal control effectiveness. The International Auditing Standards explain that internal auditors are not expected to have experience and specialised knowledge to investigate fraud. The internal audit role is not to investigate fraud, but to evaluate risks and provide reasonable assurance that the organisation has taken adequate measures with regard to internal controls, and that risks are mitigated and reduced. In circumstances like these, it is the responsibility of the public entity management to design and implement control mechanisms required to prevent irregularities and fraud, as well as developing an organisational culture that is based on ethical behaviour (Alina et al., 2018).

Munteanu et al. (2017) further state that, taking the above into consideration, internal audit can provide advice and solutions, and make proposals to enhance control strategies to reduce the fraud

risk. According to best practice, internal auditors must exercise a special interest in the phenomenon of fraud. The actions undertaken by the internal auditor in fraud detection and prevention involve the following: discussions amongst the audit team about the fraud phenomena or the suspected existence of fraud; understanding the organisation and its environment, and then evaluating the risks associated with the fraud phenomenon; evaluating unusual transactions; assessing determinant risk factors; knowing how fraud control is achieved by those who are responsible for corporate governance and risk assessment; discussions with management about the process of evaluating and monitoring fraud, ethical norms and behaviour as well as obtaining statements on how to manage the fraud phenomenon; and assessing the application of accounting policies (Eulerich et al., 2021).

The next section will focus on how supply chain fraud can be prevented by applying the elements described above with regard to fraud management.

4.3.3 Supply Chain Fraud

Supply chain fraud can be committed by individuals or through collusion between several individuals and organisations (KPMG, 2017). The Internal Audit Standard, 1210. A2 states that “The internal auditor should have sufficient knowledge to identify the indicators of fraud but is not required to have the experience of a person whose primary responsibility is to detect and investigate fraud”. Seeing that the key mechanism for detecting fraud is control, the responsibility of internal auditors is to examine and evaluate the efficiency and effectiveness of internal control (Institute of Internal Auditors, 2016). The threat of fraud is inevitable across the world. The Association of Certified Fraud Examiners (ACFE) (2016) reported that fraud in the public sector came second after the banking sector and financial services (The Association of Certified Fraud Examiners, 2016).

According to Nusantara et al. (2020), this phenomenon is caused by public sector organisations that have a complex bureaucratic structure, low employee integrity and a weak system of control. Various attempts have been made to deal with fraud in the public sector, particularly within the supply chain. Fraud prevention efforts have also been carried out. These efforts have included

requiring each government department to have an internal audit function, the creation of electronic systems to support the process of transparency and accountability in the implementation of government activities, and the payment of performance benefits in order to increase income and enhance employee morale. Internal auditors are part of internal controls, whose main purpose is to assist with fraud prevention, detection, and investigation in an organisation (Nusantara et al., 2020; Gramling & Schneider, 2018; Iyer et al., 2018).

Petraşcu and Tieanu (2014) state that the detection of fraud is not easy and requires internal auditors to have a professional attitude. Organisations that have an internal audit function will better detect fraud and lessen the possibility of fraud. As previously explained, internal audit represents an efficient line of defence in preventing and detecting fraud. Internal auditors can thus prevent fraud by improving the organisation's internal controls, attending fraud control training, providing fraud complaint services as well as establishing a public sector forensic department.

Kummer et al. (2015) established that there are three effective tools for fraud detection in an organisation, particularly within supply chain, namely: whistle-blower policies, fraud control policies, and recording fraud risks. The research indicated that the most commonly used tools, such as fraud risk assessment, codes of ethics, training on fraud awareness, fraud control and internal control review, had no effect in detecting fraud. However, Othman et al. (2015) established that operational audits, improved audit committees, improved internal controls, the implementation of fraud complaints policies, staff rotations, and forensic accountants are tools that aid in fraud prevention and detection in the public sector. Research conducted by Drogalas et al. (2017) indicated that the effectiveness of internal audit, auditor responsibility and auditor training have a significant effect on fraud detection. It is thus emphasized that internal auditors have a crucial role in fraud detection.

4.3.4 Signs of Fraudulent Activities and Behaviour

Sandhu (2020) found that numerous researchers and professional fraud examiners have emphasized the need for early detection of frauds. Although there are various ways in which fraud can be detected, the most effective and efficient way is to identify fraudsters by scrutinizing

personnel behaviour for peculiarities typical of fraudsters.

According to Widilestariningtyas and Karo (2016), there are three major types of frauds, namely: the misuse of assets and fraud relating to assets, which entails active entity theft; fabricated statements on financial reports; and lastly the corruption and abuse of position in government sector for personal gain. Internal audit thus plays a crucial role in observing and monitoring activities for such activities. Internal audit does not only provide assurance that the anti-fraud control program is running effectively, but also ensures that it could deter and detect fraud. With internal audit, fraudulent activities, irregularities and other disadvantaging issues in an organisation can be mitigated and prevented (Widilestariningtyas & Karo, 2016; Hashim et al., 2020).

This study will also assess how fraud within supply chain management fits in the afore-mentioned frauds. Asset misappropriation, which entails misuse of the organisation's resources, may generally involve employees or senior executives within the supply chain inflating an expense report or inflating bills incurred. This is the most common type of fraud and is present in almost all corporate organisations (The Association of Certified Fraud Examiners, 2014). Financial statement fraud may not only be found within the supply chain, but within the organisation as a whole. This type of fraud has been indicated as a serious concern for both investors and stakeholders (Kazemian et al., 2019). Pavone (2018) describes financial statement fraud as a deliberate act of manipulating financial statements through omissions or misstatements to create a false impression of the organisation's financial position. The intent of this type of fraud is to mislead the users by depicting a greater performance to attract investors or by simply obscuring performance to limit tax liability.

Lastly, corruption is another category of fraud and entails the abuse of position, particularly in the public sector as explained above. This can be found in supply chain management, committed by supply chain custodians as they may be familiar with the system of supply chain management, and it is thus easier for them to manipulate or override it.

Taking the above into consideration, there are various ways in which fraud can be mitigated or prevented. Fraud prevention is described as an activity driven by management to implement policies, systems and procedures to ensure that the required activities are conducted by the board of directors, management and other employees in an organisation to provide trust in achieving the organisational objectives (Yuniarti & Ariandi, 2017).

These objectives include rigid financial support, efficiency and effective operations and compliance with laws and regulations (Widilestariningtyas & Karo, 2016). Furthermore, Alexandra (2005) states that when fraud is detected, it should be prevented using the following techniques: establishing a good internal control structure; effective use of activity control; improvement of organisational culture; and effective use of the internal audit function.

The increasing economic burden due to financial fraud has placed an emphasis on furnishing accounting professionals with effective fraud detection skills and tools. The ACFE (2016) indicated that the occurrence of fraud cases relative to occupational fraud cases increased from 7.6% in 2012 to 9.6% in 2016. The increasing number of financial statement fraud cases across the world indicated that conventional audit methods may be ineffective in financial statement fraud detection due to lack of experience and knowledge of accounting fraud among auditors. Continuous auditing with fraud detection tools is thus recommended for timely fraud detection to enhance the efficiency of the audit process (Chan & Vasarhelyi, 2018). Audit quality and auditor experience with a client, as well as familiarity with fraud detection tools are therefore some elements that enhance fraud detection.

Furthermore, as explained above, internal auditors not only have a role in fraud detection, but in fraud prevention as well. According to Ojo (2017), fraud prevention within an organisation is a combined effort by management and both internal and external auditors. Auditors should thus not be overburdened by the sole responsibility for preventing fraud in an organisation, but rather work together with top management, employees and other individuals in the organisation to prevent fraud. Auditors may be of great assistance in gathering resources of different departments in the organisation to prevent fraud. Management bears a bigger responsibility for establishing, maintaining and enforcing internal controls, while internal auditors play a major role by testing

and evaluating the efficiency and effectiveness of internal controls proportionate with the level of potential risk exposure in the organisation. Ojo (2017) further states that as part of combating fraud by internal auditors, they may conduct proactive auditing to search for misappropriation of assets and information misrepresentation.

Fraud is increasing globally, with the introduction of modern technology, and is highly profitable for the fraudsters. Organisations thus need to appreciate the main feature of fraud when formulating general preventative measures. Based on this concept, comprehensive fraud prevention measures must be implemented across the organisation for best possible results (Coenen, 2008).

According to Coenen (2008), the preventative measures entail fraud education, fraud investigations and fraud preventative techniques. These measures are dependent on each other, as overlooking one of them may cause the other components to be ineffective. Coenen (2008) further recommends that fraud education should be conducted regularly. Internal auditors thus ensure that fraud awareness training is provided for employees in line with management principles; for example, fraud training is usually provided at departments that have a higher fraud occurrence, such as the supply chain department. Coenen (2008) emphasizes that when determining how fraud investigations will take place, it is crucial to identify the red flags that will cause management to consider investigation. Internal auditors should analyse the red flags and decide if there is a need for an investigation in case of any suspicious transactions. Ojo (2017) indicates that the proactive preventative techniques begin with a risk assessment, and that once these risks have been identified, management should develop methods and techniques to manage them. This normally involves concentrating on risk which may cause a greater financial loss in case of fraud (Sow et al., 2018; Sarda et al., 2018).

Now that the issues of fraudulent behaviour, the influence of internal audit on fraud prevention, and the categories of fraud have been explained as well as how they fit in within supply chain management, the next section will focus on the strategies to mitigate frauds.

4.3.5 Strategies to Mitigate Fraud

It may not be possible to prevent fraud before it can occur, nor to detect all fraud which does occur. This does not imply that detection should take priority over prevention or prevention over detection; both are equally important. According to Hakami et al. (2020), internal auditors are not necessarily responsible for preventing fraud and should thus not be held accountable should fraud occur. In planning financial statement audits, auditors should assess the risk that fraud and error may result in financial statements containing material misstatements. Based on this risk assessment, good audit procedures should be drafted to ensure that they detect the entire collection of misstatements resulting from fraud or error on the financial statements. In instances where fraud is suspected by the auditors, they are required to communicate to management in writing and in instances where material fraud has been detected, they need to communicate to a supervisory body. Subsequently, an external audit may be conducted, depending on the organisation's circumstances, and this can serve as one of the major processes of detecting fraud (Donning et al., 2019; Patterson et al., 2018). According to Hazami-Ammar (2019), fraud prevention entails all activities that aim to prevent fraud and reduce the exposure to fraud when it arises, such as controls that are related to the selection of customers and service providers. By contrast, fraud detection entails measures undertaken to discover whether fraud or other irregularity has occurred. The preventative and detective procedures that are provided for in the internal control perspective, must be up to date and flexible to respond to fraud. This is covered by the internal audit's self-investigation about fraud and irregularities (SIFI). For example, misappropriation of funds or property followed by misrepresentation of accounts requires significant skill and effort to conceal this act, and makes it more challenging to detect, thus necessitating detailed investigation. If the fraud investigated does indeed exist, then the internal auditor needs to take the necessary measures to update the detection and prevention procedures. The internal audit function's SIFI improves the efficiency of the internal control system, which in turn protects the organisation against the fraud risk.

Widilestariningtyas (2012) indicates that the relation between internal audit and fraud prevention is that internal audit impacts significantly on fraud prevention both concurrently and partially. Tahawa et al. (2020) found that if internal control in an organisation is weak, there will be a high possibility of fraud and errors, however if internal control is strong, the possibility of fraud and

irregularities will be relatively low. This means that better internal controls, stronger fraud prevention efforts, and a skilled internal audit function will result in higher quality fraud prevention efforts. It is almost impossible for an organisation to be free from error, fraud and irregularities (Zahari et al., 2020; Mangala & Kumari, 2017).

4.4 SUMMARY OF THE CHAPTER

This chapter provided a detailed description of the effectiveness of internal audit in detecting and preventing supply chain management fraud. Based on the research presented above, it is found that in any organisation, the detection of fraud and auditing of corporate activities through the internal audit function is crucial for proper and continuous operation of the organisation. It is important for an organisation to have an effective system of internal control in place in order to identify and limit any irregularities. The availability of an internal audit unit thus plays a very important role in an organisation.

Taking into consideration what has been described above, it is revealed that it is of vital importance for management and executives to be well informed on the types and sources of supply chain fraud so that they are able to detect and mitigate them before they become significant. It is almost impossible to totally eliminate fraud; however a detailed and comprehensive audit plan and identification program can assist a diligent supply chain manager to detect unusual patterns of activities. A clear segregation of duties in the supply chain will also assist in mitigating the occurrence of fraudulent activities.

As explained above, internal audit on its own cannot fully prevent and detect fraud; however it plays an important role in helping with prevention and detection. There is thus a need for effective internal controls. Should internal auditors wish to become fraud experts, they may enhance their knowledge, skills and experience by obtaining the Certified Fraud Examiners credential. Another way of enhancing the effectiveness of internal auditors in detecting supply chain fraud is through information technology. Detection of fraud thus is positively influenced by both the effectiveness of internal audit and the responsibilities of internal auditors.

The chapter further indicates that detecting fraud makes it more likely that fraud will be prevented in future, as management may be able to assess how to prevent the particular fraud in future through assistance of internal auditors. Furthermore, the ways in which fraud is prevented will assist in early fraud detection. As previously explained, it may not be possible to prevent fraud before it can occur, nor to detect all fraud which does occur. This does not imply that detection is more important than prevention or prevention is more important than detection; both are equally important. With regards to fraud prevention, internal audit as a third line of defence ensures that the governing body as well as senior management is provided with a broad and detailed assurance based on the highest level of independence and objectivity within the organisation. The major role of internal audit in the prevention and detection of fraud is thus to know and comprehend techniques and mechanisms by which fraud is manifested and to ensure that the evaluation and control of the risk of fraud is sufficient and is performed at the right intensity. It is evident that internal audit is an anti-fraud control tool: internal audit is more effective in fraud prevention and detection through the use of common tools such as whistleblower policies, fraud control policies as well as recording fraud risks.

Furthermore, the analysis above indicates that a relationship may exist between the characteristics of the organisation and the ability of internal auditors to contribute to the self-investigation about fraud and irregularities (SIFI). Similarly, the characteristics of the internal audit function, through its independence and objectivity, as well as the activities it carries out, were also expected to be linked to the internal audit function's contribution to the investigation of fraud and irregularities.

CHAPTER 5

RESEARCH METHODOLOGY

5.1 INTRODUCTION

This chapter presents the research design and methodology used to test the research questions outlined in Chapter 1 of the study. The chapter explains and justifies the research design and methodology chosen to evaluate the role of internal audit effectiveness in preventing supply chain management fraud in the Gauteng Provincial Treasury. The chapter then outlines the rationale for using a mixed method research design. Lastly, the summary of the chapter is provided.

5.2 RESEARCH DESIGN

A mixed method research design is a procedure for collecting, analysing, and “mixing” both quantitative and qualitative research methods in a single study to understand a research problem (Teddlie & Tashakkori, 2011; Morse, 2016). A mixed method design employs a combination of qualitative and quantitative approaches to collect and analyse data (Morse, 2016). An integration of qualitative and quantitative methods has become common in research (Teddlie & Tashakkori, 2011). The mixed method design was able to provide detailed and comprehensive data in order to achieve the research objectives and answer the research questions.

The category of mixed-method research design covers four types of research design: triangulation, embedded, explanatory, and exploratory (Teddlie & Tashakkori, 2011; Morse, 2016). This study employed an explanatory sequential design, which begins with quantitative data collection and is followed by qualitative data collection (Tashakkori & Teddlie, 2021). This method was used in order to obtain a clearer picture from the quantitative data, and then to use the qualitative data to provide a better understanding and explanation of the phenomena in question.

Figure 5.1 depicts the flow of the mixed method research design of the study.

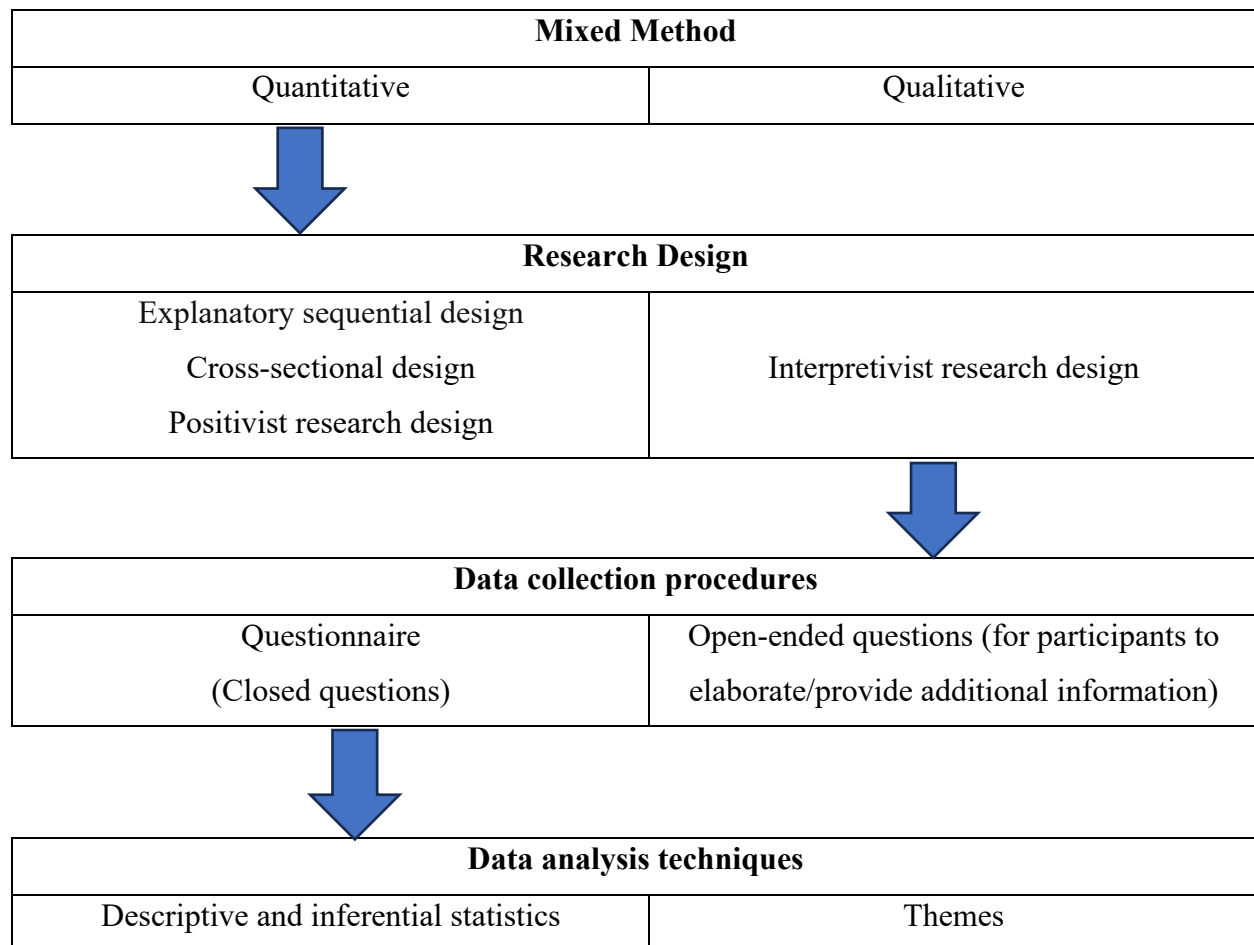


Figure 5.1: Mixed method research flow

5.2.1 Rationale for Using a Mixed Method

The mixed method research design was applied in this study to develop a framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. There is no single research method which can be considered the best method in all circumstances. The choice of research method depends on the types of research questions posed, data required, and the types of research objectives to be achieved (Smith, 2022). The research design for this study is a mixed-method approach. Mixed-method research plays a crucial role in research where qualitative methods address outcome questions (Creswell & Clark, 2017). Mixed methods result in gathering evidence that is more convincing than would have been possible to produce by a single method. Most research methods, when used individually may be

flawed; however, these limitations can be mitigated through mixed method research, which combines methodologies to provide better answers to the research questions (Turner et al., 2017; Harrison et al., 2020).

The primary method of data collection used in this study was a structured questionnaire (quantitative method). The structured questionnaire also collected additional qualitative data by means of a limited number of open-ended questions. The data from the questionnaire were analysed using descriptive statistics, and the open-ended questions were qualitatively analysed to support the findings of the questionnaire. A mixed method was employed to produce descriptive statistics and narrative data and to further interpret the data. Fetters et al. (2013) advocate for an integration of mixed method designs, as it allows the researcher to make quantitative results more understandable with the support of a qualitative narration of the findings.

5.2.1.1 Explanatory Sequential Design

According to Creswell and Clark (2017), there are four categories of mixed method research designs: triangulation; embedded; explanatory; and exploratory. This study adopted an explanatory sequential design, in which the researcher first collects and analyses quantitative data, then uses those findings to inform qualitative data collection (Creswell & Clark, 2017). This design is used when the researcher wants to further explain a set of quantitative data with additional qualitative information. Quantitative data can be used to generate qualitative results and to explain findings from the quantitative data (Fetters et al., 2013).

With specific reference to this study, in the first phase, surveys were conducted to obtain quantitative data to develop a framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. In the same questionnaire, there were a few qualitative, open-ended questions that required the participants to elaborate on their responses. Those responses were used for qualitative data on the effectiveness of supply chain management and the effectiveness of internal audit in fraud prevention in supply chain management.

The qualitative responses in the survey were quite short and without long content. In this case, separate qualitative analysis was done, with specific research questions that were fully responded to. Thus, the rationale for this approach is that the quantitative data and the analysis provided descriptive statistics, and the qualitative analysis allowed the researcher to find out about the effectiveness of supply chain management and the effectiveness of internal audit in fraud prevention in supply chain management.

5.2.1.2 Cross-sectional Study Design

In a cross-sectional study, independent and dependent variables are measured at the same point in time using a single research instrument (Robinson et al., 2005; Levin, 2006). A cross-sectional study involves looking at data from a population at one specific point in time. The participants in this type of study are selected based on particular variables of interest. Unlike longitudinal studies, which look at a group of people over an extended period, cross-sectional studies are used to describe what is happening at the present moment (Cherry, 2019).

This study followed a cross-sectional study design to develop a framework for improving the role of internal audit in fraud detection and prevention in the supply chain management within the South African public sector at a point in time. According to Levin (2006) and Wang and Cheng (2020) a cross-sectional design analyses data at a single point in time and is used to investigate associations between risk factors and the outcome of interest. Thus, with cross-sectional research, the study examined one variable in different groups that are similar in all other characteristics. These characteristics are identified as appointing suppliers who are not tax compliant; failure to use competitive processes for quotations and bids; incorrect use of the preference points system; lack of appropriate bid committees; and appointment of bid committee members not aligned with policy requirements (National Treasury, 2015).

5.2.1.3 Positivist Research Design

Kaboub (2008) and Alharahsheh and Pius (2020) state that there are two major types of research paradigms: the positivist and the non-positivist. O'Connell et al. (2020) explain that positivists aim

to test a theory through observation and measurement in order to predict and control the factors that influence its surroundings. Kaboub (2008) and Alharahsheh and Pius (2020) state that within the positivist paradigm, real events can be observed and explained logically through analysis. Alessandrini (2012) and Bonache (2021) explain that the positivist favours quantitative data, while the non-positivist favours qualitative data. Positivist research designs seek generalized patterns based on an objective view of reality (Giddings, 2006; Kincheloe & Tobin, 2009; Dubois & Gadde, 2014; Rahi, 2017).

