THE EFFECTIVENESS OF THE SUPPLY CHAIN MANAGEMENT SYSTEM AT A SELECTED COMMUNITY EDUCATION & TRAINING COLLEGE IN KWAZULU-NATAL

by

BHEKEFINI SIBUSISO VINCENT MTHETHWA

STUDENT NUMBER

22176483

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Approved for final submission

Supervisor **Date** 18/03/2024
Dr Sean Jugmohan

Co-supervisor **Date** 18/03/2024

Dr Kudakwashe Shonhiwa

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ABSTRACT

The current Community Education and Training Colleges (CETCs) have evolved from the old Adult Education and Training (AET) system where all supply chain management processes were centralised nationally in Pretoria. The decentralisation of supply chain processes to CETs in 2019 meant that the CETCs were expected to carry out all the supply chain management functions. The devolving of the supply chain management (SCM) function to the CET colleges meant that a selected community education and training college (CETC) has a mandate of servicing all the community learning centres (CLCs) and satellite learning centres (SLCs) falling within their jurisdiction.

This study embarked on an exploration of how a selected CETC has responded to the transition of inheriting SCM functions. This was done by: firstly attempting to establish how human and physical resources impact on SCM in a selected CETC; secondly the identification of possible prevalent SCM risks; thirdly identifying performance measures to supply chain practices; and fourthly establishing what supply chain risk mitigation strategies affected SCM practices. Against this backdrop, the study made recommendations on all four objectives in the process, also suggesting the possible risk mitigation that could be applied to the possible challenges that this study endeavoured to unmask or reveal.

In order to collect data that would enable the study to draw these findings on the effectiveness of SCM in a selected CETC, a quantitative method was adopted. The study sourced data from a population size of 118 respondents comprising all management officials at the central office of the selected CETC and all CLC managers and satellite supervisors on the PERSAL system of the selected CETC.

The study applied the STATA 17 software package to present the statistical data analysis of the data collected. Consequently, graphs and tables were used in the study to interpret data which corroborated the findings of the study on the effectiveness of SCM systems in a selected CETC, espoused in the objectives of the study.

Keywords: Effectiveness, Supply Chain Management, selected CETC

DECLARATION

I, Bhekefini Sibusiso Vincent, hereby declare that this mini-dissertation is original, and all the contents are appropriately acknowledged and explicitly referenced. A bibliography is appended to the mini-dissertation. Furthermore, it represents my own opinions and not necessarily those of the Durban University of Technology.

I also certify that the mini-dissertation has not heretofore been submitted in any of its parts or entirety for a degree of Master of Business Administration (MBA) in any other institution of higher learning locally or internationally.

I hereby give permission for my work to be available for photocopying and/or re-printing, for inter-library loan, and for the title and abstract of this thesis to be made available to other educational institutions and students.

Bhekefini Sibusiso Vincent Mthethwa

PRINT NAME SIGNATURE

22176483 **11 November 2023**

STUDENT NUMBER DATE

DEDICATION

This mini-dissertation is dedicated to my late parents, Simon Doveyana Mthethwa and Thembani Grace Mthethwa, for instilling in me the love of education, which spurred me to complete this study.

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TABLES OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ABET	Adult basic education and training
AET	Adult Education and Training
CETC	Community Education and Training College
CETCs	Community Education and Training Colleges
CETA	Continuous Education and Training Act
CLCs	community learning centres
DHET	Department of Higher Education and Training
FA	Factor Analysis
IREC	Institutional Research Ethics Committee
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
KZN CETC	KwaZulu-Natal Community Education and Training College
NEET	not in employment, education or training
PSET	post school education and training
SAICA	South African Institute of Chartered Accountants
SCM	Supply Chain Management
SCMM	Supply Chain Management Medium
SCRIM	Supply Chain Risk Integrated Management
SCRM	Supply Chain Resource Management
SLCs	satellite learning centres
SSCM	sustainable supply chain management
TVET	Technical Vocational Education and Training

CHAPTER ONE
INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

This chapter commences by outlining the background to the study, as well as a discussion of the problem statement. A presentation of the intention of the study follows, including discourse on firstly the aim of the study, secondly the research questions, and thirdly the objectives of the study. The rationale for the study is then discussed, with the chapter concluding with an outline of the structure and contents of the ensuing chapters.

1.2 BACKGROUND TO THE STUDY

The background to the study is outlined based on the following:

- The Legislative Framework to Historical Transition,
- The selected community education and training college (CETC) jurisdictional area,
- The staff cohort demographics, and
- The supply chain management resources.