Wahyuni (2012) says that positivists see society as shaping the individual and believe that 'social facts' shape individual action. Positivists prefer quantitative methods such as social surveys, structured questionnaires (Fios & Gea, 2016; Park et al., 2020) and statistics because they give good reliability (Straub et al., 2004) and representativeness (Boddy, 2016). According to Sale et al. (2002), positivist researchers emphasise the importance of doing quantitative research. Bloomfield and Fisher (2019) emphasise that in positivist research, the focus is to look for relationships or correlations between two or more variables. While this study makes use of both quantitative and qualitative data, the primary reliance on quantitative data places it within the positivist research paradigm.

To achieve the research objectives in this study, the research employed a primarily quantitative approach, complemented by a limited degree of qualitative data collection. The reason for using this paradigm is that real events with regard to supply chain management will be observed and explained logically through analysis in order to identify a way in which internal audit can be used as a tool for fraud prevention within the supply chain.

5.2.1.4 Interpretivist Research Design

Schwartz-Shea & Yanow (2013) describe an interpretive research design as concerning subjective interpretations of social phenomena from the perspectives of the subjects involved. Simpson (2014) states that interpretivists like to use qualitative research methods to interpret the views of participants. An interpretivist approach to social research would be much more qualitative, using methods such as unstructured interviews or participant observation. According to Alharahsheh and

Pius (2020), interpretivism is an approach to social research which seeks to understand the motivations for people's actions. Interpretivism is based on the assumption that reality is subjective, multiple and socially constructed (Alharahsheh & Pius, 2020). Therefore, to say the researcher can understand someone's reality through their experience of that reality requires the researcher to understand the individual's historical perspective. Interpretive approaches rely on questioning and observation in order to discover or generate a rich and deep understanding of the phenomenon being investigated (Schwartz-Shea & Yanow, 2013; Alharahsheh & Pius, 2020). This is closely associated with qualitative methods of data collection (Simpson, 2014).

Interpretivism emphasizes that it is crucial for the researcher to understand the differences between humans in their role as social actors. Interpretivism thus considers differences such as cultures, circumstances, as well as times leading to the development of different social realities. Interpretivism is different from positivism as it aims to include richness in the insights gathered rather than attempting to provide definite and universal laws that can be generalised and made applicable to everyone regardless of some key variables and factors (Myers, 2008; Saunders et al., 2009; Bhattacharjee, 2012).

This study employed an interpretive approach to a limited degree through the inclusion in the questionnaire of open-ended questions designed to elicit qualitative responses. This would enable the consideration of the unique context of the research, the given circumstances at hand, as well as the participants involved (Alharahsheh & Pius, 2020).

5.3 RESEARCH METHODS

Walliman (2021) describes research methods as specific procedures for collecting and analysing data. The research method indicates several steps adopted by a researcher in studying the research problem (Mishra & Alok, 2022) and in a manner in which problems are systematically resolved (Johnson et al., 2007; Saunders et al., 2009).

This subsection discusses the concepts of quantitative research methods, qualitative research methods, and mixed method research approaches.

5.3.1 Quantitative Research Methods

Mohajan (2020) explains that a quantitative research approach involves the collection of data for quantification and statistical treatment. A quantitative method thus provides an objective measure of reality through the use of inferential statistics to quantify the results. Therefore, it is through the use of quantitative research that the researcher tends to use mathematical models as the methodology of data analysis (Mohajan, 2020). Methods of quantitative data collection and analysis include questionnaires with closed-ended questions, methods of correlation and regression, mean, mode and median analysis and others.

Kumar (2011) and Bloomfield and Fisherm (2019) argue that quantitative research outlines the relationship between the variables in the research populations and strives to clarify the relationship in mathematical expressions and statistics. A quantitative method for this research was adopted as one of the methods. Bloomfield and Fisherm (2019) explain that the quantitative method stems from a positivist worldview. Therefore, a quantitative research method is best captured in numbers and by counting of things (Watkins, 2012; Alharahsheh & Pius, 2020). Mixed method research responds to the interests and needs of different stakeholders in research (Doyle et al., 2009).

A quantitative research method is founded on positivism (Dubois & Gadde, 2014; Rahi, 2017), which takes scientific explanations to be nomothetic by measuring the social world objectively and testing hypotheses. The study is conducted using a cross-sectional and positivist research design.

5.3.2 Qualitative Research Method

A qualitative research method was also adopted. The qualitative research method, as explained by Anku (2017), is guided by an interpretative approach and is holistic in nature, trying to understand social life. While these types of designs are specific, well-structured and have been tested for validity and reliability, qualitative research methods are used to understand the meaning behind human behaviour, using several techniques such as observations, interviews, focus groups and document analysis (Busetto et al., 2020).

5.3.3 Mixed Method Research Approach

A mixed method approach was used to gather information to develop a framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. Most research methods, when individually used, may be flawed; however, these limitations can be mitigated through mixed method research, which combines methodologies to provide better answers to the research questions (Turner et al. 2017; Harrison et al., 2020). Mixed method research plays a crucial role in research where qualitative methods address outcome questions. Mixed methods allow the researcher to gather more convincing evidence than they would have been able to by using a single method.

5.4 POPULATION AND SAMPLING FRAME

5.4.1 Population

Population refers to the collection of elements which have several characteristics in common (Creswell & Clark, 2017). The number of elements in the population is the size of the population, while a sample refers to the subset of the population (Kothari, 2004). The target population is the entire population or group that a researcher is interested in researching and analysing (Etikan & Bala, 2017; Abadie et al., 2020; Majid, 2018).

According to Leedy and Ormrod (2015), the target population must be identified and described. Given that the target population represents the entire population which study intends to investigate, it is important to explain the referred population. The population is the complete set of internal auditors with specialized knowledge and competencies to evaluate controls, risk management and governance processes within the Gauteng Provincial Treasury. There were 112 internal auditors in employment at the Gauteng Provincial Treasury at the time the study was conducted, and the study targeted all of them for the role they play in SCM. Furthermore, the rationale for selecting internal auditors was to ensure that the participants were able to relate to the role of internal audit and internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury.

5.4.2 Target Population

According to Casteel and Bridier (2021), the target population is the specific group of potential participants to whom the researcher may have access, that represents the nature of the population of interest. Thus, the target population was all internal auditors employed by the Gauteng Provincial Treasury who possess sufficient knowledge of fraud to identify red flags indicating fraud; understand the characteristics of fraud and the techniques used to commit fraud; evaluate the indicators of fraud and decide whether further action is necessary and whether an investigation should be recommended; and have evaluated the effectiveness of controls to prevent or detect fraud.

5.4.3 Sampling Frame

Sampling frames are important for researchers to stay organised and ensure that the most up-to-date information for a population is being used (Casteel & Bridier, 2021). Casteel and Bridier (2021) further explain that the sampling frame is an operationalized representation of the target population and is the group of units from which the sample is recruited. It is used to solicit research data from the precise group of individuals who are recruited to participate in the study. In this study, the participants were recruited through the Office of the Provincial Treasury and participants' information was organized using telephone numbers, names of persons, physical addresses, and email addresses. All this information was arranged through the office of the Chief Audit Executive at the Gauteng Provincial Treasury, during September 2021.

5.4.4 Sampling Techniques

This study adopted the use of convenience sampling. Convenience sampling is a non-probability sampling technique applicable to both qualitative and quantitative studies (Etikan et al., 2016). In quantitative studies, a convenience sampling technique is usable where members of the target population that meet certain practical criteria, such as easy accessibility, and geographical proximity are included for the purposes of the study (Etikan et al., 2016). Leedy and Ormrod (2015) emphasise that in convenience sampling techniques, the researcher selects subjects who are

more readily accessible. Convenience sampling methods place primary emphasis on generalizability (Etikan et al., 2016). Thus, from the researcher's point of view, collecting data from the internal auditors was most convenient as they have an appreciation of evaluating the effectiveness of controls to prevent or detect fraud.

The sample size of the internal auditors in the Gauteng Provincial Treasury was determined by the number of available positions in the structure who participated in the study, as the researcher requested the structure of internal audit in the Gauteng Provincial Treasury. This process made it convenient for the researcher to reach out to all 112 internal auditors under the employment of the Gauteng Provincial Treasury. Therefore, the researcher used a convenience sampling technique as all 112 participants met the criteria to participate in the study. The researcher distributed survey questionnaires to 112 internal auditors and received 41 completed questionnaires.

5.4.4.1 Type of Sampling Techniques

When choosing a specific type of sampling technique, it is crucial to decide a broad sampling technique.

Probability sampling

This technique allows the investigator to generalize the findings of the sample to the target population. Probability sampling means that every item in the population has an equal chance of being included in the sample. One way to undertake random sampling would be if the researcher constructed a sampling frame first and then used a random number generation computer program to pick a sample from the sampling frame. Probability or random sampling has the greatest freedom from bias but may represent a sample in terms of time and energy for a given level of sampling error (Acharya et al., 2013; Taherdoost, 2016). Probability sampling includes simple random sampling, systematic random sampling, stratified random sampling, cluster sampling, etc. A sampling frame is fundamental in probability sampling because, if the sampling frame is not drawn appropriately from the population of interest, random sampling from that frame cannot address the

research problem. Generalizations can be made only to the actual population defined by the sampling frame.

Etikan and Bala (2017), Lamm and Lamm (2019) and Pace, (2021) further clarify that probability sampling is categorized into, but not limited to the following:

- Simple random sampling

This method allows every individual an equal chance of being selected in the sample from the population. Data is chosen using a random number table or computer-generated list of random numbers.

- Systematic random sampling

In this method, the selection of the first subject is done randomly and then the subsequent subjects are selected by a periodic process.

- Stratified random sampling

This method allows data to be divided into various sub-groups (strata) sharing common characteristics like age, gender, race, income, education, and ethnicity. A random sample is taken from each stratum. This assures representation of all groups in the population. The characteristics of each stratum can be estimated, and comparisons can be made. It also reduces variability from systematic sampling.

- Cluster sampling

This method is a two-step process in which the entire population is divided into clusters or groups, usually geographic areas or districts like villages, schools, wards, blocks, etc. It is most usefully applied in large national surveys. The clusters are chosen randomly. All individuals in the cluster are taken in the sample. Usually, it requires a larger sample size. Cluster sampling is very useful when the population is widely scattered, and it is impractical to sample and select a representative sample of all the elements.

- **Multiphase sampling**

This method is a complex form of cluster sampling. The population is organized into groups; subsequently, groups are randomly selected and then the members are randomly selected in these groups (an equal number selected per group). A part of the information is collected from the whole sample and part from the sub-sample (Etikan & Bala, 2017; Acharya et al., 2013; Taherdoost, 2016; Pace, 2021).

Non-probability sampling

According to Sharma (2017) and Sarstedt et al. (2018), this sampling technique refers to samples in which the probability that a subject is selected is unknown and results in selection bias in the study. It includes convenience/purposive sampling, quota sampling, snowball sampling, etc. Each method of sampling has its own advantages and limitations; however, probability sampling is preferable, since its results can be generalized (Elfil & Negida, 2017). Tutz (2023) indicates that several studies have highlighted how to use non-probability sample surveys to obtain better estimations. Statistical analysis of non-probability survey samples encounter big challenges since the mechanism used for selecting non-probability samples is typically unknown and thus treating non-probability samples as if they were a simple random sample often leads to biased results.

5.5 DATA COLLECTION PROCEDURES

Dudovskiy (2018) explains that data collection is a process of gathering information from all the relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcomes. The questionnaire survey method has been widely acknowledged as a capable tool for evaluating the perceptions of respondents on a particular subject. Dudovskiy (2018) further states that data collection methods can be categorised into primary and secondary methods. Primary methods of data collection include the collection of quantitative data through questionnaires, etc. Secondary methods of data collection refer to data that has already been published in books, newspapers, magazines, journals and online portals. Da Costa and Schneider (2016) emphasize that various studies have shown that the suitability of the selected data collection methods and the integrity of the data collected are very important to ensure a successful study. This study has thus

collected data from a qualitative and quantitative perspective where data was collected consistently from each participant identified in the study.

5.5.1 Questionnaire Development

A questionnaire was prepared based on the literature review and the knowledge obtained during that literature study. The questions had to be formulated in a way that research objectives are addressed, which are: evaluating the effectiveness of supply chain management systems in the Gauteng Provincial Treasury; examining the effectiveness of internal audits in detecting supply chain management fraud; assessing the effectiveness of internal audit in preventing supply chain management fraud; and developing a framework to enhance the role of internal audit in fraud prevention and detection in supply chain management. Each of the core questions provides useful information.

The final form of the questionnaire used in this study is included in Annexure 1. A final preparatory step involved consulting a professional statistician (a specialist in the use of questionnaires and their interpretation) regarding the validity, reliability and quality of the questionnaire's possible responses. This was done to ascertain whether the data collected would be usable and would lead to expressive results that could be analysed through the use of descriptive statistics. The questionnaire was then finalised for distribution.

The questionnaire contained demographic questions as well as those to obtain nominal data using a five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). The study employed a purposeful sampling technique to select internal auditors to participate in the study to develop a framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury.

The questionnaire used in the explanatory survey was also used. This was made with the open-ended question that asked respondents if they would like to mention any other factor that was not included in the questionnaire regarding their effectiveness of supply chain management and the effectiveness of internal audit in preventing supply chain management fraud. The open-ended

questions were used to collect qualitative data, and close-ended questions were used to collect quantitative data. The sections of the research instruments are described below.

Section A describes the biographical/demographic information of the participants. This section asks for the participants' biographical information relevant to the number of years of experience they have working in the public sector, their highest academic qualifications, and what they think are the main contributing factors to fraud risk in supply chain management. **Section B** poses questions regarding the efficacy of the supply chain management system in the Gauteng Provincial Treasury. This section consisted of 18 questions. The questions were developed in accordance with the literature on effective supply chain management systems. **Section C** consisted of 3 key questions on the role and effectiveness of internal audit in detecting supply chain management fraud. In this section also included questions regarding management perceptions towards internal audit in supply chain management. **Section D** requires participants to indicate how effective internal audit is in preventing supply chain management fraud. **Section E** required participants to assess the role of the internal audit as a step towards developing a framework for improving the role of internal audit in fraud prevention and detection in supply chain management.

5.5.2 Data Handling and Preparation for Analysis

The data collection process used in this study was sequentially collected as follows:

- An initial e-mail was sent to Gauteng Provincial Treasury requesting their formal participation in the research study. The email also contained an explanation of the process of gathering the data required from an ethical perspective as well as the steps taken to protect the confidentiality and integrity of the data. This e-mail was accompanied by a letter of request to conduct a research study (on an official Tshwane University of Technology letterhead) from the study supervisor and co-supervisor in which the significance of the study and its research objectives were highlighted, as well as the structured questionnaire. The accompanying letter of request from the study supervisors and the questionnaire are included in Annexure 1 and Annexure 3 of this study.

- A second e-mail containing the structured questionnaire was then sent to participants (internal auditors in the employ of the Gauteng Provincial Treasury) accompanied by ethical approval from the Faculty of Economics and Finance Research Ethics Committee of Tshwane University of Technology (Annexure 2) as well as research approval from the Gauteng Provincial Treasury (Annexure 4). This email requested that they complete and return the questionnaire by a specific date.
- The feedback received from the respective participants (their completed questionnaires, and their voluntary and unstructured explanations to some of the questions) was then analysed. The structured questionnaire comprised a combination of open and closed-ended questions.

5.6 DATA ANALYSIS TECHNIQUE

Overall, 112 questionnaires were sent to the participants and 41 completed questionnaires were received for analysis. This yielded a response rate of 36.6%. This response rate is thus acceptable, given that the email surveys are highly variable and traditionally in the range of 25% to 30% (Menon & Muraleedharan, 2020).

5.6.1 Quantitative Data Analysis

Quantitative data was analysed using the Statistical Package for the Social Sciences (SPSS). The reason for selecting the SPSS statistical package is that it facilitates the calculation of all essential statistics, such as frequency distributions, exploratory factor analysis, and analysis of variance (ANOVA), required for data analysis and to present findings. Furthermore, SPSS is easily available and user-friendly so it can be learned within a short period of time. The researcher also worked with a statistician and further read a number of books to become familiar with the SPSS application and how to present and interpret the data.

Thus, the questionnaire data was analysed based on the research questions and interpreted in line with the research approaches and design. For quantitative data, the following statistical analysis methods were used.

- *Frequency distributions*

Frequency distributions are visual displays that organise and present frequency counts so that the information can be interpreted more easily. Frequency distributions can show absolute frequencies or relative frequencies, such as proportions or percentages (Tiemann, 2015). The frequency graphs are depicted in Chapter 7 of this study.

- *Exploratory Factor Analysis*

Exploratory factor analysis was used as an extraction method with varimax rotation conducted to determine the dimensionality of each of the subsections; factors with eigenvalues above 1 (Kaizer criterion) were accepted. Cronbach alpha coefficient was used to determine the internal consistency (reliability) of each of the identified factors, with thresholds as stated *in the* literature as 0.5 (acceptable); 0.6 (satisfactory for exploratory research) and 0.7 (most used instrument) (George & Mallery, 2003).

- *Descriptive statistics*

The purpose of descriptive statistics is to describe and summarise what the data looks like as well as to compare variables numerically (Cooksey & Cooksey, 2020). The data analysis techniques used in this study are discussed in detail in Chapter 6. The quantitative data, for the purposes of this study, was analysed through the use of descriptive statistics.

The quantitative data for this study was analysed using the popular quantitative data management and statistical software application Statistical Analysis Software (SAS). Quantitative data collected from responses to questionnaire surveys, similar to the one in this study, can be analysed or displayed through descriptive or inferential statistics (Burns & Burns, 2008). The descriptive statistics for the fifteen continuous variables are provided in Table 6.2. The scores for the internal audit role in fraud prevention and detection within SCM in the Gauteng Provincial Treasury variables were changed into proportion (from score values) so that they could be interpreted easily. Descriptive statistics were carried out to understand the distribution of the participants as well as the role of internal audit in supply chain management fraud prevention in the Gauteng Provincial Treasury.

- *Analysis of variance (ANOVA)*

The one-way analysis of variance (ANOVA) is used to test whether there are significant differences in the mean scores of more than two groups. The one-way analysis of variance (ANOVA), comparing the highest academic qualification (all three groups) for created continuous variables, is summarized in Table 6.7.

One-way analysis of variance (ANOVA) was thus used to compare the highest academic qualification (all three groups) for created continuous variables.

5.6.2 Qualitative Data Analysis

- *Interpretation and reporting of open-ended responses:*

Having organized and manually coded the qualitative data from the questionnaire, the themes that emerged were used to interpret the results of the open-ended questions. These themes addressed the effectiveness of the Treasury's supply chain management and the effectiveness of internal audit in preventing fraud in the supply chain management.

- *Qualitative survey*

The open-ended question has become part of many surveys (Popping, 2015). In this study, the answers to open-ended questions were in the form of statements and were organised as part of a sequence of otherwise quantitative research questions. According to Popping (2015), as soon as the open-ended questions are entered into a general population survey questionnaire the answers should be analysed. The participants' responses to the open-ended questions were short answers and it was not considered necessary to use a computer program such as Atlas ti to code the text for analysis. Hence, the researcher manually coded the text and further interpreted the answers manually. When analysing open-ended questions by means of text analysis procedures, Popping (2015) advocates that the coding must be performed by a human coder, and the researcher has the choice to code and decide on the themes manually. On the other hand, the significance of examining written responses to open-ended questions is emphasised by Jaeger and Rasmussen (2021), whereas Hansen and Swiderska (2023) concentrate on incorporating both open-ended and closed-ended questions with diverse text analysis techniques. However, McGillivray, et al., (2020)

does not fully endorse manual coding when dealing with large datasets. The codes that were identified from the survey related to the effectiveness of supply chain management and the role of internal audit in fraud detection and prevention within supply chain management. Therefore, to produce qualitative data, the researcher used methods such as thematic analysis to interpret patterns and meanings in the data.

5.7 RELIABILITY AND VALIDITY

Cypress (2017) explains that reliability and validity are criteria by which researchers assess measurement quality. Leedy and Ormrod (2015) also describe that in quantitative research, reliability and validity are very important for decreasing errors that might arise from measurement problems in the research study.

5.7.1 Reliability of Data

Creswell (2014) states that reliability is achieved when the researcher measures consistency and that the reliable questionnaire also consistently measures the same objectives of the study. The reliability indicates that the measurement system produces similar results under the same conditions and is reproducible (Mohamad et al., 2015; Noble & Smith, 2015). This study ascertains the reliability through the questionnaires. The researcher conducted a pre-test study on the questionnaires before the final distribution. The pretesting was done with the aim of refining and correcting the questionnaire to ensure that it was reliable. The researcher discussed the content of the questions with the members of the Gauteng Treasury to check possible errors in the instrument. Reliability was also achieved through the review of the literature to check if the concepts used in the questions were consistent with the literature review. Another element of reliability was achieved through measuring the internal consistency of the items on the reliability of scale, as Cronbach's Alpha was also calculated.

5.7.2 Validity of Data

Research integrity is the overarching concept that governs the validity and trustworthiness of research (Bouter et al., 2021). The validity of qualitative data was dependent on the ethical procedures used by the researcher. This includes the research design, data collection and analysis, and data management before analysis. These ethical procedures could be traced from the research proposal sent to the Faculty Research Ethics Committee for approval. The Tshwane University of Technology requested the researchers to adhere to a certain code of conduct when collecting data, and such considerations protect the rights of research participants, enhance research validity, and maintain scientific integrity.

Another form of validity was achieved when the researcher asked the experts in the National Treasury to examine the wording of the survey items. This helped the researcher to assess whether the survey questions were relevant to measuring internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury and to further determine if there was a need to redesign the questionnaires. As the questionnaire was assessed as easy to understand, and the questions were not open to different interpretations by the participants, it can be concluded that the questionnaire has high validity. Taherdoost (2016) attests that a questionnaire is one of the most widely used tools to collect data and further explains that the main objective of a questionnaire in research is to obtain relevant information in the most reliable and valid manner.

5.7.3 Methodological Triangulation

Triangulation is often used to describe research where two or more methods are used (Heale & Forbes, 2013). Triangulation aims at validating the results of a study (Flick, 2018). The objective is to increase confidence in the findings through confirmation (Heale & Forbes, 2013).

The quantitative and qualitative data were collected concurrently using the same questionnaire. The questionnaire made use of Likert Scales for quantitative data, and open-ended questions for qualitative responses. The researcher first analysed the quantitative data and then qualitative responses from the open-ended questions. For the quantitative analysis, the researcher used

descriptive statistics, mean scores, and standard deviations. For the qualitative analyses themes were used, which were categorised from the key sections of the questionnaire. The procedures were used to facilitate thematic discussions of the written text about the effectiveness of the supply chain management and the effectiveness of internal audit in preventing fraud in the supply chain management. The qualitative, open-ended questions are measured through the effort that the participants made in answering the open-ended questions. It is concluded that such effort was put into answering the open-ended question, that then described the reality of the results. Therefore, the consistency of findings obtained through different instruments confirms the findings from both quantitative and qualitative methods, and empirical materials used to collect the research data.

5.8 ETHICAL CONSIDERATIONS

The Tshwane University of Technology (TUT) has specific rules, regulations and processes about getting ethical clearance for any part of a study that may breach ethical norms. Such procedures require submission of a full research proposal, completed TUT ethics declaration, TUT ethics checklist, and full research instruments. Any study conducted by students, staff, and stakeholders affecting the university has to comply with ethical processes of permissions to carry out such a research project. The researcher had already been granted consent to conduct the research by the Gauteng Provincial Treasury (see Annexure 4). Therefore, before engaging in data collection processes, the researcher sought and secured ethical clearance from the Faculty of Economics and Finance Research Ethics Committee of Tshwane University of Technology (see Annexure 2). The TUT Research Ethics Committee keeps all researchers mindful of ethical considerations in research. Key to these ethical considerations are voluntary participation, informed consent as a legal requirement, anonymity as a means to ensure that participants are not identifiable in any way, and the maintenance of confidentiality to protect the privacy of research participants. The identities of the participants were anonymized.

In order to obtain informed consent, the participants were provided with a copy of the ethical clearance received from the Faculty of Economics and Finance Research Ethics Committee of Tshwane University of Technology (see Annexure 2). This was used to explain the process by telling participants that the research was legitimate and being conducted ethically. The use of an

informed consent process was one key ethical component of the ethical conduct of research with human subjects.

The study used the results to develop a framework that should ultimately help to reduce incidents of fraud in supply chain management processes. In order to preserve the anonymity of the participants, without their identity being linked to specific statements in the open-ended questions, the names of the participants were not disclosed nor were they linked to their responses. In the same way, an ethical clearance letter from the Tshwane University of Technology was presented to the participants to safeguard the researcher, the organisations and the research participants against potential legal implications.

Social science studies are about individuals, communities and societies (Academy of Social Sciences, 2021). The consideration of research ethics is about acknowledging processes and any potential risk that the research may encounter. Hence, the researcher acknowledged that before beginning any research activities and data collection, there is a need to sort out any ethical matters connected with the research questions, and objectives of the research. As a result, this study made an effort to acknowledge all contributions provided by the TUT Research Committee and to give reference to the Gauteng Provincial Treasury and the scholars in the form of references. This will aid the researcher in maintaining ethical practices and keeping the study free from any material bias and elements of plagiarism. Thus, the research proposal and the specific literature chapters were run through plagiarism software (Turnitin) to ensure that elements of plagiarism are minimised or avoided.

The Faculty Research Ethics Committee (FREC) approved the research study and the instruments as the study has minimal risks to humans and animals. All participants were adults working for the Gauteng Provincial Treasury and they were performing their duties independently in the workplace. All these criteria qualified the participants to participate in the study. Finally, participants were given adequate time to decide whether they had changed their minds about participating in the research as they were given a questionnaire through a tool within Google Drive for creating online survey forms.

During this study, the researcher's efforts were directed by the ethical values associated with the internal audit and compliance profession. The researcher is a member of the Compliance Institute Southern Africa (CISA), which is an independent professional body for the compliance profession. The required approval to conduct this study was obtained from the Faculty of Economics and Finance Research Ethics Committee of the Tshwane University of Technology. In order to observe the principles of research ethics, this research respects the well-being, independence, and dignity of the interviewees (The British Psychological Society, 2010). Approval to conduct research was initially sought from the National Treasury (office of the Director General), however the request was declined as the entire SCM structure was undergoing a review due to serious capacity constraints, and approval to conduct research would thus not be in the best interest of the Department, and would also pose a threat to the academic research. Subsequently, a request to conduct research was made to the Gauteng Provisional Treasury and approval thereof was obtained.

To observe the principles of research ethics, this research respected the well-being, independence, and dignity of the interviewees (The British Psychological Society, 2010).

The following research principles were taken into consideration to safeguard the rights of respondents (Caulfield et al., 2008; Wisker, 2008; Oliver, 2010):

- The researcher informs the interviewees about the entire scope of the questions. This is done in writing by sending each interviewee a description of the interview in advance.
- The procedure of the interview is explained to the interviewees.
- The interviewees' freely informed consent is requested.
- The interview is executed exactly as explained to the interviewee.
- The interviewee's consent is requested to permit other researchers to use the findings of this interview in similar research projects.
- No kind of covert or deceptive research is conducted.
- Relevant questions are asked concerning the research issues, and personal questions are avoided.
- The interviews are kept confidential by anonymising them.

5.9 SUMMARY OF THE CHAPTER

This chapter provided a detailed description of the research methodology. As explained above, this study aimed to investigate the role of internal audit in fraud prevention within supply chain management. In order to achieve the research objectives, this study employed qualitative as well as a quantitative research method to quantify the causes and effects that presents the role of internal audit in fraud detection and prevention.

This study thus focused on the positivist paradigm. The reason for using this paradigm is that real events with regard to supply chain management were to be observed and explained logically through analysis in order to determine a way in which internal audit can be used as a tool for fraud prevention within the supply chain. The study applied a probability sampling method as it allows the investigator to generalize the findings of the sample to the target population. This sampling also incorporated stratified random sampling to select the participants of the questionnaire. This type of sampling was selected due to its ability to allow data to be divided into various sub-groups (strata) sharing common characteristics like age, gender, race, income, education, and ethnicity. It also assures representation of all groups in the population needed.

The next chapter deals with the data analysis and interpretation of the results.

CHAPTER 6

DATA ANALYSIS AND INTERPRETATION OF THE RESULTS

6.1 INTRODUCTION

This chapter presents the data analysis and the results of the study. The chapter analyses the data set from the key research questions. The presentation of the results in this chapter aims to develop a framework for internal audit effectiveness in supply chain management fraud prevention in the Gauteng provincial treasury. This chapter reports the descriptive and inferential statistics results. The analysis of the results is presented in tables and graphs, in line with the research objectives. The chapter concludes with a summary of the chapter.

6.2 SECTION A – QUANTITATIVE RESULTS

Response rate

Overall, 112 questionnaires were sent to the participants and 41 completed questionnaires were received for the analysis. This yielded a response rate of 36.6%. This response rate is thus acceptable, given that the email surveys are highly variable and traditionally in the range of 25% to 30% (Menon & Muraleedharan, 2020).

Analysis of research questions

Data was analysed using Statistical Package for the Social Science (SPSS), version 27.0. Both descriptive and inferential statistical analysis were carried out to understand the distribution of the participants' socio-economic profile characteristics as well as their perceptions of the role of internal audit in supply chain management fraud prevention in the Gauteng Provincial Treasury. One-way analysis of variance (ANOVA) was used to compare the highest academic qualification (of all three groups) for created continuous variables.

6.2.1 Socio-Economic Profile of Participants

Descriptive information on the socio-economic positions of the participants is discussed in this section. The socio-economic information consists of items such as the number of years of experience in the public sector and the participants' highest academic qualification.

6.2.1.1 Years of Experience in the Public Sector

In Figure 6.1 below, the majority of the participants (55%) who completed the questionnaire have more than 10 years of experience in the internal audit field. This implies that they have a better-than-average understanding of the role of internal audits and their effectiveness. Badara and Saidin (2013) indicate that experience is a crucial aspect to consider because auditors' experience influences their professionalism, and this therefore has a critical impact on their efficiency and effectiveness. Furthermore, research indicates that when auditors have more experience, they are more knowledgeable about errors, and they are able to identify errors more accurately. It is also suggested that the knowledge advantage is a result of the ability to provide better explanations for audit findings (Gaballa & Ning, 2011). However, other researchers argue that, although experience is a good predictor of knowledge, not all forms of knowledge are obtained equally by persons with a given amount of experience. Similarly, not all people with the same experience in a particular field are likely to have the same problem-solving capabilities, but may rather depend on rote execution of tasks or activities. This is because different types of knowledge are obtained through different experiences and training (Lehmann & Norman, 2006).

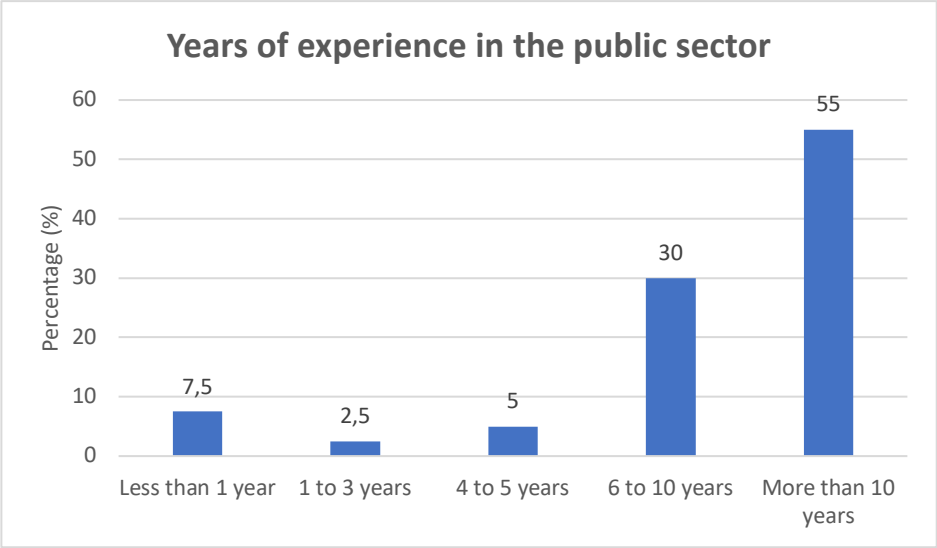


Figure 6.1: Participants percentage by years of experience in the public sector

6.2.1.2 Highest Academic Qualification

When asked about their highest level of academic qualification, 45% of the participants indicated that they had obtained a degree, while 40% had obtained a postgraduate degree (see Figure 6.2). This shows that the majority of respondents should have a good understanding of the role of internal audit and should be able to accurately evaluate its effectiveness.

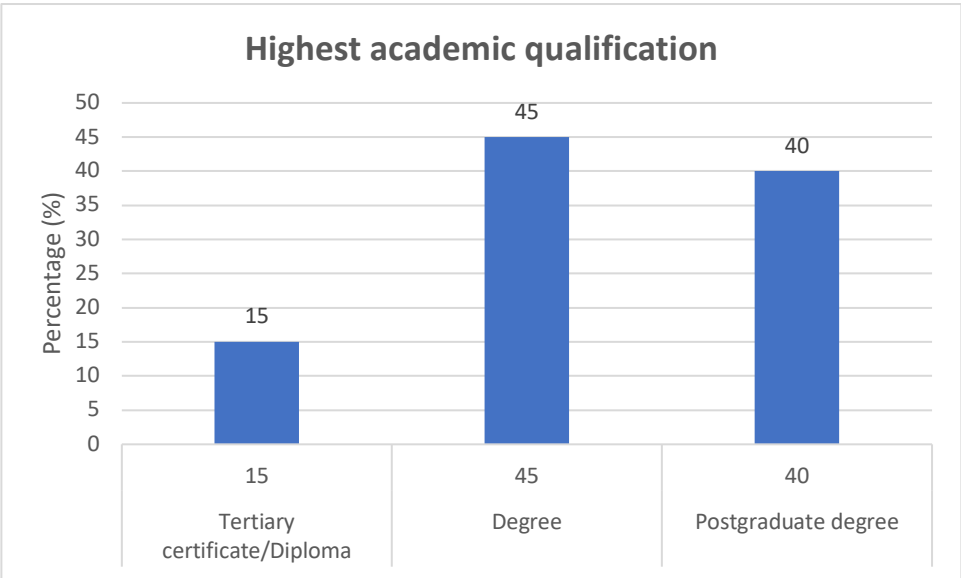


Figure 6.2: Participants percentage by the highest academic qualification

6.2.2 The Main Contributing Factors to Fraud Risk in SCM

Study participants were asked what they considered to be the main contributing factors to fraud risk in supply chain management. Figure 6.3 shows that greed (22.81%), bribery (17.4%), poor controls/monitoring (18.42%), and weakness in the system (19.3%) are the four factors considered by participants to be the highest contributors to fraud risk in the supply chain management. Bribery and greed are human conditions that may be exacerbated by poor controls/monitoring. Poor controls also may result in weaknesses in the system. Therefore, understanding the existing opportunities to commit fraud within the existing system of controls enables auditors to identify which fraud schemes an individual is most likely to commit when the controls do not function as expected by management. Pressure in this analysis is political and service delivery pressure, and the opportunity to commit fraud thus refers to the weaknesses in the system where an individual has the power or ability to exploit and commit fraud (Varma & Khan, 2016).

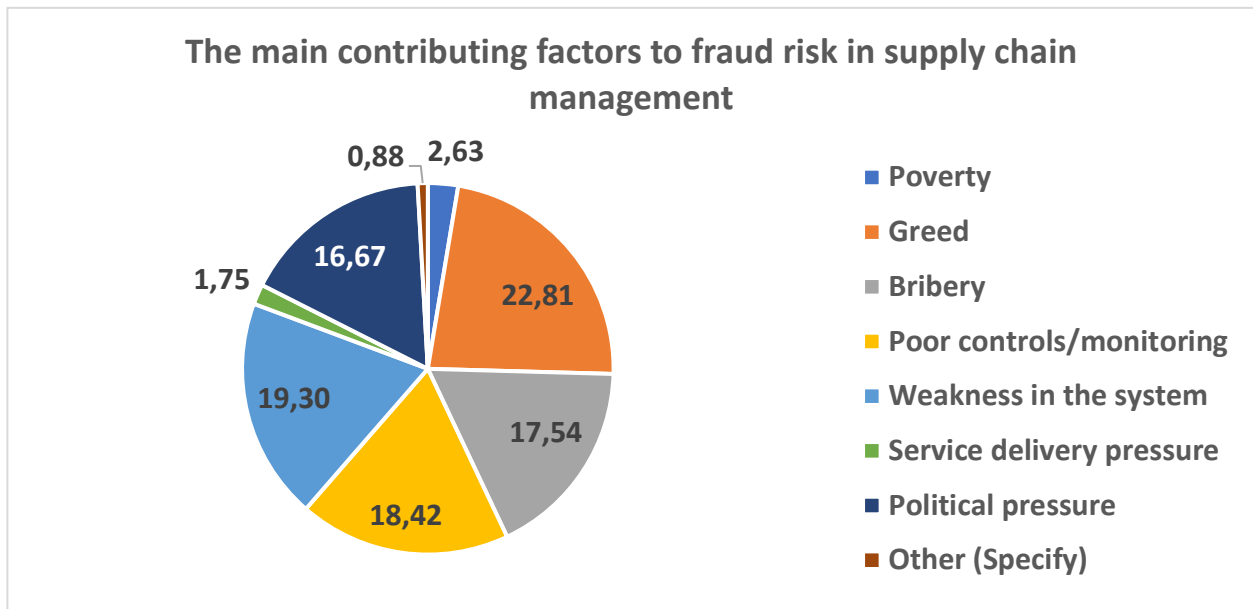


Figure 6.3: The main contributing factors to fraud risk in supply chain management

6.2.3 Quantitative Analysis and Results for Objective 1: The Effectiveness of the SCM System in the Gauteng Provincial Treasury

This section addresses the effectiveness of the SCM system in the Gauteng Provincial Treasury. The categories in which the effectiveness of SCM is assessed are listed below, together with the results, presented in the form of graphs.

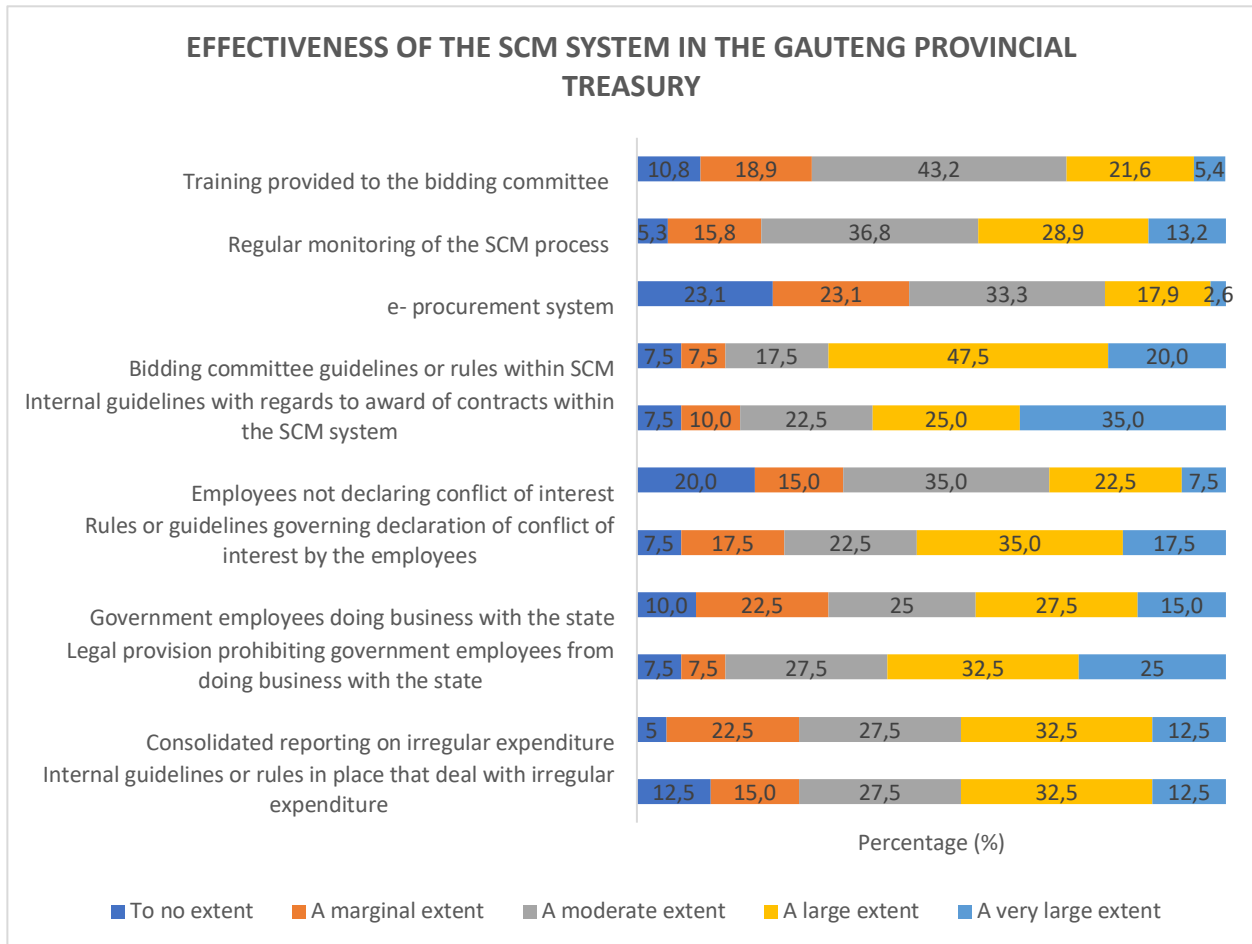


Figure 6.4: The effectiveness of SCM system in the Gauteng Provincial Treasury

Internal guidelines or rules dealing with irregular expenditure

The majority of the participants indicate that there are internal guidelines or rules in place that deal with irregular expenditure (45%) (a combination of a large (32.5%) and a very large extent (12.5%) responses). Only a minority of the participants (12.5%) indicate that there are no internal guidelines or rules in place. It is therefore evident that there are internal guidelines or rules in place

in the Gauteng Provincial Treasury Department that deal with irregular expenditure, but that some participants are unaware of them, or consider them to be ineffective, or that they do not cover all areas of operation.

Consolidated reporting on irregular expenditure

The results indicate that there is consolidated reporting on irregular spending to a large and a very large extent (45%). However, 5% of the participants indicate that there is no consolidated reporting on irregular expenditure. It is therefore evident that a majority of the participants believe that there is consolidated reporting of irregular expenditure in the Gauteng Provincial Treasury Department.

Legal provision prohibiting government employees from doing business with the state

The results indicate that respondents recognise that there is a legal provision in place that prohibits government employees from doing business with the state, and 57.5 % of the participants have stated that this is complied with to a large and very large extent. While this assists in preventing conflict of interest, 7.5% of the participants state that there is no such legal provision in place.

Government employees doing business with the state

42.5% of participants indicated that there are instances where government employees are doing business with the state (a combination of a large (27.5%) and very large extent (15%) responses). Although Figure 6.4 above indicates that respondents are aware that there is a legislation in place that prohibits government employees from doing business with the state, participants indicate that there are still individuals who do so. This indicates widespread and wilful contravention of the legislation in question.

These responses are corroborated by the Department of Public Service and Administration (DPSA). In a 2020 assessment of the DPSA's progress in implementing measures that prevent public servants from conducting business with the state, it was found that 1 539 public servants did so. Of that number, a total of 1 111 employees were from provincial departments and 428

from national departments. Public servants engaging in such activity are subject to both disciplinary action and possible criminal charges (Public Service and Administration, Performance Monitoring and Evaluation, 2020).

Rules or guidelines governing declaration of conflict of interest by the employees

When asked whether there are rules or guidelines in place that govern the declaration of conflict of interest by the employees, 52.5% of participants indicated that there were (a combination of a large (35%) and a very large extent (17.5%)). This may indicate that nearly half of employees are unaware of the rules and guidelines that govern the declaration of conflict of interest, and as a result they should be brought up to date on the requirement to comply. It is the responsibility of the relevant department to ensure that the employees are aware of the legislation in question, and then ensure compliance.

Employees not declaring conflicts of interest

When asked to what extent there are instances of state employees not declaring conflicts of interests, 20% of participants indicated that there was no extent to which this happened. This indicates that the majority of participants (80%) are aware of at least some instances of state employees not declaring conflicts of interest. The results thus indicate that although there are rules or guidelines in place that govern the declaration of conflict of interest by the employees, at least some employees still do not comply. 30% of participants indicated an awareness of non-compliance to a large and a very large extent. It is the responsibility of the relevant department to ensure that its employees are aware of and comply with the rules regarding declaration of conflict of interest.

Internal guidelines with regard to award of contracts within the SCM system

The results indicate that the extent to which there are internal guidelines in place with regards to the award of contracts within the supply chain management system is 60% (a combination of a large (25%) and a very large extent (35%)). This may indicate that supply chain custodians are

aware of the guidelines that govern the award of contracts and as a result they should comply. Compliance with the guidelines with regard to awarding contracts would ensure that contracts are awarded fairly and appropriately.

Bidding committee guidelines or rules within SCM

The results indicate that the extent to which there are bidding committee guidelines or rules in place within supply chain management is 67.5% (a combination of a large extent (47.5%) and very large extent (20%)). This may indicate that the bidding committee is aware of the guidelines that are in place and govern them and as a result, they should comply. Compliance with the guidelines with regard to bids would ensure that bids are dealt with appropriately as well as ensuring that no supplier is unfairly given an advantage over another.

The section above addresses internal guidelines or rules in place regarding declaration of conflict of interest, award of contracts within the supply chain management system, and bidding committee guidelines. The results indicate a positive outcome that there are guidelines or rules in place addressing the above-mentioned issues. The main aim of utilizing a bidding committee is to ensure that bids or proposals are given an objective and fair evaluation. The evaluation cannot be objective or fair if someone on the bidding committee has a conflict of interest that unfairly impacts the evaluation and distorts the results through bias (The World Bank, 2020).

E-procurement system

The results indicate that the extent to which there is an e-procurement system is 20.5% (a combination of a large (17.9%) and a very large extent (2.6%)). The results are not a good indication as it is imperative to have an e-procurement system in place. This is emphasized by Sitompul (2022), who explains that e-procurement or electronic procurement of goods and services is a method that is perceived to be more efficient, effective and transparent. E-procurement is expected to promote transparency and lessens fraudulent practices in the procurement of goods and services.

Regular monitoring of the SCM process

A majority of the participants (78.9%) indicate that the supply chain management process is being monitored on a regular basis to ensure consistency/that the process works as intended (a combination of a moderate (36.8%), large (28.9%) and very large extent (13.2%)). Monitoring of the supply chain process may result in effective supply chain management. It is critical that the supply chain management process is monitored on a regular basis to ensure that the process works as intended.