1.2.1 The Legislative framework to historical transition

The legislative framework upon which the selected CETC is founded is the Continuous Education and Training Act (CETA) 16 of 2006. This study focuses on a selected CETC based in Durban, under the auspices of the Department of Higher Education and Training (DHET). Groener and Land (2022) attest that CETs have a mandate to respond to community needs, especially to those who are not in education, employment or training (NEET). These training centres incorporate all community learning centres (CLCs) and satellite learning centres (SLCs). Originally, these centres were referred to as adult basic education and training (ABET) centres (DHET: 2015). This implies that community

learning centres (CLCs) and satellite learning centres (SLCs) continue to operate, but with a broader mandate of incorporating occupational skills programmes.

1.2.2 The selected CET college's jurisdictional area

At the time that the selected CETC was established, the supply chain management services in all community education and training colleges (CETCs) was centralised at the DHET head office in Pretoria (DHET, 2015b). This arrangement ended in 2019, when CETCs, with the support of the South African Institute of Chartered Accountants (SAICA) project, were given the function of running their own supply chain processes (DHET, 2019). This transformation implied that the CETCs were being rendered the custodians of supply chain management services, covering the entire ten districts and the only one Metropolitan city of KwaZulu-Natal. The vastness of the area covered is illustrated in the figure below:

Figure 1.1: **The Map of KZN**

Source: Wikipedia (2016)

The premise to conduct this study is deduced from establishing the effectiveness of the supply chain management processes in the selected CETC in centres located in all the districts of KwaZulu-Natal. Considering this, the study also seeks to embrace respondents from the entire jurisdictional area for which the selected CETC is responsible.

1.2.3 The supply chain management human resources

Based on the researcher's observation of the establishment and development of the community education and training sector, CETCs had no dedicated SCM unit at the central offices, and the function of SCM for these colleges remained the responsibility of the Department of Higher Education's SCM unit. The function of SCM was devolved to the CETC in 2019, but there were no extra posts made available for the establishment of the SCM unit. This functioned, and still functions at present, with the limited staff that have been there since the start of CETCs. This renders the matter of deploying human capital to oversee the SCM operations at a selected CETC, a primary focus area and a challenge that remains to date.

The researcher has also observed that the DHET has provided interns to work with the Deputy Principal: Finance on all supply chain management processes in order to mitigate the challenge of allocating human capital. While this has kept the institutions running, it has provided challenges, such as a lack of institutional memory, and some instability with the continuous process of interns joining, and then leaving. The other disadvantage of working with predominantly 'intern' staff is that it requires great amounts of effort to train them to establish and sustain effective SCM operations. It is therefore hypothesised that the findings of this study are likely to indicate some of these challenges.

1.3 PROBLEM STATEMENT

The devolving of the supply chain management function to the CETCs meant that a selected CETC has a mandate of servicing all the community learning centers (CLCs) and satellite learnig centres (SLCs) falling within their jurisdiction. Being relatively new institutions, there was a lack of information on how the CETCs were fairing on their

acquired supply chain management responsibility, especially after the South African Institute of Chartered Accountants (SAICA) contract to support these CETCs came to an end. In light of this, this study therefore attempts to establish the effectiveness of supply chain management at a selected CETC in KwaZulu-Natal.

1.4 AIM AND OBJECTIVES

The aims and objectives of the study are presented below.

1.4.1 Aim of the study

The aim of the study is to assess the effectiveness of the supply chain management system at a selected community education and training college (CETC) in KwaZulu-Natal.

1.4 2 Objectives of the study

The objectives of the study are:

1.4.2.1 To examine human and physical resources that enable effective supply chain management system implementation at the selected CETC;

1.4.2.2 To explore supply chain management risks prevalent in the acquisition and distribution of goods and services at the selected CETC;

1.4.2.3 To assess the performance measures applicable to supply chain practices in the selected CETC; and

1.4.2.4 To examine the supply chain risk mitigation strategies in achieving efficiency in the selected CETC.

1.4.3 Research Questions

The research questions are:

1.4.3.1 What human and physical resources are there to enable effective supply chain management system implementation at the selected CETC?

1.4.3.2 What supply chain management risks are prevalent in the acquisition and distribution of goods and services at the selected CETC?

1.4.3.3 What performance measures for supply chain practices are in place in the selected CETC?

1.4.3.4 What supply chain risk mitigation strategies are in place to ensure efficiency in the selected CETC?

1.5 RATIONALE OF THE STUDY

The current CETCs have evolved from the old Adult Education and Training (AET) system where all supply chain management processes were centralised nationally in Pretoria. The decentralisation of supply chain processes to CETCs means that the CETCs are expected to carry out all the supply chain management functions. To date, there has not been any study conducted to establish the effectiveness of this transition.