Training provided to the bidding committee

A majority of the participants (70.2%) indicate that training is provided to the bidding committee to a moderate or greater extent (a combination of moderate (43.2%), large (21.6%) and very large (5.4%) extents) in order to enhance the skills in the execution of the supply chain management process. Furthermore, results indicate that training provided to the bidding committee is provided to a 'no extent' (10.8%). This implies that adequate training is provided for the bidding committee to enhance their skills in performing their work. This will thus have a positive impact on the effectiveness of the supply chain management process.

The PFMA Act No.1 (1999) stipulates that officials implementing the institution's supply chain management system should be trained and deployed according to the requirements of the Framework for Minimum Training and Deployment issued by the National Treasury. This is a key aspect that will assist in ensuring an effective supply chain management. Compliance with ethical standards is of vital importance in any organisation. All role players in a supply chain management system must comply with the highest ethical standards to encourage mutual trust and respect and to promote an environment where business can be conducted with integrity and in a fair and reasonable manner. Furthermore, the National Treasury's Code of Conduct for Supply Chain Management Practitioners must be adhered to by all officials and other role players involved in supply chain management. These role players must acknowledge and disclose any conflict of interest that may arise; treat all suppliers and potential suppliers fairly; not utilise their position for private gain or to improperly benefit another person; ensure that they do not

compromise the credibility or integrity of the supply chain management system through the acceptance of gifts; be trustworthy in their use of public property; and assist accounting officers or accounting authorities in fighting corruption and fraud in the supply chain management system (Oussii & Taktak, 2018; Sambo, 2019; Sajjad et al., 2020).

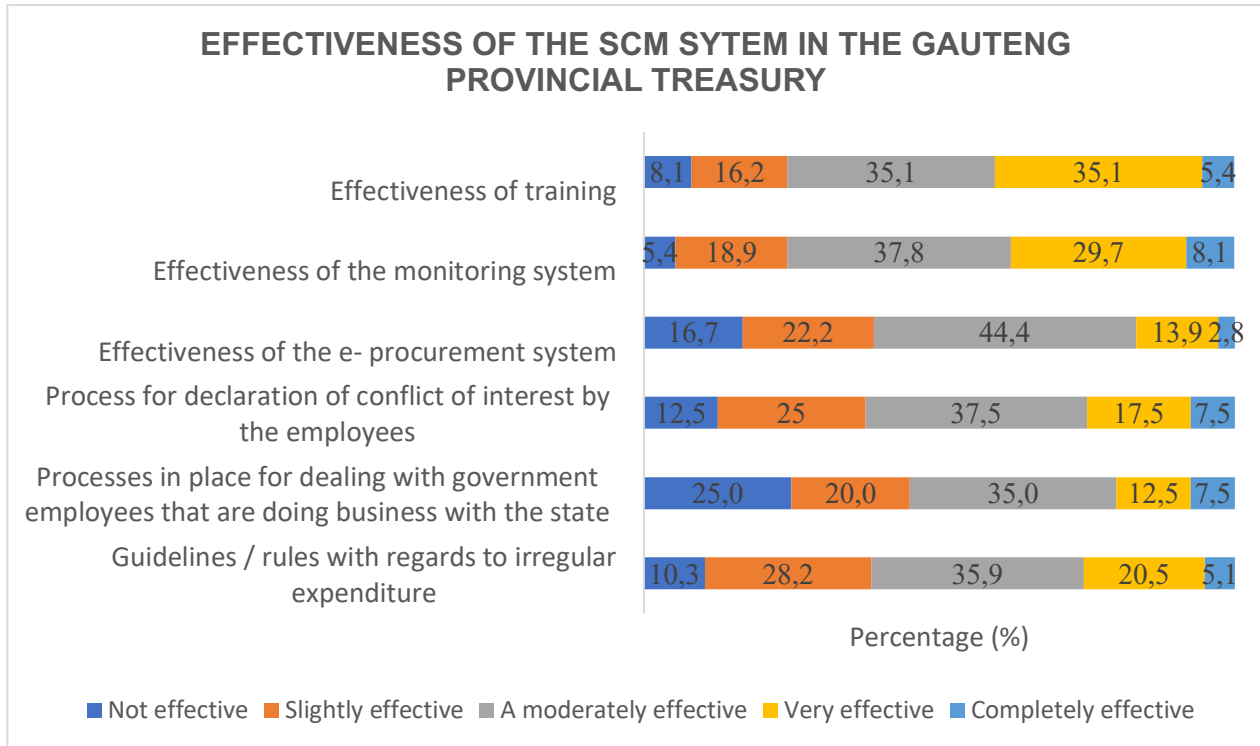


Figure 6.5: The effectiveness of the SCM system in the Gauteng Provincial Treasury

The categories on the graph above address the effectiveness of supply chain management in the Gauteng Provincial Treasury. More discussion is provided below.

Guidelines / rules with regard to irregular expenditure

A majority of the participants indicate that the guidelines / rules with regard to irregular expenditure are effective (a combination of moderately (35.9%), very (20.5%) and completely (5.1%)). Irregular expenditure should therefore be reduced as there are effective guidelines in place that guide the supply chain custodians. This is only possible if the custodians choose to act in compliance with the guidelines / rules in place.

Processes in place for dealing with government employees who are doing business with the state

The results indicate that the processes that are in place with regard to dealing with government employees who are doing business with the state are perceived to be either very or completely effective by 20% of participants (a combination of a very effective (12.5%) and completely effective (7.5%)). This implies that the processes that are in place with regard to dealing with government employees that are doing business with the state are not effective. This is in line with the results above indicating that 42.5% of the participants state that government employees are doing business with the state (see Figure 6.4). Although there are processes in place dealing with government employees who are doing business with the state, there is a high number of instances recorded of employees who are nevertheless still doing business with the state. This suggests that the response indicating a low perception of the effectiveness of these measures is a true reflection of what is happening in the department. If the processes were effective, such a high number of instances of government employees doing business with the state would not have been recorded.

Process for declaration of conflict of interest by employees

A majority (62.5%) of the participants indicate that the process of declaration of conflict of interest by the employees is at least moderately effective (made up of moderately (35%), very (17.5%) and completely effective (7.5%)). This suggests that a majority of the employees are aware of the process of declaration of conflict of interest, and as a result they are compliant, and the process is thus at least moderately effective. This can be linked to Figure 6.4 above stating that the extent to which there are rules or guidelines in place that govern the declaration of conflict of interest by the employees is recognised to a large and a very large extent (52.5%). This indicates that employees are aware of the rules and guidelines that govern the declaration of conflict of interest and that the implementation thereof is effective.

Effectiveness of the e-procurement system

The results indicate that 16.7% of participants did not consider the e-procurement system to be working effectively. This response can be linked to Figure 6.4 above, indicating that the extent to which there is an e-procurement system in place is 20.5%. The results are not a good indication of an effective e-procurement system; however, it is imperative to have an e-procurement system in place that is working effectively. E-procurement is expected to reflect transparency and reduce fraudulent practices in the procurement of goods and services.

Effectiveness of the monitoring system

The results indicate that 37.8% of participants consider the monitoring system to be effective (combination of completely effective (8.1%) and very effective (29.7%)) and 37.8% of participants consider it to be moderately effective. Monitoring of the supply chain process may result in an effective supply chain management. This is substantiated by the response above (see Figure 6.4) which indicates that the supply chain management process is being monitored on a regular basis to a large and a very large extent (42.1%). Monitoring of the supply chain process is thus effective. It is critical that the supply chain management process continues to be monitored on a regular basis to ensure that the process works as intended.

Effectiveness of training provided

The results indicate that 40.5% of participants consider the training provided to the bidding committee to be effective in enhancing the committee members' skills in the execution of the supply chain management process (a combination of very effective (35.1%) and completely effective (5.4%)). The results can be linked to Figure 6.4 above, which indicates that adequate training is provided to the bidding committee to enhance their skills in performing their work (43.2%). As stated above, the PFMA Act No. 1 (1999) stipulates that officials implementing the institution's supply chain management system should be trained and deployed according to the requirements of the Framework for Minimum Training and Deployment issued by the National Treasury. This is a key aspect that will assist in ensuring an effective supply chain management.

6.2.4 Quantitative Analysis and Results for Objective 2: The Effectiveness of Internal Audit in Detecting SCM Fraud

This section addresses the effectiveness of internal audit in detecting SCM fraud. The categories in which the effectiveness of internal audit in detecting SCM fraud are listed below, together with the results presented in the form of graphs.

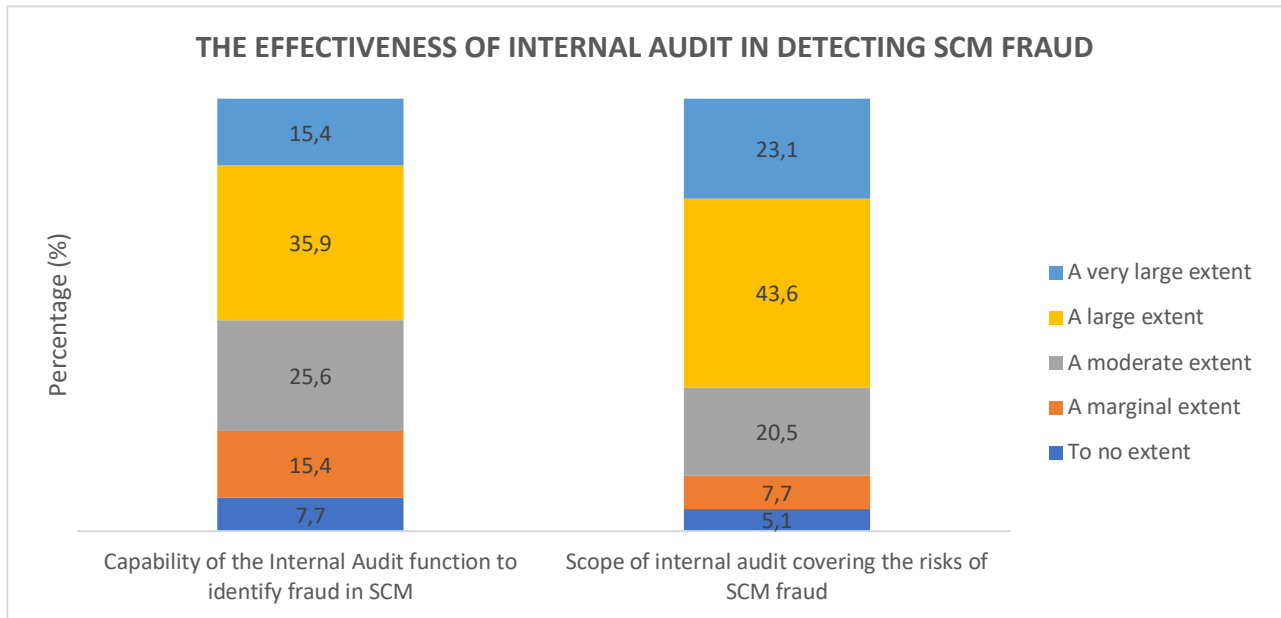


Figure 6.6: The effectiveness of internal audit in detecting SCM fraud

The capability of the Internal Audit function to identify fraud in SCM

Figure 6.6 above indicates that 51.3% of participants consider the internal audit function to have the capability to identify fraud in the supply chain management process (to a large and a very extent) and only 7.7% do not (answering to no extent). It can thus be concluded that Internal Audit in the Gauteng Provincial Treasury does have the capability to identify fraud in SCM.

Scope of internal audit covering the risks of SCM fraud

Figure 6.6 further indicates that a majority of the participants state that the scope of an internal audit in the Gauteng Provincial Treasury does always cover the risks of supply chain management fraud to a large and a very extent (66.7%). This therefore indicates a positive result, as when the

scope covers the risks within the supply chain, risks will be mitigated as the controls addressing the risks will be evaluated.

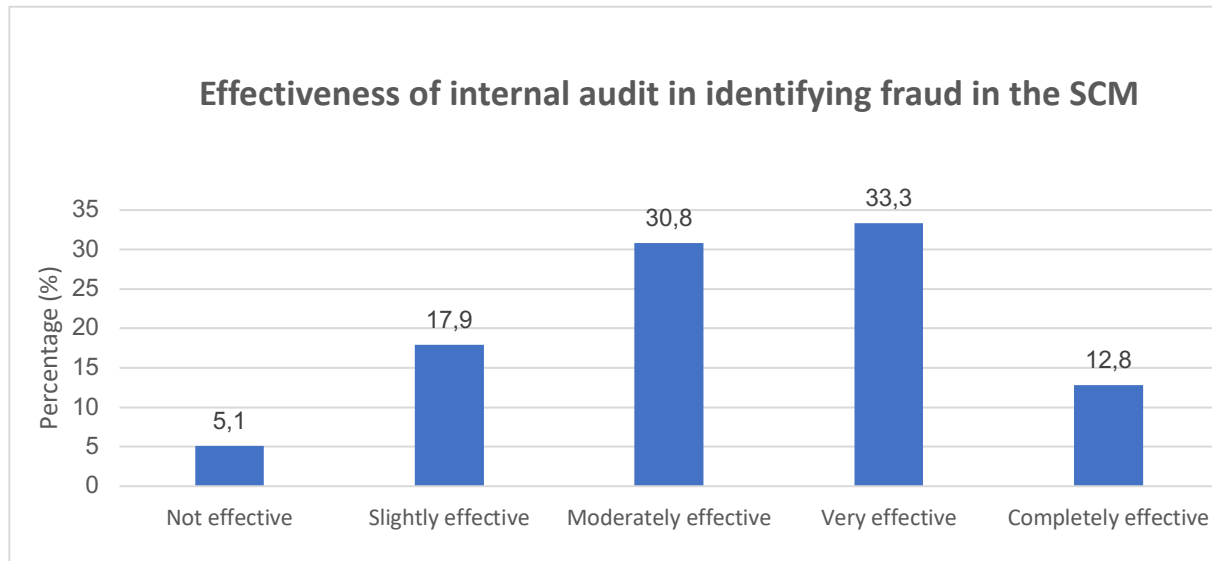


Figure 6.7: The effectiveness of internal audit in identifying fraud in the SCM

Effectiveness of internal audit in identifying fraud in the SCM

Figure 6.7 indicates that 46.1% of participants consider the internal audit to be very or completely effective in identifying fraud in the management of the supply chain. This demonstrates that the participants have confidence in internal audit, as they believe it to be very effective in identifying fraud. This result can be linked to C1 above as it indicates that the internal audit function has the capability to identify fraud in the supply chain management (51.3%). It can thus be concluded that internal audit in the Gauteng Provincial Treasury does have the capability to identify fraud and is effective in doing that.

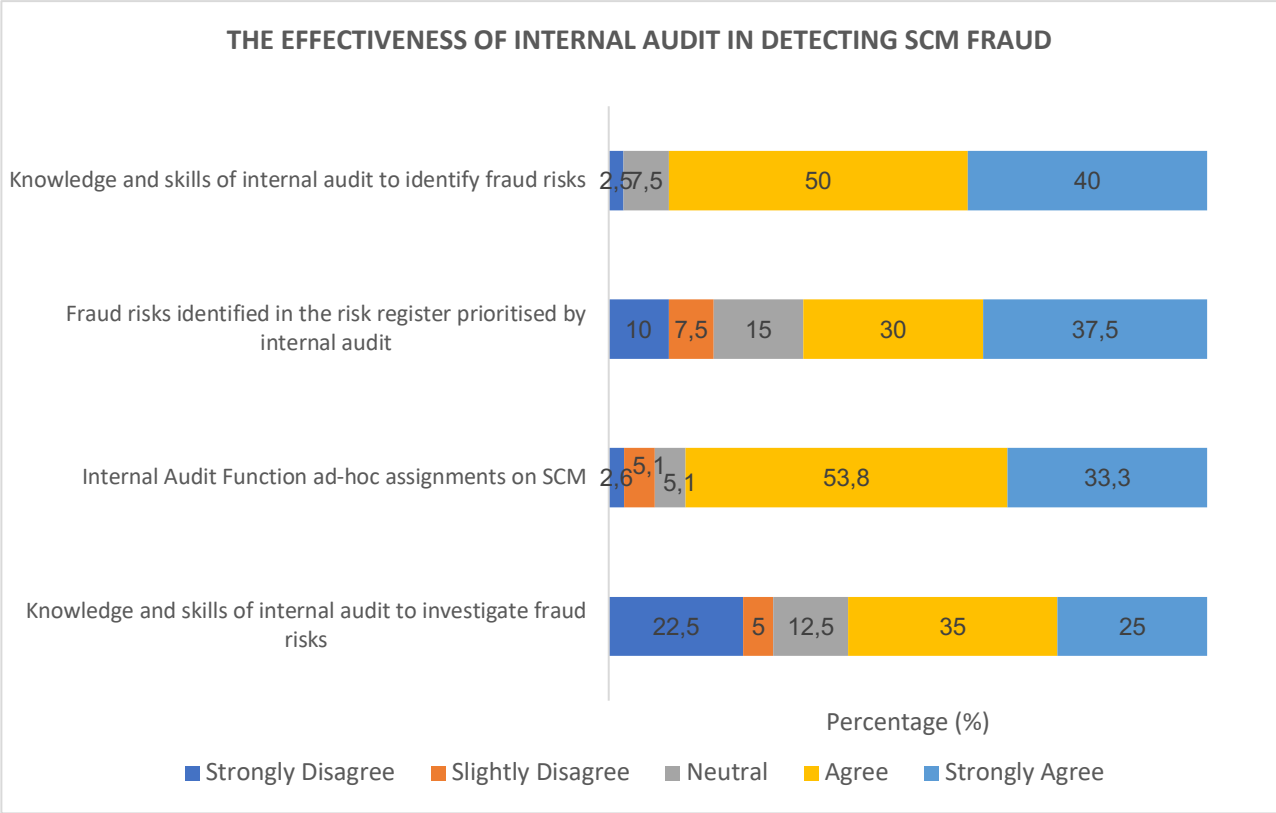


Figure 6.8: The effectiveness of internal audit in detecting SCM fraud

Figure 6.8 above indicates that although internal auditors are not required to be fraud experts nor supply chain custodians, 90% of the participants agree that they should have the skills to identify fraud within supply chain, while 67.5% agree that they should prioritise fraud risks identified in the risk register. There is also agreement that auditors should be given ad-hoc assignments on supply chain management (87.1%) as well as have the knowledge and skills to investigate fraud risks (60%).

6.2.5 Quantitative Analysis and Results for Objective 3: The Effectiveness of Internal Audit in Preventing SCM Fraud

This section addresses the effectiveness of internal audits in preventing SCM fraud. The results are explained below and are presented in the form of graphs.

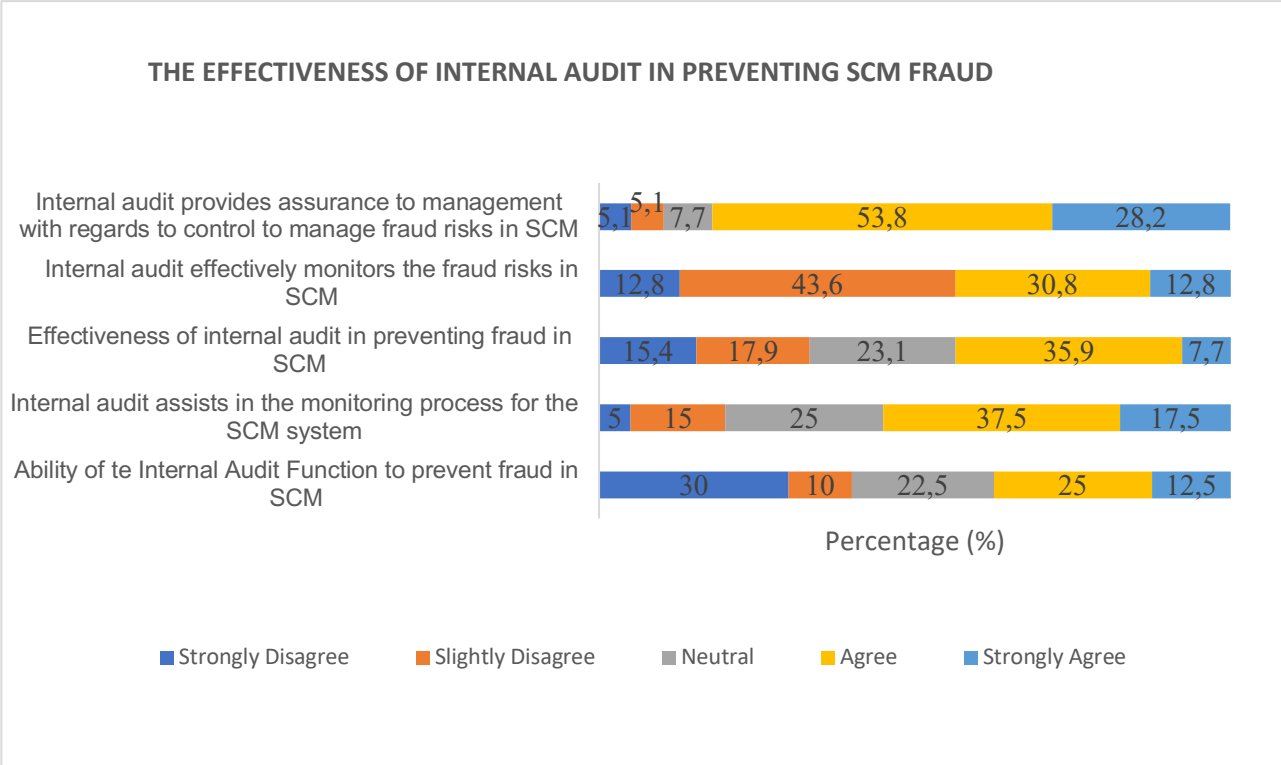


Figure 6.9: The effectiveness of internal audit in preventing SCM fraud

Figure 6.9 above indicates that 40% of the participants disagree (strongly and slightly) with the statement that the internal audit function has the ability to prevent fraud in supply chain management. The graph further indicates that internal audit is considered effective in preventing fraud in the supply chain management (43.6%) (agree and strongly agree). This is in contradiction to the finding that internal audit is viewed as not having the ability to prevent fraud. This can be interpreted that those participants who agree that internal audit has the ability to prevent supply chain management fraud, also agree that internal audit is effective in fraud prevention.

The results further indicate that participants agree and strongly agree that internal audit assists in the monitoring process for the supply chain management system (55%) and provides assurance to management with regard to control to manage fraud risks in the supply chain management system (82%). However, a large percentage of the participants disagree (strongly and slightly) that internal audit does monitor the fraud risks in the supply chain management effectively (56.4%). This means that the monitoring process of fraud risks by internal audit in the supply chain

management within Gauteng Provincial Treasury could be improved to ensure effective monitoring.

6.2.6 Quantitative Analysis and Results for Objective 4: Developing a Framework to Improve the Role of Internal Audit in Fraud Prevention and Detection in Supply Chain Management

This section presents an overall analysis of the role of internal audit in fraud prevention and detection in supply chain management, with the intention of developing a framework for improving the effective performance of that role. The categories in which the role of internal audit in fraud prevention and detection in supply chain management was analysed are listed below, together with the results presented in the form of graphs.

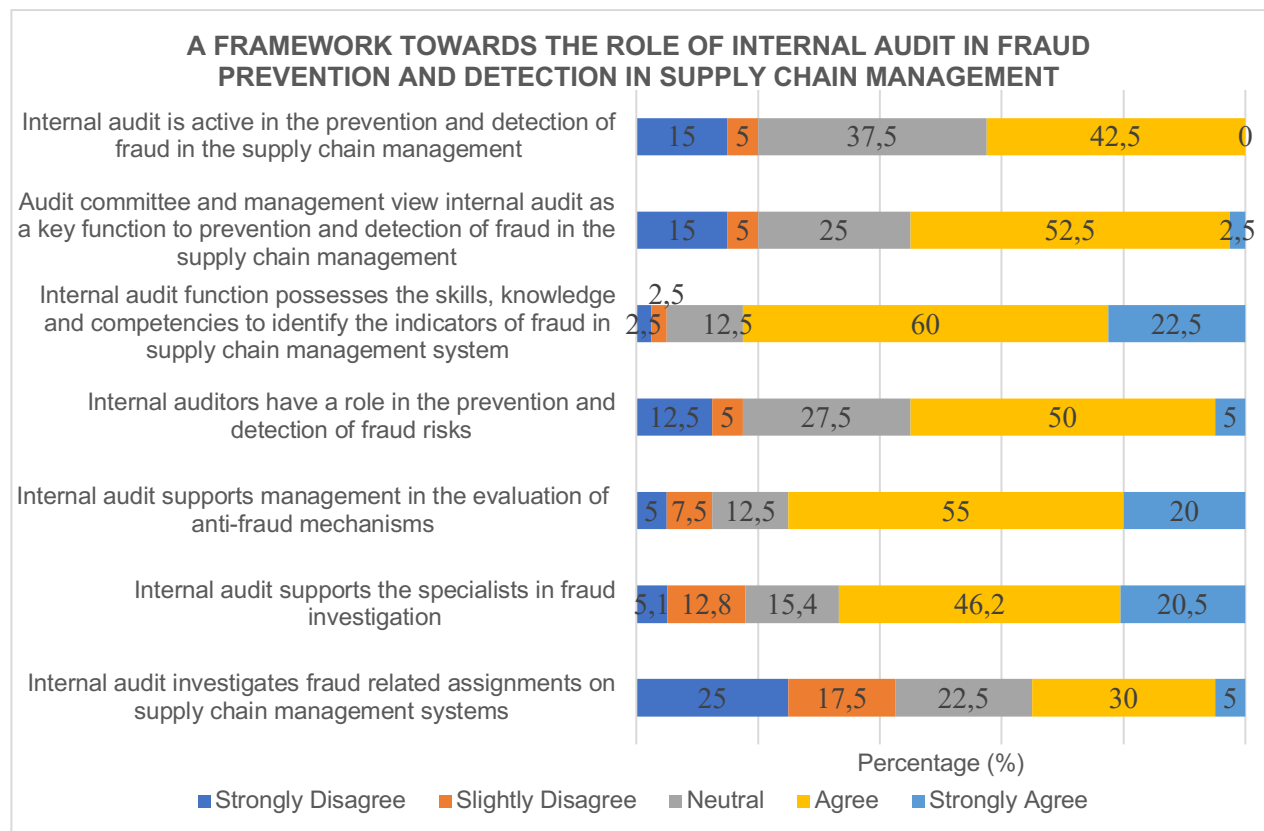


Figure 6.10: Developing a framework to improve the role of internal audit in fraud prevention and detection in supply chain management

The results in Figure 6.10 indicate that 42.5% of participants disagree (strongly and slightly) that internal audit investigates fraud related assignments on supply chain management systems. This percentage is higher than those who agree and strongly agree (35%). This means internal audit is not viewed as investigating fraud related assignments on supply chain management systems.

The results further indicate that 66.7% of participants agree and strongly agree that internal audit supports the specialists in fraud investigation. A conclusion can be made that, although internal audit does support the specialists in fraud investigations, they do not conduct the investigations themselves. This is in line with the Standards for the Professional Practice of Internal Auditing, which state that internal auditors are not required to investigate fraud unless they have the specific experience and expertise required to do so.

Furthermore, the results indicate that 75% of participants agree and strongly agree that internal audit supports management in the evaluation of anti-fraud mechanisms. This could be linked to the above analysis indicating that internal audit supports both management and specialists in fraud investigation.

Figure 6.10 also indicates that 55% of participants agree and strongly agree that internal auditors have a role in the prevention and detection of fraud risks. This can be linked to Figure 6.6 above, which indicates that the internal audit function is considered to have the capability to identify fraud in the supply chain management (51.3% of participants) as well as Figure 6.9 above, which indicates that internal audit is effective in preventing fraud in the supply chain management (43.6% of participants).

The results indicate that 82.5% of participants agree and strongly agree that the internal audit function does possess the skills, knowledge, and competencies required to identify the indicators of fraud in the supply chain management system. This can be linked to the data presented in Figure 6.8 above, which indicates that 90% of participants agree and strongly agree that internal audit should have the knowledge and skills to identify fraud risks in the supply chain. This means that internal audit is considered to have the expertise in identifying the indicators of fraud.

6.3 FURTHER STATISTICAL ANALYSIS

6.3.1 One Sample T-test

A one-sample t-test was run on the 5-step Likert scale to evaluate statements related to the role of internal audit in fraud prevention and detection in supply chain management, with the reference point defined as 3. Only the listed mean scores for the effectiveness of the SCM system in the Gauteng Provincial Treasury that were significant were included.

Table 6.1: One sample t-test

	N	Mean	Std. Deviation	t	df	p-value	Mean Difference	95% CI of the Difference	
								Lower	Upper
The effectiveness of the SCM system in the Gauteng Provincial Treasury									
To what extent is there a legal provision that prohibits government employees from doing business with the state?	40	3,60	1,172	3,237	39	0,002	0,6	0,23	0,97
In your view, on a scale of 1-5 are the processes that are in place with regards to dealing with government employees that are doing business with the state effective?	40	2,58	1,217	-2,21	39	0,033	0,43-	-0,81	-0,04
To what extent are there internal guidelines in place with regards to award of contracts within the supply chain management system?	40	3,60	1,194	3,178	39	0,003	0,6	0,22	0,98
To what extent are there bidding committee guidelines or rules in place within supply chain management?	40	3,65	1,122	3,664	39	<0,001	0,65	0,29	1,01
To what extent is there an e-procurement system in place?	39	2,54	1,120	-2,57	38	0,014	-0,46	-0,82	-0,10
In your view, on a scale of 1-5, is the e-procurement system working effectively?	36	2,64	1,018	-2,13	35	0,041	-0,36	-0,71	-0,02

								95% CI of the Difference	
	N	Mean	Std. Deviation	t	df	p-value	Mean Difference	Lower	Upper
The effectiveness of internal audit in detecting SCM fraud									
To what extent does the scope of internal audit always cover the risks of supply chain management fraud?	39	3,72	1,075	4,172	38	<0,001	0,718	0,37	1,07
Internal audit function should be given ad-hoc assignments on supply chain management	39	4,10	0,912	7,552	38	<0,001	1,103	0,81	1,40
Internal audit should always prioritise fraud risks identified in the risk register	40	3,78	1,310	3,74	39	<0,001	0,775	0,36	1,19
Internal audit should have the knowledge and skills to identify fraud risks in the supply chain	40	4,25	0,809	9,777	39	<0,001	1,25	0,99	1,51
The effectiveness of internal audit in preventing SCM fraud									
Internal audit assists in the monitoring process for the supply chain management system	40	3,48	1,109	2,709	39	0,010	0,475	0,12	0,83
Internal audit effectively monitors the fraud risks in the supply chain management	39	3,44	0,882	3,085	38	0,004	0,436	0,15	0,72
Internal audit provides assurance to management with regards to control to manage fraud risks in the supply chain management	39	3,95	1,025	5,782	38	<0,001	0,949	0,62	1,28
Developing a framework towards the role of internal audit in fraud prevention and detection in supply chain management									

								95% CI of the Difference	
	N	Mean	Std. Deviation	t	df	p-value	Mean Difference	Lower	Upper
Internal audit supports the specialists in fraud investigation	39	3,64	1,112	3,601	38	<0,001	0,641	0,28	1,00
Internal audit supports management in the evaluation of anti-fraud mechanisms	40	3,78	1,025	4,782	39	<0,001	0,775	0,45	1,10
Internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in supply chain management system	40	3,98	0,832	7,415	39	<0,001	0,975	0,71	1,24

Table 6.1 above shows that there is strong awareness that there is a legal provision in place that prohibits government employees from doing business with the state. A majority of the participants have stated that this is done to a large and very large extent (mean = 3.60, a statistically significant difference of 0.6 (95% CI, 0.23 to 0.97), $t(39) = 3.24$, $p=0.002$). The results indicate that the processes that are in place with regards to dealing with government employees that are doing business with the state are not effective (mean = 2.58, a statistically significant difference of 0.43 (95% CI, -0.81 to -0.04), $t(39) = -2.21$, $p=0.033$). It is perceived that there are to a very large and to a large extent internal guidelines in place with regards to the awarding of contracts within the supply chain management system (mean = 3.60, a statistically significant difference of 0.6 (95% CI, -0.22 to 0.98), $t(39) = 3.18$, $p=0.003$). There is a very large and a large extent to which there are bidding committee guidelines or rules in place within supply chain management (mean = 3.65, a statistically significant difference of 0.65 (95% CI, 0.29 to 1.01), $t(39) = 3.66$, $p=0.010$). Furthermore, the results indicate that an e-procurement system is non-existent (mean = 2.54, a statistically significant difference of -0.46 (95% CI, -0.82 to -0.10), $t(38) = -2.57$, $p=0.014$), or that the e-procurement system is not working effectively (mean = 2.64, a statistically significant difference of -0.36 (95% CI, -0.71 to -0.02), $t(35) = -2.13$, $p=0.041$). Thus, overall, there is strong evidence to conclude that the majority of participants believe that the SCM system in the Gauteng Provincial Treasury is at best only partially effective.

Regarding the effectiveness of internal audit in detecting SCM fraud, the results showed that the scope of internal audit in the Gauteng Provincial Treasury does cover the risks of supply chain management fraud to a large and a very large extent (mean = 3.72, a statistically significant difference of 0.72 (95% CI, 0.37 to 1.07), $t(38) = 4.17$, $p<0.001$). Participants agree and strongly agree that the internal audit function should be given ad-hoc assignments on supply chain management (mean = 4.10, a statistically significant difference of 1,103 (95% CI, 0.81 to 1.40), $t(38) = 7.55$, $p<0.001$). Participants also agree and strongly agree that internal audit should always prioritise fraud risks identified in the risk register (mean = 3.78, a statistically significant difference of 0.76 (95% CI, 0.36 to 1.19), $t(38) = 7.55$, $p<0.001$). Participants agree and strongly agree that internal audit should have the knowledge and skills to identify fraud risks in the supply chain (mean = 4.25, a statistically significant difference of 0.76 (95% CI, 0.99 to 1.51), $t(39) = 9.78$,

$p < 0.001$). Thus, there is strong evidence overall to conclude that a majority of participants believe that internal audit is effective in detecting SCM fraud.

Furthermore, the objective addressing the effectiveness of internal audit in preventing SCM fraud, indicated that participants agree and strongly agree that internal audit assists in the monitoring process for the supply chain management system (mean = 3.48, a statistically significant difference of 0.48 (95% CI, 0.12 to 0.83), $t(39) = 2.71$, $p = 0.010$). The results further indicated that a large percentage of the participants disagree (strongly and slightly) that internal audit monitors the fraud risks in the supply chain management effectively (mean = 3.44, a statistically significant difference of 0.44 (95% CI, 0.15 to 0.72), $t(38) = 3.09$, $p = 0.004$). Participants also agree and strongly agree that internal audit does provide assurance to management with regard to managing fraud risks in the supply chain management system (mean = 3.95, a statistically significant difference of 0.95 (95% CI, 0.62 to 1.28), $t(38) = 5.88$, $p < 0.001$). Thus, there is strong evidence overall to conclude that a majority of participants believe that internal audit is effective in preventing SCM fraud. However, the monitoring process by internal audit of fraud risks in the supply chain management system within Gauteng Provincial Treasury could be improved to ensure more effective monitoring outcomes, as results indicated that a significant number of participants disagree with the statement that internal audit does monitor the fraud risks.

Lastly, with regard to developing a framework to improve the role of internal audit in fraud prevention and detection in supply chain management, the results indicated that internal audit supports the specialists in fraud investigation (mean = 3.64, a statistically significant difference of 0.64 (95% CI, 0.28 to 1.00), $t(38) = 3.60$, $p < 0.001$). The results also indicate that internal audit supports management in the evaluation of anti-fraud mechanisms (mean = 3.78, a statistically significant difference of 0.78 (95% CI, 0.45 to 1.10), $t(39) = 4.78$, $p < 0.001$), and lastly that the internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in the supply chain management system (mean = 3.98, a statistically significant difference of 0.98 (95% CI, 0.71 to 1.24), $t(39) = 7.42$, $p < 0.001$). There is thus strong evidence to conclude that internal auditors do have a role in the prevention and detection of fraud risks. Therefore, internal audit is viewed as having a role in the prevention and detection of fraud risks and the expertise necessary to carry out this role.

6.4 EXPLORATORY FACTOR ANALYSIS

To investigate if the statements can be reduced and composite variables can be used to represent the statements regarding audit committee effectiveness, exploratory factor analysis was used to test if data reduction is feasible. Each subsection was analysed separately.

Exploratory factor analysis was used as an extraction method with varimax rotation conducted to determine the dimensionality of each of the subsections and factors with eigenvalues above 1 (Kaiser criterion) were accepted. Cronbach alpha coefficient was used to determine the internal consistency (reliability) of each of the identified factors with threshold stated in the literature as 0.5 (acceptable); 0.6 (satisfactory for exploratory research) and 0.7 (most used instrument) (George & Mallery, 2003).

FACTOR ANALYSIS OF 4 ASPECTS OF INTERNAL AUDIT'S EFFECTIVENESS IN SCM FRAUD PREVENTION AND DETECTION IN THE GAUTENG PROVINCIAL TREASURY

Goretzko et al. (2021) define factor loading as the correlation between the original variables and the factors, the key to understanding a factor's key nature. The factors are used to identify variables for further data analysis or to make factors (Goretzko et al., 2021). The results of the factor analysis conducted to identify the underlying structure of 4 aspects of the internal audit's effectiveness in SCM fraud prevention and detection in the Gauteng Provincial Treasury are presented in Tables 6.2 – 6.5 below. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value (which should be 0.6 or above) and Bartlett's Test of Sphericity value (should be significant - 0.05 or smaller) were checked to verify if the dataset was suitable for factor analysis. In our analysis, the KMO value was found to be 0.726 for the effectiveness of the SCM system in the Gauteng Provincial Treasury, 0.670 for the effectiveness of internal audit in detecting SCM fraud, and 0.653 for developing a framework for improving the role of internal audit in fraud prevention and detection in supply chain management, respectively, which exceeded the recommended KMO threshold of 0.6 (Braeken & Van Assen, 2017). However, the KMO value was found to be 0.418 for effectiveness of internal audit in preventing SCM fraud, which is below the acceptable

threshold of 0.5 (Braeken & Van Assen, 2017). Bartlett’s Test of Sphericity (Shrestha, 2021) was statistically significant ($p < 0.001$) for all items in all four areas, thus indicating that factor analysis was appropriate. The factor analysis shows the split into 2 factors for all subscales.

6.4.1 Effectiveness of SCM System in the Gauteng Provincial Treasury

Table 6.2: Factor analysis for effectiveness of SCM system in the Gauteng provincial treasury

Factor	KMO & Bartlett’s test (sig. value)	% Variance explained	Factor loadings				Cronbach’s Alpha
			Factor 1	Factor 2	Factor 3	Factor 4	
	0.726 P<0.001	77.6%	Factor 1	Factor 2	Factor 3	Factor 4	0.913
To what extent are there internal guidelines or rules in place that deal with irregular expenditure?			0.825				
To what extent is there consolidated reporting on irregular expenditure?			0.626				
In your view, on a scale of 1-5, the guidelines/rules with regard to irregular expenditure are:			0.485				
To what extent is there a legal provision that prohibits government employees from doing business with the state?			0.805				
To what extent are there instances where government employees are doing business with the state?					-0.842		
In your view, on a scale of 1-5 are the processes that are in place with regards to dealing with government employees that are doing business with the state effective?					0.549		
To what extent are there rules or guidelines that govern the declaration of conflict of interest by the employees?			0.864				

Factor	KMO & Barlett's test (sig. value)	% Variance explained	Factor loadings				Cronbach's Alpha
			Factor 1	Factor 2	Factor 3	Factor 4	
	0.726 P<0.001	77.6%	Factor 1	Factor 2	Factor 3	Factor 4	0.913
In your view, on a scale of 1-5, is the process of declaration of conflict of interest by the employees effective?			0.784				
To what extent are there internal guidelines in place with regard to the award of contracts within the supply chain management system?			0.866				
To what extent are there bidding committee guidelines or rules in place within supply chain management?			0.849				
In your view, on a scale of 1-5, is the bidding committee always consistent with the supply chain management process?			0.551				
To what extent is there an e-procurement system in place?				0.921			
In your view, on a scale of 1-5, is the e-procurement system working effectively?				0.911			
To what extent is the supply chain management process being monitored on a regular basis to ensure consistency / that the process works as intended?						0.671	
In your view, on a scale of 1-5, is the monitoring process effective?			0.780				
To what extent is there training provided for the bidding committee to enhance the skills in the execution of the supply chain management process?						0.819	
In your view, on a scale of 1-5, is the training effective in enhancing the skills in the execution of the supply chain management process?					0.755		

From Table 6.2 above, based on the initial variables identified through the questionnaire, four factors were identified for further analysis. These components accounted for 77.6% of the total variance in the original variables. The first factor (Factor 1) shows that there is a positive correlation between the following variables: “To what extent are there internal guidelines or rules in place that deal with irregular expenditure?.”; “To what extent is there consolidated reporting on irregular expenditure?.”; “In your view, on a scale of 1-5, the guidelines/rules with regards to irregular expenditure are:.”; “To what extent is there a legal provision that prohibits government employees from doing business with the state?.”; “To what extent are there rules or guidelines that govern the declaration of conflict of interest by the employees?.”; “In your view, on a scale of 1-5, is the process of declaration of conflict of interest by the employees effective?.”; “To what extent are there internal guidelines in place with regards to award of contracts within the supply chain management system?.”; “To what extent are there bidding committee guidelines or rules in place within supply chain management?.”; “ In your view, on a scale of 1-5, is the bidding committee always consistent with the supply chain management process?” and “In your view, on a scale of 1-5, is the monitoring process effective?” This factor therefore appears to represent the effectiveness of the Supply Chain Management system in the Gauteng provincial departments.

The second factor (Factor 2) in Section B above illustrates a positive correlation between variables: “To what extent is there an e-procurement system in place?” and “In your view, on a scale of 1-5, is the e-procurement system working effectively?” This factor represents the e-procurement system and its effectiveness.

The third factor (Factor 3) in Section B above illustrates a negative correlation with the following variables: “To what extent are there instances where government employees are doing business with the state?” However, factor 3 was positively correlated with the following variables: “In your view, on a scale of 1-5 are the processes that are in place with regards to dealing with government employees that are doing business with the state effective?” and “In your view, on a scale of 1-5, is the training effective in enhancing the skills in the execution of the supply chain management process?” This factor therefore represents the processes of dealing with government employees that are doing business with the state and SCM process training.

The fourth factor (Factor 4) in Section B above illustrates a positive correlation with the following variables: “To what extent is the supply chain management process being monitored on a regular basis to ensure consistency / that the process works as intended?” and “To what extent is there training provided for the bidding committee to enhance the skills in the execution of the supply chain management process?”. This factor represents monitoring of the SCM process and training provided for the bidding committee.

6.4.2 Effectiveness of Internal Audit in Detecting SCM Fraud

Table 6.3: Factor Analysis for effectiveness of internal audit in detecting SCM Fraud

Factor	KMO & Barlett’s test (sig. value)	% Variance explained	Factor loadings		Cronbach’s Alpha
			Factor 1	Factor 2	
	0.670 P<0.001	68.3%	Factor 1	Factor 2	0.766
To what extent does the internal audit function have the capability to identify fraud in the supply chain management?				0.916	
In your view, on a scale of 1-5, is internal audit effective in identifying fraud in the supply chain management?				0.901	
To what extent does the scope of internal audit always cover the risks of supply chain management fraud?				0.722	
Internal audit should have the knowledge and skills to investigate fraud risks in the supply chain			0.744		
Internal audit function should be given ad-hoc assignments on supply chain management			0.810		
Internal audit should always prioritise fraud risks identified in the risk register			0.833		
Internal audit should have the knowledge and skills to identify fraud risks in the supply chain			0.725		

6.4.3 Effectiveness of Internal Audit in Preventing SCM Fraud

This section considers the effectiveness of internal audit in detecting fraud in the supply chain. These components accounted for 68.3% of the total variance in the original variables. The first factor (Factor 1) shows a high correlation between the following variables: “Internal audit should have the knowledge and skills to investigate fraud risks in the supply chain”; “Internal audit function should be given ad-hoc assignments on supply chain management”; “Internal audit should always prioritise fraud risks identified in the risk register”; and “Internal audit should have the knowledge and skills to identify fraud risks in the supply chain”. As such this factor appears to represent the knowledge and skills internal audit have which are necessary to investigate fraud risks in the supply chain and internal audit’s prioritization of fraud risks identified in the risk register.

The second factor (Factor 2) in Section C above illustrates a positive correlation between variables: “To what extent does the Internal Audit function have the capability to identify fraud in the supply chain management?”; “In your view, on a scale of 1-5, is internal audit effective in identifying fraud in the supply chain management?”; and “To what extent does the scope of internal audit always cover the risks of supply chain management fraud?”. This factor therefore represents the internal audit function’s capability to identify fraud in the supply chain and the scope of internal audit in covering the risks of SCM fraud.

6.4.4 Effectiveness of Internal Audit in Preventing SCM Fraud

Table 6.4: Factor analysis for effectiveness of internal audit in preventing SCM Fraud

Factor	KMO & Barlett’s test (sig. value)	% Variance explained	Factor loadings		Cronbach’s Alpha
	0.418 P<0.001	68.6%	Factor 1	Factor 2	0.684
Internal audit function has the ability to prevent fraud in the supply chain management				0.919	

Factor	KMO & Barlett's test (sig. value)	% Variance explained	Factor loadings		Cronbach's Alpha
			Factor 1	Factor 2	
	0.418 P<0.001	68.6%	Factor 1	Factor 2	0.684
Internal audit assists in the monitoring process for the supply chain management system			0.743		
Internal audit is effective in preventing fraud in the supply chain management				0.762	
Internal audit effectively monitors the fraud risks in the supply chain management			0.780		
Internal audit provides assurance to management with regards to control to manage fraud risks in the supply chain management			0.763		

Table 6.4 above shows that two factors were extracted for the effectiveness of internal audit in preventing fraud in the SCM. These components accounted for 68.6% of the total variance in the original variables. The first factor (Factor 1) shows a high correlation between the following variables: “Internal audit assists in the monitoring process for the supply chain management system”; “Internal audit effectively monitors the fraud risks in the supply chain management”; and “Internal audit provides assurance to management with regards to control to manage fraud risks in the supply chain management”. As such, this factor appears to represent the monitoring of the SCM system and management of fraud risks within SCM.

The second factor (Factor 2) in Table 6.4 above illustrates a positive correlation between variables: “Internal audit function has the ability to prevent fraud in the supply chain management” and “Internal audit is effective in preventing fraud in the supply chain management”. This factor therefore represents the internal audit function’s ability to prevent fraud in the SCM and its effectiveness.

6.4.5 Developing a Framework to Improve the role of Internal Audit in Fraud Prevention and Detection in Supply Chain Management

Table 6.5: Factor analysis for developing a framework to improve the role of Internal Audit in fraud prevention and detection in supply chain management

Factor	KMO & Barlett's test (sig. value)	% Variance explained	Factor loadings			Cronbach's Alpha
			Factor 1	Factor 2	Factor 3	
	0.653 P<0.001	75.9%	Factor 1	Factor 2	Factor 3	0.653
Internal audit investigates fraud related assignments on supply chain management systems					0.960	
Internal audit supports the specialists in fraud investigation				0.795		
Internal audit supports management in the evaluation of anti-fraud mechanisms				0.844		
Internal auditors have a role in the prevention and detection of fraud risks			0.882			
Internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in supply chain management system				0.714		
Audit committee and management view internal audit as a key function to prevention and detection of fraud in the supply chain management			0.861			
Internal audit is active in the prevention and detection of fraud in the supply chain management			0.692			

Table 6.5 above shows that three factors were extracted for developing a framework to improve the role of internal audit in fraud prevention and detection in supply chain management. These components accounted for 75.9% of the total variance in the original variables. The first factor (Factor 1) shows a high correlation between the following variables: “Internal auditors have a role

in the prevention and detection of fraud risks”; “Audit committee and management view internal audit as a key function to prevention and detection of fraud in the supply chain management”; and “Internal audit is active in the prevention and detection of fraud in the supply chain management”. As such, this factor appears to represent the role of internal audit in the prevention and detection of fraud risk and how internal audit is viewed by the audit committee and management with regard to prevention and detection of fraud in the supply chain.

The second factor (Factor 2) in Section E above illustrates a positive correlation between variables: “Internal audit supports the specialists in fraud investigation”; “Internal audit supports management in the evaluation of anti-fraud mechanisms”; and “Internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in supply chain management system”. This factor therefore represents the internal audit function’s support within fraud investigation in the SCM system, and their skills, knowledge and competencies to identify the indicators of fraud in the SCM system.

The third factor (Factor 3) in Section E above illustrates a positive correlation with the variable: “Internal audit investigates fraud-related assignments on supply chain management systems”. This factor therefore represents the internal audit function in investigating fraud-related assignments on SCM systems.

The next section summarises the results of the above analysis, using descriptive statistics for continuous variables.

6.5 DESCRIPTIVE STATISTICS FOR CONTINUOUS VARIABLES

The descriptive statistics for the fifteen continuous variables are provided in Table 6.2. The scores for the internal audit function’s role in fraud prevention and detection within SCM in the Gauteng Provincial Treasury variables were changed into proportion (from score values) so that they could be interpreted easily.

Table 6.6: Summary of continuous variables

	N	Mean	Median	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
The effectiveness of SCM system in the Gauteng provincial treasury	30	63,37	66,67	13,76	25,56	90	-0,72	0,94
The effectiveness of internal audit in detecting SCM fraud	39	77,69	80	17,95	20	100	-0,8	1,33
The effectiveness of internal audit in preventing SCM fraud	37	67,89	68	15,1	36	100	-0,1	-0,26
Developing a framework towards strengthening the role of internal audit in fraud prevention and detection in supply chain management	39	67,47	68,57	12,36	34,29	91,43	-0,62	0,44
The effectiveness of the SCM system	36	65,94	68	17,7	24	98	-0,5	0,01
The e-procurement system and its effectiveness	36	52,5	60	20,05	20	100	-0,03	-0,33

	N	Mean	Median	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Government employees doing business with the state and the SCM process training	37	58,56	60	12,39	33,33	80	-0,63	-0,34
Monitoring the SCM process and bidding committee training	36	61,94	60	18,64	20	100	-0,33	-0,19
Knowledge and skills in internal audit to investigate fraud risks and their prioritization of fraud risks	39	77,69	80	17,95	20	100	-0,8	1,33
Internal audit function's capability to identify fraud in SCM and their scope of covering SCM fraud risk	39	69,23	66,67	19,02	26,67	100	-0,08	-0,81
Monitoring of the SCM system and management of fraud risks	38	72,81	73,33	15,84	40	100	-0,23	-0,58
Internal audit function's ability	39	58,72	60	23,53	20	100	-0,25	-0,97

	N	Mean	Median	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
to prevent fraud in the SCM and its effectiveness there-of.								
The role of internal audit in the prevention and detection of fraud risk and how they are by the audit committee and management	40	64	70	18,17	20	80	-1,2	0,42
Internal audit function's support within fraud investigation in the SCM and their competencies to identify the indicators of fraud in the SCM system	39	75,9	80	16,09	33,33	100	-0,99	0,91
Internal audit function in investigating fraud-related assignments on SCM systems.	40	54,5	60	25,62	20	100	-0,07	-1,29

With regard to continuous variables created for each factor, Table 6.2 shows the eleven mean scores that were changed to percentages. The highest average scores were for the knowledge and skills internal audit has to investigate fraud risks in the supply chain; internal audit's prioritization of fraud risks identified in the risk register; and the effectiveness of internal audit in detecting SCM fraud (77.69%). These were followed by internal audit function's support within fraud investigation in the SCM, and their skills, knowledge and competencies to identify the indicators of fraud in the SCM system (75.89%) and monitoring of the SCM system and management of fraud risks within SCM (72.8%). The e-procurement system and its effectiveness score were the lowest, on average, at 52.5%. All continuous variables have Skewness and Kurtosis values of between -2 and +2, therefore they can be assumed to be normally distributed.

6.6 ONE-WAY ANALYSIS OF VARIANCE (ANOVA)

The one-way analysis of variance (ANOVA) is used to test whether there are significant differences in the mean scores of more than two groups. The one-way analysis of variance (ANOVA), comparing the highest academic qualification (all three groups) for created continuous variables, is summarized in Table 6.7.

Table 6.7: One-way ANOVA comparing highest academic qualification

	Variance source	A sum of Squares <i>SS</i>	<i>Degrees of freedom df</i>	Mean Square <i>MS</i>	F-statistic	p-value
The effectiveness of the SCM system in the Gauteng Provincial Treasury	Between	347,2	2	173,6	1,144	0,334
	Within	4098	27	151,8	----	----
	Total	4445	29	----	----	----
The effectiveness of internal audit in detecting SCM fraud	Between	9,02	2	4,51	0,338	0,716
	Within	480,7	36	13,35	----	----
	Total	489,7	38	----	----	----
The effectiveness of internal audit in preventing SCM fraud	Between	98,51	2	49,26	4,041	0,027
	Within	414,5	34	12,19	----	----
	Total	513	36	----	----	----

	Variance source	A sum of Squares SS	Degrees of freedom df	Mean Square MS	F-statistic	p-value
Developing a framework to strengthen the role of internal audit in fraud prevention and detection in supply chain management	Between	97,57	2	48,79	2,862	0,07
	Within	613,7	36	17,05	----	----
	Total	711,2	38	----	----	----
The effectiveness of SCM system	Between	207,1	2	103,6	1,349	0,274
	Within	2534	33	76,78	----	----
	Total	2741	35	0	----	----
The e-procurement system and its effectiveness	Between	0,18	2	0,09	0,021	0,979
	Within	140,6	33	4,26	----	----
	Total	140,8	35	0	----	----
Government employees doing business with the state and the SCM process training	Between	7,54	2	3,77	1,098	0,345
	Within	116,7	34	3,43	----	----
	Total	124,3	36	0	----	----
Monitoring the SCM process and bidding committee training	Between	4,31	2	2,15	0,605	0,552
	Within	117,3	33	3,56	----	----
	Total	121,6	35	0	----	----
Knowledge and skills of internal audit to investigate fraud risks and their prioritization of fraud risks	Between	9,02	2	4,51	0,338	0,716
	Within	480,7	36	13,35	----	----
	Total	489,7	38	0	----	----
Internal audit function's capability to identify fraud in SCM and their scope of covering SCM fraud risk	Between	15,2	2	7,6	0,93	0,404
	Within	294	36	8,17	----	----
	Total	309,2	38	0	----	----
Monitoring of the SCM system and management of fraud risks	Between	50,13	2	25,06	5,53	0,008
	Within	158,6	35	4,53	----	----
	Total	208,8	37	0	----	----
The role of internal audit in the prevention and detection of fraud risk and how they are perceived by the audit committee and management	Between	4,36	2	2,18	0,381	0,686
	Within	206	36	5,72	----	----
	Total	210,4	38	0	----	----

	Variance source	A sum of Squares SS	Degrees of freedom df	Mean Square MS	F-statistic	p-value
Internal audit function's support within fraud investigation in the SCM system, and their competencies to identify the indicators of fraud in the SCM system	Between	8,83	2	4,41	0,582	0,564
	Within	280,8	37	7,59	----	----
	Total	289,6	39	0	----	----
Internal audit function's abilities in investigating fraud-related assignments on SCM systems.	Between	36,32	2	18,16	3,536	0,040
	Within	184,9	36	5,14	----	----
	Total	221,2	38	0	----	----

Table 6.7 above indicates that there is a significant difference between the means as determined by the one-way ANOVA. These differences are between the effectiveness of internal audit in preventing SCM fraud ($F(2,34) = 4.041, p = 0.027$), Monitoring of the SCM system and management of fraud risks ($F(2,35) = 5.53, p = 0.008$) and internal audit's function in investigating fraud related assignments on SCM systems ($F(2,36) = 3.54, p = 0.40$) scores for the three independent groups (highest academic qualification). Although one-way ANOVA is an omnibus test statistic, it does not tell which specific groups were different from each other on the abovementioned scores. However, this can be found in the Multiple Comparisons table which contains the results of the Tukey post hoc test (see Table 6.8).

Table 6.8: Compensation score results using the Tukey-Kramer method

Pairs I, J	Mean Difference (I-J)	95% Confidence Interval		P-value
		Lower limit	Upper limit	
<i>The effectiveness of internal audit in preventing SCM fraud</i>				
Tertiary certificate/Diploma, Degree	3,306	-0,05	7,66	0.166
Tertiary certificate/Diploma, Postgraduate degree	5,067*	0,65	9,48	0.022

Pairs I, J	Mean Difference (I-J)	95% Confidence Interval		P-value
		Lower limit	Upper limit	
Degree, Postgraduate degree	-1,761	-4,79	1,27	0.340
<i>Monitoring of the SCM system and management of fraud risks</i>				
Tertiary certificate/Diploma, Degree	-1,471	-3,95	1,00	0,324
Tertiary certificate/Diploma, Postgraduate degree	-3.200*	-5,72	-0,68	0,010
Degree, Postgraduate degree	-1,729	-3,58	0,12	0,070
<i>Internal audit function's abilities in investigating fraud-related assignments on SCM systems.</i>				
Tertiary certificate/Diploma, Degree	-2,022	-4,82	0,78	0,196
Tertiary certificate/Diploma, Postgraduate degree	-3.050*	-5,89	-0,21	0,033
Degree, Postgraduate degree	-1,028	-2,93	0,88	0,394

Levene's test for homogeneity of variances was used to test whether the variance in scores is the same for each of the three independent groups. All significant values for Levene's test were greater than 0.05, which means the assumptions of homogeneity of variance were not violated (Parra-Frutos, 2013). A Tukey post hoc test on the *effectiveness of internal audit in preventing SCM fraud* score shows that the mean score for participants who have a tertiary certificate/diploma (Mean = 13.40, SD = 3.65) was significantly different from the mean score for those who have a postgraduate degree (Mean = 18.47, SD = 3.34); *monitoring of the SCM system and management of fraud risks* show that the mean score for participants who have a tertiary certificate/diploma (Mean = 9.00, SD = 2.19) was significantly different from the mean score for those who have a postgraduate degree (Mean = 12.20, SD = 1.93), and *Internal audit function's abilities in investigating fraud related assignments on SCM systems risks* show that the mean score for participants who have a tertiary certificate/diploma (Mean = 9.20, SD = 3.42) was significantly different from the mean score for those who have a postgraduate degree (Mean = 12.25, SD = 1.84). There was no statistically significant difference between other groups (Lee & Lee, 2018).

6.7 THE RELATIONSHIP BETWEEN CONTINUOUS VARIABLES

The relationship was determined using the Pearson correlation coefficient. The value of the coefficient indicates the direction and strength between the continuous variables and is shown in Table 6.9 below. Pearson correlation coefficient ranges between -1 and 1 and can be treated as a general indicator of the strength of the relationship between variables.

Table 6.9: The relationship between continuous variables

	A	B	C	D	A	AA	BB	CC	DD	EE	FF	GG	HH	II
A	1	0,1 13	0.382 *	0,265	0.969 **	0.43 2*	0.738 **	0.694 **	0,113	0.827 **	0.451 *	0,161	0,062	0.427 *
B		1	0.450 **	0.403 *	0,107	0.35 1*	0,058	0,074	1.000 **	0,277	0,301	0.438 **	0,139	0.321 *
C			1	0.562 **	0.359 *	0,16 5	0.347 *	0,182	0.450 **	0.406 *	0.830 **	0.799 **	0,250	0.681 **
D				1	0,249	0,27 8	0,044	0,029	0.403 *	0,238	0.329 *	0.639 **	0.797 **	0.768 **
A					1	0,26 4	.674* *	0.546 **	0,107	0.811 **	0.492 **	0,097	- 0,047	0.460 **
A						1	.364* *	0,218	0.351 *	0,306	- 0,005	0,229	0.352 *	0,117
B							1	0,316	0,058	0.615 **	0.436 **	0,103	- 0,098	0,272
C								1	0,074	0.408 *	0,300	- 0,054	- 0,165	0,223
D									1	0,277	0,301	0.438 **	0,139	0.321 *
E										1	0.462 **	0,164	- 0,034	0.392 *
F											1	0.329 *	- 0,060	0.620 **
G												1	0.543 **	0.533 **

	A	B	C	D	A	AA	BB	CC	DD	EE	FF	GG	HH	II
H													1	0.343
H														*
II														1
*. Correlation is significant at the 0.05 level (2-tailed).														
**. Correlation is significant at the 0.01 level (2-tailed).														
A - Effectiveness of SCM system														
B - Effectiveness of internal audit in detecting SCM fraud														
C - Effectiveness of internal audit in preventing SCM fraud														
D - Developing a Framework to strengthen the role of internal audit in fraud prevention and detection in supply chain management														
AA - the e-procurement system and its effectiveness														
BB - Government employees doing business with the state and the SCM process training														
CC - Monitoring the SCM process and bidding committee training														
DD - Knowledge and skills in internal audit to investigate fraud risks and their prioritization of fraud risks														
EE - Internal audit function's capability to identify fraud in SCM systems and their scope of covering SCM fraud risk														
FF - Monitoring of the SCM system and management of fraud risks														
GG - Internal audit function's ability to prevent fraud in the SCM system and its effectiveness there-in														
HH - The role of internal audit in the prevention and detection of fraud risk and how they are perceived by the audit committee and management														
II - Internal audit function's support within fraud investigation in the SCM and their competencies to identify the indicators of fraud in the SCM system														

6.8 SECTION B: QUALITATIVE ANALYSIS

6.8.1 Interpretation and Reporting of Open-ended Responses

Having organized the qualitative data from the questionnaire, the themes were used to interpret the results of the open-ended questions. These themes were categorised in the written text about the effectiveness of the supply chain management and the effectiveness of internal audit in preventing fraud in the supply chain management.

6.8.2 Qualitative Analysis and Results for Objective 1: Effectiveness of the Supply Chain Management

The qualitative comments provided information about the spectrum of opinions about the sub-sections:

Quotations from open-ended questions	Questionnaire item
<p>Participants indicate that <i>“the guidelines/rules that deal with irregular expenditure which they have knowledge of in the Gauteng Provincial Treasury include, but are not limited to: Supply chain management policies, National Treasury Regulations, Irregular Expenditure Framework, PFMA Section 38(1)(c)(ii), Internal Standard Operating Procedures and Internal Circular on what constitute irregular expenditure”</i>.</p>	<p>Internal guidelines or rules dealing with irregular expenditure.</p>

The participants’ responses above can be corroborated with the adoption by the National Treasury of a Supply Chain Management Policy, as part of National Treasury Regulations (National Treasury, 2001). The policy addresses inconsistencies in the public procurement processes. The policy was aimed at enhancing the principles of good governance as well as dealing with the South African government’s equity policy objectives. The supply chain management policy must conform to a set of prescribed regulatory frameworks in which an organisation develops a supply chain management policy, internal guidelines, or rules.

Quotations from open-ended questions	Questionnaire item
<p>Participants indicate that: <i>“the legal provisions prohibiting government employees from doing business with the state that they are cognisant of include, but are not limited to:</i></p>	<p>Legal provision prohibiting government employees from doing business with the state.</p>

Quotations from open-ended questions	Questionnaire item
<p><i>Remunerative Work Outside Public Service (RWOPS), Department of Public Service and Administration (DPSA) Code of Conduct, National Treasury Regulations, Public Service Regulations. It is also revealed in the responses that Internal policies state that doing business with the state constitutes serious misconduct, which may result in the termination of employment by the employer.</i></p> <p>Furthermore, participants reference Regulation 13 (c) of the Public Service Regulations, 2016, which prohibits public service employees from conducting business with an organ of the state, as well as Section 8 of the Public Administration Management Act, 2014, which criminalises conducting business with the state for public administration employees and for special advisors. <i>While other participants indicate that there are ethics and declaration processes in place to prevent employees from doing business with the state, however, there is no robust policy such as consequence management to deal with employees who transgress the rule. Auditors do run the statistics to identify such employees and recommend to management, but implementation of such recommendation seems to be a challenge”.</i></p>	

Quotations from open-ended questions	Questionnaire item
<p>Furthermore, participants indicate that <i>“the channels/procedures/ processes that are used to deal with government employees doing business with the state are the following:</i></p> <ul style="list-style-type: none"> • <i>Disciplinary Action</i> • <i>Assessments prior to awarding a tender</i> • <i>Declaration of interests</i> • <i>The internal policies state that doing business with the state constitutes serious misconduct, which may result in the termination of employment by the employer, there are disciplinary committees in place that deals with such.</i> • <i>Screening and declarations of all vendors is done through the policies implemented; however, the controls are bypassed through collusion or in a situation where employees lack skill to perform their task”</i> <p>Whilst participants state that <i>“the channels/ procedures/ processes above are used to deal with government employees doing business with the state, the other participants state that “there is no monitoring that is currently being done in most of the departments”.</i></p>	

According to section 8 of the Public Administration Management Act (No. 11 of 2014), no public servant may do business with the state. It has always been the Parliamentary Committee’s view that the practice of public servants doing business with the state undermines good governance principles, and the ethical standards within which government must do its work. This practice has

in many instances undermined government’s ability to deliver quality services, as in many instances companies connected to public servants got business they were not equipped to deliver. The Public Service Regulations, 2016 will, if effectively applied, help avoid such challenges and ensure quality services are delivered to all South Africans.

Quotations from open-ended questions	Questionnaire item
<p>Participants indicate that <i>“the guidelines/rules that govern the declaration of conflict of interest by the employees in which they have knowledge of in the Gauteng Provincial Treasury include, but are not limited to: PFMA, Conflict of Interest declaration form, disciplinary procedures, annual declarations by SCM officials, declarations by all members when undertaking a tender evaluation process, National Treasury Regulation, Public Service Regulation and Code of Conduct”</i>.</p> <p>Furthermore, participants have indicated <i>“that conflict of interest was identified through declaration form completed and vetting done, as part of an audit and the issue was reported as non-compliance, through audits conducted internally or by the Auditor General (AG) and is reported on the audit reports, Ethics team have a list of officials who supposed to complete and they reconcile a list of submission against a list of officials who were expected to do submission; through the AG system that detect such employees dealt with as follows: a formal hearing or Dismissal”</i>.</p>	<p>Rules or guidelines governing declaration of conflict of interest by the employees.</p>

The National Treasury’s Code of Conduct for Supply Chain Management Practitioners must be adhered to by all officials and other role players involved in supply chain management. These role players must acknowledge and disclose any conflict of interest that may arise; not utilise their position for private gain or to improperly benefit another person; be trustworthy in their use of public property; and assist accounting officers or accounting authorities in fighting corruption and fraud in the supply chain management system (Oussii & Taktak, 2018; Sambo, 2019; Sajjad et al., 2020).

Quotations from open-ended questions	Questionnaire item
<p>While some participants indicated that <i>“they are not aware of instances where the bidding committee guidelines or rules within supply chain management were not adhered to, other indicated that there are overturning of decisions by relevant SCM Committees, charge for non-compliance, during the commencement of covid 19; there was not enough time to allow for normal processes of procurement because this was a state of emergency, however, permission to deviate from normal processes was sought and granted”</i>.</p>	<p>Bidding committee guidelines or rules within SCM</p>

The Preferential Procurement Policy Framework Act (PPPFA) (No. 5 of 2000) was approved by parliament to conform to the constitutional requirements for ethical and efficient SCM and procurement. The Act aligns the procurement process regulations to the February 2022 Constitutional Court judgement. It comprises a framework used in applying the preferences in the public sector bidding system. Any department of the state implementing the preferences policy may only do so within the framework of the Act. The PPPFA and the related regulations promote historically disadvantage individuals (HDIs) and development objectives by allocating preferences points to these various policy objectives. This Act thus permits the National Treasury to make

regulations or issue instructions, applicable to all institutions to which the Act applies, concerning the determination of a framework for an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost-effective (Watermeyer, 2011; Mahlangu & Mofokeng, 2018).

Quotations from open-ended questions	Questionnaire item
<p>Participants indicated that they “... <i>are not aware of instances where e-procurement system rules were not adhered to while other participants indicated the following: there is a system in place for procurement on the Request For Quote (RFQ) procurement process, most of the big procurements that exceed R500 000 are still manual and there are still departments that opt not to use the e-procurement system when procuring in order to bypass the controls embedded in that system, however, they were not aware of instances when the e-procurement rules were not adhered to and the repercussion thereof. In most instances where there is no adherence to system rules, management is notified when there are findings on the system in order for management to comment and provide action plans to address them. This will enhance the controls embedded in the systems and monitoring thereof. Manual orders are discouraged across the department. In a few instances where employees or managers resorted to manual orders, disciplinary action was taken to curb such practices</i>”.</p>	<p>e-procurement system</p>

Sitompul (2022) explains that e-procurement or electronic procurement of goods and services is a method that is perceived to be better because the implementation is more efficient, effective and transparent. E-procurement is expected to reflect transparency and lessen fraudulent practices in the procurement of goods and services.

Quotations from open-ended questions	Questionnaire item
<p>Participants indicate that <i>“the supply chain management process is monitored in the Gauteng Provincial Treasury through:</i></p> <ul style="list-style-type: none"> • <i>Internal audits and quality assurance reviews.</i> • <i>monitoring of controls in place.</i> • <i>National Treasury approvals of certain thresholds of procurement.</i> • <i>Having various committees with different individuals throughout the SCM process.</i> • <i>supervisory reviews at each step.</i> • <i>review and approvals by senior management.</i> • <i>annual assurance reviews; automation of the SCM process; compliance checklists, reporting of non-compliance and irregularities.</i> • <i>Internal Control Assessments and financial reporting; and database of contracts awarded, contract registers, SLAs are monitored, monitoring and review of SCM Policy, Bid Committee”.</i> 	<p>Regular monitoring of the SCM process</p>

Sibanda et al. (2020) indicate that control environments that are not strong have a negative impact on monitoring and evaluation and this results in non-compliance with supply chain management

regulations and policy guidelines. Therefore, non-compliance may go undetected or only be identified afterwards. To prevent this, supply chain management policies need to be reviewed on an annual basis. Measures to prevent corruption embedded in the supply chain management policy also have to be strongly implemented.

6.8.3 Qualitative Analysis and Results for Objectives 2 and 3: Effectiveness of Internal Audit in Detecting and Preventing Fraud

The qualitative comments provided information about the spectrum of opinions about the subsections.

Quotations from open-ended questions	Questionnaire item
<p>Participants indicate <i>“that the Internal Audit function has the capability to identify fraud in SCM due to the following issues/findings picked up within the Gauteng Provincial Treasury and how it was dealt with:</i></p> <ul style="list-style-type: none"> • <i>Picking up payments happening to a single service provider in a short space of time</i> • <i>Internal audit assesses the fraud indicators and forensic audit investigates fraud.</i> • <i>Protective Personal Equipment (PPE) purchases reported to the Fraud Unit and Special Investigating Unit (SIU)</i> • <i>Double invoicing was identified. The affected employees were dismissed after a disciplinary process.</i> • <i>Internal audit has flagged system deviations and weaknesses that could aid in preventing fraud,</i> 	<p>The capability of the Internal Audit function to identify fraud in SCM.</p>

Quotations from open-ended questions	Questionnaire item
<ul style="list-style-type: none"> • <i>Identified suppliers who were directors in the same company colluding by bidding for the same tender at different prices and end up recommended for the tender (tender rigging), escalated to fraud investigators”.</i> 	

The role of an internal audit function is not to investigate fraud, but to evaluate risks and provide reasonable assurance that the organisation has taken adequate measures with regard to internal controls, and that risks are mitigated and minimized. However, internal audit does not only provide assurance that the anti-fraud control program is running effectively but also ensures that it could deter and detect fraud. Internal audit can mitigate and prevent fraudulent activities, irregularities and other disadvantaging issues in an organisation (Widilestariningtyas & Karo, 2016; Hashim, et al., 2020).

Quotations from open-ended questions	Questionnaire item
<p>Participants indicated the below, regarding the scope of internal audit covering the risks of supply chain management fraud and how it is dealt with:</p> <ul style="list-style-type: none"> • <i>“If the scope does not cover the area identified internal audit would still reflect the risk in the management report for management to respond and give an action plan to the risk.</i> • <i>Internal Audit functions are risk-based and since SCM is one the high-risk areas within government, Internal Audit always priorities SCM audit and the scope is always inclusive of fraud risks.</i> 	<p>Scope of internal audit covering the risks of SCM fraud</p>

Quotations from open-ended questions	Questionnaire item
<ul style="list-style-type: none"> • <i>Always cover this aspect in collaboration with the Office of the Auditor General of South Africa.</i> 	

From the above response, it can be concluded that it is crucial that the scope of internal audit covers the risks of SCM fraud. It is seen as the role of the internal audit function to be the third line of defence against fraud within public organisations by detecting and preventing fraud risks (World Bank, 2017). According to Coram et al. (2006) and Jeppesen (2019), the internal audit function thus plays an important role in fraud prevention and detection.

6.9 SUMMARY OF THE CHAPTER

This chapter provided a detailed description of how the data set from the key research questions was analysed. The presentation of the results in this chapter is intended to assist in the development of a framework for improving internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. The descriptive and inferential statistics results were reported. The analysis of the results is presented in tables and graphs, in line with the research objectives. As indicated above, the first objective regarded evaluating the effectiveness of supply chain management systems in the Gauteng Provincial Treasury. A one-sample t-test was run on a 5-point Likert scale to evaluate statements related to the role of internal audit in fraud prevention and detection in supply chain management, where reference point was defined as 3. Thus, overall, there is strong evidence to conclude that the majority of participants believe that the SCM system in the Gauteng Provincial Treasury is partially effective. The second objective of this research was to examine the effectiveness of internal audit in detecting supply chain management fraud. This examination was done on four significant levels. The results showed that overall, there is strong evidence to conclude that the majority of participants believe that internal audit is effective in detecting SCM fraud.

The analysis of objective 3 of this research indicates that there is strong evidence to conclude that the majority of participants believe that internal audit is effective in preventing SCM fraud.

However, the monitoring process of fraud risks by internal audit in the supply chain management within Gauteng Provincial Treasury could be improved to ensure effective monitoring, as results indicated that participants disagree that internal audit does monitor the fraud risks.

Lastly, regarding developing a framework towards strengthening the role of internal audit in fraud prevention and detection in supply chain management, results indicated that internal audit is viewed as having a role in the prevention and detection of fraud risks and it therefore indicates that internal audit is viewed to have the expertise in identifying the indicators of fraud.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter presents a summary of the findings from the statistical analysis discussed in Chapter 6 and indicates how these findings have met the objectives of this research: to develop a framework for internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury. The chapter proposes a framework for improving/assessing the effectiveness of internal audit in supply chain management fraud prevention in the Gauteng Provincial Treasury. It includes an assessment of the contribution this study has made to the body of knowledge (as is expected of any doctoral research study), as well as recommendations for further investigation, arising from this study.

As discussed in the previous sections, this thesis has contributed to the body of knowledge in two ways. Firstly, by answering research question 4 (relating to objective 4) it has proposed a framework towards evaluating the role of internal audit in fraud prevention. Secondly, making use of the proposed framework, the study suggests future research studies, and thirdly, the study makes recommendations on how internal audit can be effective in preventing supply chain fraud in the public sector environment. These are discussed sequentially in the following sections.

7.2 SUMMARY OF FINDINGS

The findings are summarised according to the research objectives as follows:

Objective 1: To evaluate the effectiveness of supply chain management systems in the Gauteng Provincial Treasury

A one-sample t-test was run on a 5-point Likert scale to evaluate statements related to the role of internal audit in fraud prevention and detection in supply chain management, with the reference point defined as 3.

The acceptable significance or alpha level for this research was set at 5%, hence a P value result within the range from 0 - 5% is regarded as significant, whilst any value above 5% is regarded as insignificant.

Only the listed mean scores for the effectiveness of the SCM system in the Gauteng Provincial Treasury that were significant were included. The results indicated that there is strong evidence that there is awareness of the legal provisions in place that prohibit government employees from doing business with the state. A majority of the participants stated that this is done to a large and very large extent (mean = 3.60, a statistically significant difference of 0.6 (95% CI, 0.23 to 0.97), $t(39) = 3.24$, $p=0.002$). The results further indicate that the processes that are in place with regard to dealing with government employees who are doing business with the state are not effective (mean = 2.58, a statistically significant difference of 0.43 (95% CI, -0.81 to -0.04), $t(39) = -2.21$, $p=0.033$). There is a very large and a large extent to which participants are aware of internal guidelines in place with regard to the award of contracts within the supply chain management system (mean = 3.60, a statistically significant difference of 0.6 (95% CI, -0.22 to 0.98), $t(39) = 3.18$, $p=0.003$). There is a very large and a large extent to which there are bidding committee guidelines or rules in place within supply chain management (mean = 3.65, a statistically significant difference of 0.65 (95% CI, 0.29 to 1.01), $t(39) = 3.66$, $p=0.010$). Furthermore, the results indicate that an e-procurement system is either non-existent (mean = 2.54, a statistically significant difference of -0.46 (95% CI, -0.82 to -0.10), $t(38) = -2.57$, $p=0.014$), or the e-procurement system is not working effectively (mean = 2.64, a statistically significant difference of -0.36 (95% CI, -0.71 to -0.02), $t(35) = -2.13$, $p=0.041$). Thus, there is strong evidence overall to conclude that the majority of participants believe that The SCM system in the Gauteng Provincial Treasury is only partially effective (*refer to Table 6.1: One-Sample t-test*).

Objective 2: To examine the effectiveness of internal audits in detecting supply chain management fraud.

The second objective of this research was to examine the effectiveness of internal audit in detecting supply chain management fraud. This examination was done on four significant levels. The results showed that the scope of internal audit in the Gauteng Provincial Treasury does always cover the

risks of supply chain management fraud to a large and a very large extent (mean = 3.72, a statistically significant difference of 0.72 (95% CI, 0.37 to 1.07), $t(38) = 4.17$, $p < 0.001$). Participants agree and strongly agree that the internal audit function should be given ad-hoc assignments on supply chain management (mean = 4.10, a statistically significant difference of 1,103 (95% CI, 0.81 to 1.40), $t(38) = 7.55$, $p < 0.001$). Participants agree and strongly agree that internal audit should always prioritize fraud risks identified in the risk register (mean = 3.78, a statistically significant difference of 0.76 (95% CI, 0.36 to 1.19), $t(38) = 7.55$, $p < 0.001$). Participants agree and strongly agree that internal audit should have the knowledge and skills to identify fraud risks in the supply chain (mean = 4.25, a statistically significant difference of 0.76 (95% CI, 0.99 to 1.51), $t(39) = 9.78$, $p < 0.001$). Thus, overall, there is strong evidence to conclude that the majority of participants believe that internal audit is effective in detecting SCM fraud.

Objective 3: To assess the effectiveness of internal audits in preventing supply chain management fraud.

In order to achieve objective 3 of this research, the effectiveness of internal audit in preventing supply chain management fraud was examined at the following three levels, in conjunction with the other two variables (highest level of education and years of experience). The results indicated that participants agree and strongly agree that internal audit assists in the monitoring process for the supply chain management system (mean = 3.48, a statistically significant difference of 0.48 (95% CI, 0.12 to 0.83), $t(39) = 2.71$, $p = 0.010$). The results further indicated that a large percentage of the participants disagree (strongly and slightly) that internal audit effectively monitors the fraud risks in the supply chain management (mean = 3.44, a statistically significant difference of 0.44 (95% CI, 0.15 to 0.72), $t(38) = 3.09$, $p = 0.004$). Participants agree and strongly agree that internal audit provides assurance to management with regard to control to manage fraud risks in the supply chain management (mean = 3.95, a statistically significant difference of 0.95 (95% CI, 0.62 to 1.28), $t(38) = 5.88$, $p < 0.001$). Thus, there is strong evidence overall to conclude that the majority of participants believe that internal audit is effective in preventing SCM fraud. However, the process of monitoring fraud risks by internal audit in the supply chain management within Gauteng Provincial Treasury could be improved to ensure effective monitoring, as results indicated that

participants disagree on the statement that internal audit does monitor the fraud risks. The results are presented in Table 1 in Chapter 6.

Objective 4: To develop a framework towards improving the role of internal audit in fraud prevention and detection in supply chain management and thus to contribute to the extension of knowledge on the subject.

Lastly, regarding developing a framework towards improving the role of internal audit in fraud prevention and detection in supply chain management, the results indicated that internal audit supports the specialists in fraud investigation (mean = 3.64, a statistically significant difference of 0.64 (95% CI, 0.28 to 1.00), $t(38) = 3.60$, $p < 0.001$); internal audit supports management in the evaluation of anti-fraud mechanisms (mean = 3.78, a statistically significant difference of 0.78 (95% CI, 0.45 to 1.10), $t(39) = 4.78$, $p < 0.001$), and lastly, the internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in supply chain management system (mean = 3.98, a statistically significant difference of 0.98 (95% CI, 0.71 to 1.24), $t(39) = 7.42$, $p < 0.001$). There is thus strong evidence to conclude that internal auditors have a role to play in the prevention and detection of fraud risks. Therefore, internal audit is viewed as having a role in the prevention and detection of fraud risks and it therefore indicates that internal audit is viewed as having the expertise to identify the indicators of fraud. The results are presented in Table 1 in Chapter 6.

Furthermore, three factors were extracted for developing a framework towards improving the role of internal audit in fraud prevention and detection in supply chain management. These components accounted for 75.9% of the total variance in the original variables. The first factor (Factor 1) showed a high correlation between the following variables: “Internal auditors have a role in the prevention and detection of fraud risks”: “Audit committee and management view the internal audit as a key function in the prevention and detection of fraud in the supply chain management”; and “Internal audit is active in the prevention and detection of fraud in the supply chain management”. As such, this factor appears to represent the role of Internal Audit in the prevention and detection of fraud risk and how internal audit is viewed by the Audit Committee and management with regard to the prevention and detection of fraud in the SCM.

The second factor (Factor 2) illustrated a positive correlation between the following variables: “Internal audit supports the specialists in fraud investigation”; “Internal audit supports management in the evaluation of anti-fraud mechanisms”; and “Internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in the supply chain management system”. This factor therefore represents the internal audit function’s support within fraud investigation in the SCM and confirms their skills, knowledge, and competencies to identify the indicators of fraud in the SCM system.

The third factor (Factor 3) illustrated a positive correlation in the variable “Internal audit investigates fraud-related assignments on supply chain management systems”. This factor therefore represents the internal audit function in investigating fraud-related assignments on SCM systems.

The results are presented in Table 6.5 in Chapter 6.

7.3 ORIGINAL CONTRIBUTION OF THE STUDY

Doctoral theses are expected to provide an original contribution to knowledge in their field, and/or a new idea on existing knowledge, as well as a contribution to academic literature (Baptista et al., 2015; Houston, 2021). This doctoral thesis has addressed its main objective by developing a framework for internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury, which is largely characterized by its recommendations to practice and contribution to accounting studies. On one hand, the study addresses the effectiveness of internal audit in the supply chain management system, while on the other hand, the study confirms the use of internal audit in fraud prevention and detection in supply chain management.

This doctoral thesis has contributed to the field of public sector auditing literature, as it stands at the intersection of legislation and compliance. It has identified internal audit’s role of assessing compliance with significant, pertinent legislation, and its further role to alert responsible governance authorities and management of any situations which indicate fraudulent acts.

In addressing the overall research question – “What possible framework can be developed to use internal audit in fraud prevention and detection in supply chain management in the Gauteng provincial treasury?” - the study addressed three research questions: How effective is the supply management system in the Gauteng Provincial Treasury? How effective is internal audit in detecting supply chain management fraud? And how effective is internal audit in preventing supply chain management fraud? Answering these questions has helped to further understand the use of internal audit in fraud prevention and detection in supply chain management.

This research extends the existing body of knowledge by presenting a framework for assessing internal audit effectiveness in SCM fraud prevention in the Gauteng Provincial Treasury. The findings in the study reveal that organisations should follow the prescribed framework that enables a uniform execution and practice of SCM in the public sector environment to mitigate the risks in the SCM system. While this study does not provide a definite response to the question of preventing fraud in public sector SCM, it does identify best practices in organisations to design uniform controls and standard operating procedures to ensure that there is conformance to laws and regulations, reduction of errors and the maintenance of consistency in the application of regulations. The study raises important questions as to whether internal audit alone can minimize fraud in organisations, as well as whether the monitoring of supply chain management can result in an effective supply chain management process.

7.3.1 Developed a Framework for Understanding the Effectiveness of Internal Audit in Fraud Prevention in the Supply Chain Management

Apart from its specific contributions to the fields of public sector auditing and accounting studies, this PhD thesis entails theoretical contributions related to the key role of internal audit in the public sector. The result of the study indicates that the internal audit function has to have the capability to identify fraud in supply chain management.

Many of the study’s participants indicated that internal auditors should have the knowledge and skills to investigate fraud risks in the supply chain. Further, “the internal audit function should be given ad-hoc assignments on supply chain management”, “Internal audit should always prioritise

fraud risks identified in the risk register”, and “Internal audit should have the knowledge and skills to identify fraud risks in the supply chain”. As such, this factor appears to represent knowledge and skills already exist in internal audit to investigate fraud risks in the supply chain and internal audit’s prioritization of fraud risks identified in the risk register.

These findings concur with the previous literature, which suggests that internal auditors have a central role in testing any procedure and legislation to provide reasonable assurance of detecting instances of non-compliance (Hassink et al., 2009; Cohen & Leventis, 2013; Pamungkas et al., 2018), and on the systems and practices that would be designed to prevent and minimise the risk of fraud (Rezaee, 2005; KPMG, 2017; Handoyo & Bayunitri, 2021), assess the internal control framework established by management to minimize the occurrence of non-compliance (Craja et al., 2020), and especially in the supply chain management (Rustiarini et al., 2019).

Accordingly, the key role of internal audit has been repeatedly highlighted in the literature on supply chain management (see, KPMG, 2017; Christopher, 2019; Yusnaini et al., 2020; Jarah et al., 2022; World Bank, 2017, Petraşcu & Tieanu, 2014; Coram et al., 2006). Regardless of the context, the effectiveness of internal audit in identifying fraud risks is inevitably contextualised by the support of management (Ta & Doan, 2022), capability (Alzabari et al., 2019), knowledge and skills (Institute of Internal Auditors, 2023d; Asiedu & Deffor, 2017). In audit practice, the framework now suggests that internal audit is a management tool to prevent incidences of fraud. Thus, the proposed framework provides the agenda for further research on the use of internal audits for fraud prevention, ad-hoc assignments to investigate fraud, and how management could use internal audits to evaluate anti-corruption mechanisms.

This proposed framework has not yet been published in any of the public sector auditing and academic research spaces and is an ongoing academic research product that still needs to be recognised. The framework suggests that the effectiveness of internal audit within supply chain management is determined by its ability to prevent and detect fraud.

The capability of the internal audit function to identify fraud in SCM – The results indicate that the majority of participants agree that the internal audit function has the capability to identify

fraud in the supply chain management (51.3% to a large and a very large extent) and only a small minority disagree (7.7% to no extent). It can thus be concluded that Internal Audit in the Gauteng Provincial Treasury does have the capability to identify fraud in SCM.

Scope of an internal audit covering the risks of SCM fraud – The majority of the participants (66.7%) state that the scope of internal audit in the Gauteng Provincial Treasury does always cover the risks of supply chain management fraud to a large or very large extent. This indicates a positive result, as when the scope covers the risks within the supply chain, risks will be mitigated as the controls addressing the risks will be evaluated.

Knowledge and skills in internal audit to investigate fraud risks in the supply chain – The results indicate that the majority of participants agree and strongly agree (90%) that internal audit should have the knowledge and skills to identify fraud risks in the supply chain. This means that internal audit is considered to have the expertise to identify the indicators of fraud.

Internal audit function ad-hoc assignments on supply chain management – The results indicate that the majority of participants (87.1%) agree or strongly agree that the internal audit function should be given ad-hoc assignments on supply chain management.

The support of management in the evaluation of anti-fraud mechanisms – The results indicate that participants agree or strongly agree (75%) that internal audit supports management in the evaluation of anti-fraud mechanisms. Internal audit not only supports management but also specialists in fraud investigation. It is evident that internal audit is an anti-fraud control tool; internal audit is more effective in fraud prevention and detection through the use of common tools such as whistle-blower policies, fraud control policies as well as recording fraud risks.

Figure 7.1 summarizes the proposed framework and clarifies how the three research questions are central to the framework for using internal audit in fraud prevention and detection in supply chain management.

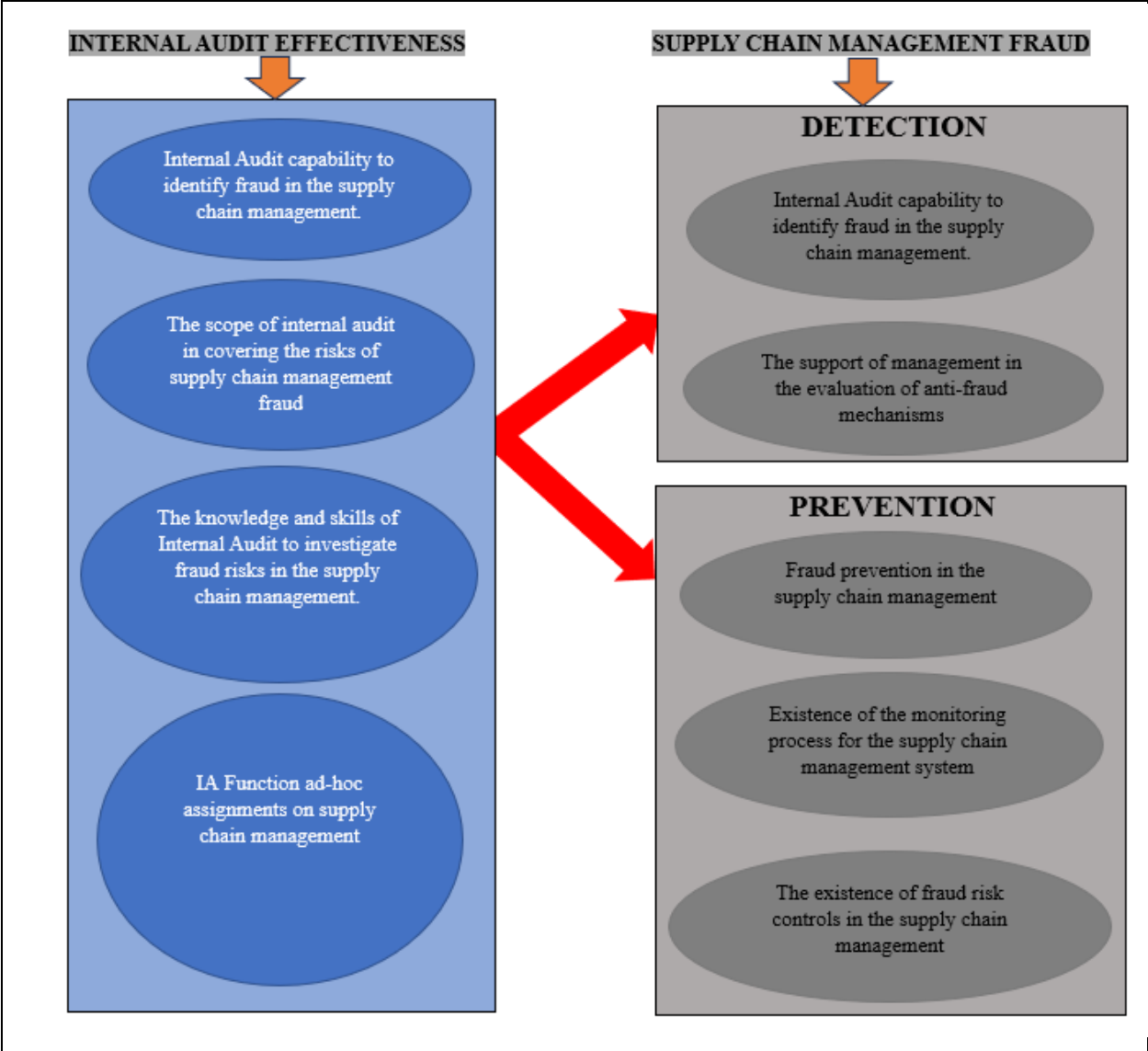


Figure 7.1: Proposed framework for internal audit effectiveness in supply chain management fraud prevention

(Source: Author’s own design)

The results of the quantitative phase of this research made a significant contribution to the framework for assessing internal audit effectiveness in supply chain management fraud prevention to ensure that cognisance is taken of the internal audit attributes. This is consistent with the IIA’s International Standards for the Professional Practice of Internal Auditing on proficiency (1210.A2), requiring “that internal auditors must have sufficient knowledge to evaluate the risk of fraud and the manner in which it is managed by the organization” (IIA, 2023b). It is clear that

more emphasis should be given to managing fraud risk. Fraud risk is faced by every organization, and the governing authorities and management can help in fraud risk management, including the internal audit role. The effective management of fraud risk would require public organisations to have a suitable anti-fraud response plan, with a clear role for internal audit when there is suspected fraud and associated control failure.

The results of qualitative responses in the proposed framework suggest regular monitoring of the SCM process is necessary to prevent fraud risks. Further, the supply chain management policies need to be reviewed to ensure that measures in place to prevent corruption are embedded in the supply chain management policy. While considering the framework, the responses to open-ended questions further suggest that the provincial treasury should have a suitable fraud prevention plan in place allowing effective management and swift response to the identification of fraud.

Detection of fraud thus is positively influenced by both the effectiveness of internal audits and the responsibilities of internal auditors. Furthermore, the ability of internal audit to *detect fraud* is driven by the **capability of** the internal audit function to identify fraud in SCM, as well as the support of management in the evaluation of anti-fraud mechanisms; similarly the ability of internal audit to *prevent fraud* in supply chain management. The study indicates that when fraud is detected, it is more likely to be prevented in future as management may be able to assess how to prevent the particular fraud in future through assistance of internal auditors. Furthermore, the ways in which fraud is prevented will also assist in early fraud detection.

7.4 RECOMMENDED USE OF FRAMEWORK IN PUBLIC SECTOR AUDIT PRACTICE AND ACCOUNTANCY RESEARCH

7.4.1 Significance of the Framework for Public Sector Internal Auditing Practice

In fact, one of the main contributions to the strengths of the use of the framework in academic research may be its dual contribution to both practice and academics. The study aims to develop a *framework for internal audit effectiveness in supply chain management fraud prevention in the Gauteng Provincial Treasury*. The model produced may help practitioners understand that, as the

complexity and scale of government operations increases, effective internal audit processes are essential to safeguard public resources and maintain the integrity of the procurement process. Internal audit plays a crucial role in identifying and investigating potentially fraudulent activities within the supply chain management process. Fraudsters continuously adapt and develop new tactics, necessitating ongoing vigilance and proactive measures from internal audit departments.

Investment in training, technology, and resources will enhance the effectiveness of internal audit departments in fraud detection and prevention. Providing awareness training to employees involved in supply chain management about potential fraud risks and preventive measures will improve their ability to prevent fraud. Effective internal audit processes are fundamental in the prevention and detection of supply chain management fraud within the government sector. By implementing robust controls, leveraging data analytics, and fostering stakeholder collaboration, government organizations can mitigate risks, safeguard public resources, and maintain the trust of the citizens they serve.

7.4.2 Significance of the Framework for Public Sector Internal Audit and Accountability Research

The findings of the literature review and the findings of the questionnaire survey of this PhD thesis entail relevant contributions to accounting studies literature. In broad terms, this study's findings suggest that the key contributions of academic accounting research to practice in accounting and public sector studies would be to increase awareness of the literature gaps in the field of academic accounting research. In addition, should the impact be fully recognized, the practitioner community would be more willing to use the suggested framework to align their policies, standards, and practices. Academics would invest in training and research workshops for doctoral research candidates. Furthermore, the results would encourage academic colleagues to cite the thesis in their classes, in their workbooks, and in their presentations to students, and for the training of non-academic accounting practitioners.

7.5 LIMITATIONS OF THE STUDY

This research has achieved its aims and objectives and further answered all the research questions. The focus of this study is on the supply chain management system in the public sector, with emphasis on the Gauteng Provincial Treasury, as it is primarily responsible for preparing the Gauteng government's annual budget and managing the government's finances. More particularly, the role of the internal auditors in fraud prevention and detection within the supply chain was analysed. The scope of this study is set within the parameters of the geographical, hierarchical and time dimensions.

There were some challenges of time and financial constraints. However, these challenges did not affect the results of the study. Every study, no matter how well it is constructed and conducted, has limitations (Simon & Goes, 2013). These limitations should be considered by researchers. Study limitations represent weaknesses within research that may impact the outcomes and conclusions of the research (Ross & Bibler Zaidi, 2019). Several limitations have been considered in the research design. Good research should disclose any limitations, their potential effects, and any mitigating controls. These limitations include risks associated with the chosen research methodology, the process for analysing data and the results of the study.

There are inherent problems with purposive sampling in data collection. The most obvious limitation of this study was the selected population to represent the study. The study targeted 112 internal auditors in the Provincial Treasury. It was accepted that the purposive sampling method would provide a reasonable estimate of populations. However, the setting chosen was a population of 41 participants/respondents. Thus, the discussion of the results was limited to those within the sample. The reliability of the results was subjected to the accuracy of the answers submitted by the participants.

Access to the participants during data collection in the Provincial Treasury was not an easy task for the researcher. The population presents as a limitation due to participants belonging to the same provincial treasury. Finding participants to complete the research questionnaire as they were working remotely presented a limitation as well. Research took place while participants were

working remotely due to the COVID-19 pandemic, which affected their availability to respond to the questionnaire.

Further research in this field may reduce the impact of some of these limitations.

7.6 SUGGESTIONS FOR FUTURE RESEARCH

Due to the limitations of the study, the researcher makes the following suggestion for the nature of future research:

- Evaluate the effectiveness of supply chain management systems in the Gauteng Provincial Treasury. To expand the role of internal audits in the effectiveness of supply chain management systems, further studies could be conducted in the public sector environment where internal audits provide business leaders with the necessary framework to develop an appropriate supply chain risk management programme. Additionally, internal audits could assess the likelihood of the risks identified in the supply chain materialising. Thus, stemming from one of the limitations of the study relating to the target population, further research and replication of this study in a different sector could help provide additional evidence and the opportunity to compare the results.
- Examine the effectiveness of internal audit in detecting supply chain management fraud. The limitation in previous research in the South African public sector, which addresses the issue of internal audit effectiveness in detecting supply chain management fraud, has provided diverse findings on whether the scope of internal audit in the Gauteng Provincial Treasury does always cover the risks of supply chain management fraud to a large and a very large extent. Therefore, further research into identifying other factors that impact the effectiveness of internal audit could contribute towards reducing the existing gap in the literature. Further research could be undertaken to examine the usefulness of internal audits in detecting fraudulent activities in supply chain management.

- Assess the effectiveness of internal audits in preventing supply chain management fraud. Future studies could be undertaken to explore how internal audits could assist management with the evaluation of internal controls used to mitigate fraud and to evaluate whether the organization's assessment of fraud risk requires any fraud investigations. Further studies could be qualitatively assigned to seek an in-depth understanding of the internal auditors and management in the public sector environment.
- Develop a framework to describe/recognise the role of internal audit in fraud prevention and detection in supply chain management. Theoretical frameworks were described alongside the existing theories that serve as a roadmap for this thesis. These theories were used to give research direction to the study. Therefore, to reassess and expand the theory, framework or model future researchers could address new theories in the research. It is also recommended that future studies address the effects of a specific role of internal audit in relation to new events and the emergence of new fraud risks using the results and model of the current study as evidence.
- The research focused on a group of 112 internal auditors employed in the Gauteng Provincial Treasury. It was acknowledged that the purposive sampling technique would yield a reasonably accurate representation of the entire population. However, the study specifically selected a sample size of 41 participants/respondents. Thus, the discussion of the results was limited to those within the sample. The reliability of the results was subjected to the accuracy of the answers submitted by the participants. Therefore, it is recommended that conducting further research and replicating this study in a different sector could offer supplementary evidence and the chance to compare the outcomes.

7.7 RECOMMENDATIONS

Amongst the challenges confronted in South Africa is wasteful expenditure in the public service, which has resulted in a massive loss of public funds. The main problem is the systemic lapses when it comes to internal processes. This is particularly seen in relation to the supply chain, where internal lapses are fully expressed (Khoza et al., 2022).

As a result of conducting this research, the study proposes that SCM custodians should be consistent in the application of regulations and collaborate with internal audit to identify fraud indicators and prevent fraud. The role of internal audit is not to investigate fraud, but to evaluate risks and provide reasonable assurance that the organisation has taken adequate measures with regard to internal controls and that risks are mitigated and minimized. The results as indicated in Chapter 6, Table 6.1 show that internal audit supports the specialists in fraud investigation, as well as management in the evaluation of anti-fraud mechanisms, and lastly the internal audit function, possesses the skills, knowledge, and competencies to identify the indicators of fraud in supply chain management systems.

There is thus strong evidence indicating that internal auditors have a role in the prevention and detection of fraud risks. This indicates that internal audit is viewed as a function that has the expertise required to identify the indicators of fraud. Through focusing on internal audit and its rules, engaging with existing literature, and interviewing respondents, it is recommended that internal audit assists in regular monitoring of the SCM process. This can be achieved through robust internal audits conducted within the supply chain, predominantly addressing aspects such as, but not limited to, fraud investigations and evaluation of anti-fraud mechanisms training provided to the bidding committee. Detecting fraud makes it more likely that fraud will be prevented in future as management may be able to assess how to prevent the particular fraud in future through the assistance of internal auditors. Furthermore, the ways in which fraud is prevented will assist in early fraud detection.

The major role of internal audit in the prevention and detection of fraud is to know and comprehend techniques and mechanisms by which fraud is manifested and that the evaluation and control of the risk of fraud is sufficient and is performed at the right intensity. It is evident that internal audit is an anti-fraud control tool, and that internal audit is more effective in fraud prevention and detection through the use of common tools such as whistle-blower policies, fraud control policies as well as recording fraud risks.

7.8 FINAL CONCLUSION

The study aims to develop a *framework for assessing internal audit effectiveness in supply chain management fraud prevention in the Gauteng provincial treasury*. The proposed framework was developed from the results of a study on *internal audit effectiveness in supply chain management fraud prevention*. The framework contains components that are considered important for the Gauteng Provincial Treasury to enhance the effectiveness of internal audits in supply chain management. These components include the capability of the internal audit function to identify fraud in SCM; the scope of internal audit covering the risks of SCM fraud; knowledge and skills of internal audit to investigate fraud risks in the supply chain; and the internal audit function *ad-hoc* assignments on supply chain management. Although the study used the Gauteng Provincial Treasury as a unit of analysis, the framework could be used in all public sector environments. Further research on the framework will be done to increase the knowledge about the effective role of internal audit in supply chain management to improve the practice of public sector auditing.

Furthermore, a conclusion can be made that, although internal audit does support the specialists in fraud investigations, they do not conduct the investigations. This is in line with the Standards for the Professional Practice of Internal Auditing, which do not require internal auditors to investigate fraud unless they have the specific experience and expertise required to do so. Furthermore, the results indicate that internal audit supports management in the evaluation of anti-fraud mechanisms. This could be linked to the analysis indicating that internal audit not only supports management but also specialists in fraud investigation. Organisations should thus adopt strategies to enhance their ability to respond quickly and cost-effectively to any disruption within the supply chain. It is thus crucial for management to be knowledgeable and fully comprehend the risks associated with supply chains. One risk may lead to other similar disruptions and negatively affect the effectiveness of the supply chain management.

Based on the research presented, it is revealed that in any organisation, the detection of fraud and the auditing of corporate activities through the internal audit function is crucial for the proper and continuous operation of the organisation. It is important for an organisation to have an effective system of internal control in place in order to identify and limit any irregularities. The availability

of an internal audit function thus plays a very important role in an organisation. Internal audit on its own cannot fully prevent and detect fraud, however, it plays an important role in helping with prevention and detection. There is thus a need for effective internal controls. Should internal auditors wish to become fraud experts, they may enhance their knowledge, skills, and experience by obtaining the Certified Fraud Examiners credential.

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ANNEXURE 1: QUESTIONNAIRE

TOWARDS A FRAMEWORK FOR THE ROLE OF INTERNAL AUDIT IN SUPPLY CHAIN MANAGEMENT FRAUD PREVENTION IN THE GAUTENG PROVINCIAL DEPARTMENTS

Aim of the study:

- To develop a framework for the role of internal audit supply chain management fraud prevention in the Gauteng Provincial Departments.

Research objectives

The objective of this study will be to:

- Evaluate the effectiveness of supply chain management systems in the Gauteng Provincial Departments;
- Examine the effectiveness of internal audit in detecting supply chain management fraud;
- Assess the effectiveness of internal audit in preventing supply chain management fraud; and
- Develop a framework towards the role of internal audit in fraud prevention and detection in supply chain management.

SECTION A: BIOGRAPHICAL/ DEMOGRAPHIC INFORMATION

A1. How many years of experience do you have working in the public sector?

Less than 1 year	1
1 to 3 years	2
4 to 5 years	3
6 to 10 years	4
More than 10 years	5

A2. What is your highest academic qualification?

Grade12/matric	1
Tertiary certificate/Diploma	2
Degree	3
Postgraduate degree	4

A3. What do you think are the main contributing factors to fraud risk in supply chain management? (You may choose more than one option)

Poverty	1
Greed	2
Bribery	3
Poor controls/monitoring	4
Weakness in the system	5
Service delivery pressure	6
Political pressure	7
Other (Specify)	8

SECTION B: HOW EFFECTIVE IS THE SUPPLY MANAGEMENT SYSTEM IN THE GAUTENG PROVINCIAL DEPARTMENTS?

B1. To what extent are there internal guidelines or rules in place that deal with irregular expenditure?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

Please briefly describe the guidelines rules you are aware of

--

B2. To what extent is there consolidated reporting on irregular expenditure?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

How often does monitoring and evaluation there-of take place?

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

B3. In your view, on a scale of 1-5 are there guidelines / rules with regards to irregular expenditure?

Not effective	Slightly effective	A moderate extent	Very effective	Completely effective
1	2	3	4	5

B4. To what extent is there a legal provision that prohibits government employees from doing business with the state?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

Please describe the legal provisions you know of:

B5. To what extent are there instances where government employees are doing business with the state?

To no extent	Marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

What channels / procedures/ processes are used to deal with it?

B6. In your view, on a scale of 1-5 are the processes that are in place with regards to dealing with government employees that are doing business with the state effective?

Not effective	Slightly effective	Moderately effective	Very effective	Completely effective
1	2	3	4	5

B7. To what extent are there rules or guidelines that govern the declaration of conflict of interest by the employees?

To no extent	To a marginal extent	To a moderate extent	To a large extent	To a very large extent
1	2	3	4	5

Please describe the rules / guidelines you are aware of / have knowledge of:

B8. To what extent are there instances where employees do not declare conflict of interest?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent

1	2	3	4	5
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Please explain how it was identified and dealt with?

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B9. In your view, on a scale of 1-5, is the process of declaration of conflict of interest by the employees effective?

Not effective	Slightly effective	Moderately effective	Very effective	Completely effective
1	2	3	4	5

B10. To what extent are there internal guidelines in place with regards to award of contracts within the supply chain

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

management system?

B11. To what extent are there bidding committee guidelines or rules in place within supply chain management?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

Please explain instances you are aware of, if any, where it was not adhered to and how it was dealt with?

--

B12. In your view, on a scale of 1-5, is the bidding committee always consistent with the supply chain management

Strongly Disagree	Slightly Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

process?

B13. To what extent is there an e- procurement system in place?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

Please explain instances where the e-procurement system rules were not adhered to and how it was dealt with?

B14. In your view, on a scale of 1-5, is the e- procurement system working effectively?

Not effective	Slightly effective	Moderately effective	Very effective	Completely effective
1	2	3	4	5

B15. To what extent is the supply chain management process being monitored on a regular basis to ensure consistency / that the process works as intended?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

Please explain how the supply chain management process is monitored:

--

B16. In your view, on a scale of 1-5, is the monitoring process effective.

Not effective	Slightly effective	Moderately effective	Very effective	Completely effective
1	2	3	4	5

B17. To what extent is there training provided for the bidding committee to enhance the skills in the execution of the supply chain management process?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

B18. In your view, on a scale of 1-5, is the training effective in enhancing the skills in the execution of the supply

Not effective	Slightly effective	Moderately effective	Very effective	Completely effective
1	2	3	4	5

chain management process?

SECTION C: HOW EFFECTIVE IS INTERNAL AUDIT IN DETECTING SUPPLY CHAIN MANAGEMENT FRAUD?

C1. To what extent does the Internal Audit function have the capability to identify fraud in the supply chain management?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

Please describe instances that you are aware of where internal audit identified fraud and how it was dealt with:

--

C2. In your view, on a scale of 1-5, is internal audit effective in identifying fraud in the supply chain management?

Not effective	Slightly effective	Moderately effective	Very effective	Completely effective
1	2	3	4	5

C3. To what extent does the scope of internal audit always cover the risks of supply chain management fraud?

To no extent	A marginal extent	A moderate extent	A large extent	A very large extent
1	2	3	4	5

If not, please explain instances where the scope of internal audit did not cover the risks of supply chain management fraud and how it was dealt with?

--

MANAGEMENT PERCEPTIONS TOWARDS INTERNAL AUDIT IN SUPPLY CHAIN MANAGEMENT

Please indicate your level of agreement with the following statements

		Strongly Disagree	Slightly Disagree	Neutral	Agree	Strongly Agree
C4	Internal audit should have the knowledge and skills to investigate fraud risks in the supply chain	1	2	3	4	5

C5	Internal audit function should be given ad-hoc assignments on supply chain management	1	2	3	4	5
C6	Internal audit should always prioritise fraud risks identified in the risk register	1	2	3	4	5
C7	Internal audit should have the knowledge and skills to identify fraud risks in the supply chain	1	2	3	4	5

SECTION D: HOW EFFECTIVE IS INTERNAL AUDIT IN PREVENTING SUPPLY CHAIN MANAGEMENT FRAUD?

		Strongly Disagree	Slightly Disagree	Neutral	Agree	Strongly Agree
D1	Internal audit function has the ability to prevent fraud in the supply chain management	1	2	3	4	5
D2	Internal audit assists in the monitoring process for the supply chain management system	1	2	3	4	5
D3	Internal audit is effective in preventing fraud in the supply chain management	1	2	3	4	5
D4	Internal audit effectively monitors the fraud risks in the supply chain management	1	2	3	4	5
D5	Internal audit provides assurance to management with regards to control to manage fraud risks in the supply chain management	1	2	3	4	5

SECTION E: DEVELOPING A FRAMEWORK TOWARDS THE ROLE OF INTERNAL AUDIT IN FRAUD PREVENTION AND DETECTION IN SUPPLY CHAIN MANAGEMENT

	Strongly Disagree	Slightly Disagree	Neutral	Agree	Strongly Agree
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E1	Internal audit investigates fraud related assignments on supply chain management systems	1	2	3	4	5
E2	Internal audit supports the specialists in fraud investigation	1	2	3	4	5
E3	Internal audit supports management in the evaluation of anti-fraud mechanisms	1	2	3	4	5
E4	Internal auditors have a role in the prevention and detection of fraud risks	1	2	3	4	5
E5	Internal audit function possesses the skills, knowledge and competencies to identify the indicators of fraud in supply chain management system	1	2	3	4	5
E6	Audit committee and management view internal audit as a key function to prevention and detection of fraud in the supply chain management	1	2	3	4	5
E7	Internal audit is active in the prevention and detection of fraud in the supply chain management	1	2	3	4	5

This is the end of the questionnaire. Thank you for your participation!

ANNEXURE 2: ETHICAL APPROVAL

Faculty of Economics and Finance Research Ethics Committee [FREC-ECO]

The TUT Research Ethics Committee is a registered Institutional Review Board (IRB 00005968) with the US Office for Human Research Protections (IORG# 0004997) (Expires 19 Jan 2014). Also, it has Federal Wide Assurance for the Protection of Human Subjects for International Institutions (FWA 00011501) (Expires 31 Jan 2014). In South Africa it is registered with the National Health Research Ethics Council (REC-160509-21). The FREC-ECO is a subcommittee of the TUT Research Ethics Committee

11 April 2022

Ref #: FREC 2022/003-ECO Name: Mrs T Khoza Student 218758223
--

Mrs T Khoza

Dear Mrs Khoza

Title: Towards a Framework for the Role of Internal Audit in Supply Chain Management Fraud Prevention in the Gauteng Provincial Departments

Programme: Doctor of Business Studies in Auditing

Supervisor: Dr KN Motubatse

Co-Supervisor: Prof CC Ngwakwe

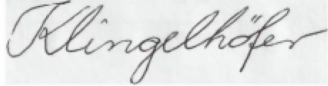
Thank you for submitting your proposal for ethics clearance.

The Faculty of Economics and Finance Research Ethics Committee reviewed the documents.

The committee approved the ethical clearance on condition that any questionnaires should be submitted for ethical clearance.

The committee wishes you well with your research endeavours.

Signature

A handwritten signature in cursive script, reading "Klingelhöfer". The signature is written in black ink on a light-colored background.

Chair: Prof Dr. rer. pol. habil. Heinz Eckart Klingelhöfer
Faculty Research Ethics Committee [Ref#: 2022/003-ECO]

cc Supervisor/HoD/etc.

Tel. 0861 102 422, Tel. (012) 382-5154, Fax (012) 382-4409, www.tut.ac.za • The Registrar, Private Bag X680, Pretoria 0001

ANNEXURE 3: LETTER OF REQUEST



Department of Auditing

FACULTY OF ECONOMICS AND FINANCE

**REQUEST FOR PERMISSION TO CONDUCT THE STUDY RESEARCH AT THE GAUTENG
PROVINCIAL DEPARTMENTS**

19 April 2022

To whom it may concern

Re: Application for permission to conduct a research study

This serves to certify that Ms Thabang Khoza, student number – **218758223**, is registered for a doctoral thesis in Business Studies in Auditing with the Tshwane University of Technology (TUT). The title of her thesis is: **“Framework for the Role of Internal Audit in Supply Chain Management Fraud Prevention in the Gauteng Provincial Departments”**.

The purpose of her study is to “examine the role of internal audit in fraud prevention and detection in relation to supply chain management in the Gauteng Provincial Departments” – with specific objectives to:

- evaluate the effectiveness of supply chain management systems in the Gauteng Provincial Departments;

- examine the effectiveness of internal audit in detecting supply chain management fraud;
- assess the effectiveness of internal audit in preventing supply chain management fraud; and
- develop a framework towards the role of internal audit in fraud prevention and detection in supply chain management.

Permission is requested from the authorities to allow student Thabang Khoza to conduct the study with the targeted participants within the Gauteng Provincial Departments. The target population to participate in the study will be external auditors (Auditor General); internal auditors; supply chain management practitioner; and risk officers. Confidentiality and anonymity will be maintained. The results of the study will be made available on request, and they will only be used for scholarly purposes to contribute towards the knowledge in the field.

We will appreciate your cooperation in this research and the required ethical clearance will be obtained from the Research Ethics Committee (REC) of the Tshwane University of Technology – upon receipt of your permission.

Yours sincerely,

Supported by:

Dr KN Motubatse -- Study Supervisor

Faculty of Economics and Finance

Ga-Rankuwa Campus

Office: +27 12 382 0602

E-mail: motubatsekn@tut.ac.za

Supported by:

Prof CC Ngwakwe

Study Co-Supervisor

Email: collinsngwakwe2@gmail.com

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ANNEXURE 4: RESEARCH APPROVAL



Enquiries: Lucas Mkhubukeli

Tel: 011 689 8165

Email:

Lucas.Mkhubukeli@gauteng.gov.za

Ms Thabang Shirley
Khoza
478 Lesolang Street
Mahube Valley
Mamelodi Pretoria
0122

RE: FEEDBACK ON THE REQUEST TO CONDUCT RESEARCH

Dear Ms Khoza

The purpose of this communiqué is to advise you that the Head of Department: Gauteng Provincial Treasury (HOD: GPT) has approved your request to conduct a research study within GPT, with the title: *“Towards a framework for the role of Internal Audit in Supply Chain Management Fraud Prevention within Gauteng Provincial Treasury (GPT)”*

That said, you are therefore urged to adhere to the GPT’s research framework when completing this study; please schedule all your research activities with participants during lunchtime and/ or after working hours to ensure that performance and service delivery does not get hampered.

Lastly, as part of the research guidelines policy for GPT, you are required to furnish the Department with

a copy of your 'final research document' upon completion for record keeping. The submission of the said document should be addressed to Ms M.R Mashabela, Director: Human Resource Development on the 5th Floor.

Should you have any enquiries, please do not hesitate to contact Human Resource Development office on the above contact details provided.

Yours Faithfully



Yours Faithfully



Ms M.R Mashebela

Director: HRD/ER/EHWP

Date: 10 May 2022