It is against this backdrop that the significance of this study is emphasised, as it seeks to establish how the CETCs have fared since the centralised transition was implemented. It is envisaged that the transition analysis will be of benefit in unpacking how the current staff have responded to the transition, and whether they are aware of (i) the changes they are subjected to and (ii) the expectations attached to such transformation processes. In the process, it also seeks to establish the possible risk mitigation that could be applied to the challenges that this study endeavours to unmask.

1.6 STRUCTURE OF THE MINI-DISSERTATION

The chapter distribution is as follows:

Chapter 1: This chapter introduces the background to the study, problem statement, aim and objectives of the study. The chapter also focuses on the research questions and the rationale of the study.

Chapter 2: In this chapter the literature review, that is consistent with the objectives of the study, is presented. It also explains the conceptual framework and the theory underpinning the investigation undertaken in this study.

Chapter 3: This chapter focuses on the research methodology of the study. It also covers target population, data sampling, the measuring instrument, the data collection, data analysis, validity and reliability; limitations of the study and ethical considerations.

Chapter 4: This chapter presents a discussion and analysis of the results in line with the objectives of the study.

Chapter 5: In this chapter, a summary of the findings, recommendations, limitation of the study, direction for future research and conclusion are presented.

1.7 CONCLUSION

This chapter commenced by outlining the background to the study and followed up with a discussion of the problem statement. It proceeded to present the intention of the study by discussing the aim of the study, the research questions and the objectives of the study. An outline for the rationale for the study was then articulated, with a conclusion outlining the structure and contents of the ensuing chapters. The next chapter will present the literature review of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter presented the introduction and outline of the study. This chapter reflects on the theory upon which this study is premised. It reviews the literature on supply chain management (SCM) and will provide clarity on the mandate of the selected Community Education and Training College (CETC) in its geographical area of KwaZulu-Natal. This chapter will further explore the SCM in relation to public sector institutions, the category under which the selected CETC falls. This chapter will therefore focus on the SCM in public sector institutions, the supply chain risk management focusing on prevalent risks, and the supply chain risk mitigation. It will conclude by presenting the supply chain performance measures.

2.2 THE THEORY UNDERPINNING THE STUDY

The phenomenon addressed in this study is underpinned by the Complexity Theory. Larseen-Freeman (2017) argues that Complexity Theory specifies how a department, a consumer, a socio-political system or a piece of technology has evolved over time. This suggests that organisations are complex, and constantly interact with one another and their surroundings.

According to Complexity Theory, the future is unpredictable. Thus, learning new things is essential to maintaining an organization's success by resolving the tension between the need for flexibility, adaptation, change and the desire for stability (Coghlan, 2019). This suggests that an institution that is unstable may stagnate. Complexity theory therefore advocates the idea that organizations are complex adaptive systems that must respond to their internal and external contexts by self-organizing and constantly developing new organizational structures (Larseen-Freeman, 2017). This theory underpins this study in terms of how a selected CETC has evolved, and will adapt to SCM processes devolved to it. Based on adaptation, change and the development of new strategies, this theory will

underpin the establishment of the effectiveness of the SCM processes at the selected CETC.

2.3 SUPPLY CHAIN MANAGEMENT (SCM) IN PUBLIC SECTOR INSTITUTIONS

Wilson (2019) affirms that Supply Chain Management (SCM) plays a vital role in both the private and public sector environments to ensure procurement management in an organisation, which promotes competitive advantage. This also implies that it promotes an organisation to function seamlessly in its quest to attain its goals. The SCM is a critical component of public administration practice as it seeks to ensure that obtaining and delivering of goods, services and infrastructural works are in line with the needs of citizens where SCM occurs (Sibanda, Zindi and Maramura, 2020). Langley, Novack, Gibson and Coyle (2020) concur that SCM systems are of great significance to public institutions, which they deem to be cradles of administration.

According to South Africa's Constitution, section 217 of 1996, acquiring goods through SCM in institutions or organisations should take place in an environment that is underpinned by conditions that advance fairness, equitability, transparency, competitiveness and cost-effectiveness. According to Wilson (2019), the generic elements of SCM for government entities provide the premise upon which the content of the procurement supply chain management policy in the South African public sector could be based.

Figure 2.1 provides the schematic summary of these generic elements as mainly being: demand management, acquisition management, logistics management and disposal management.

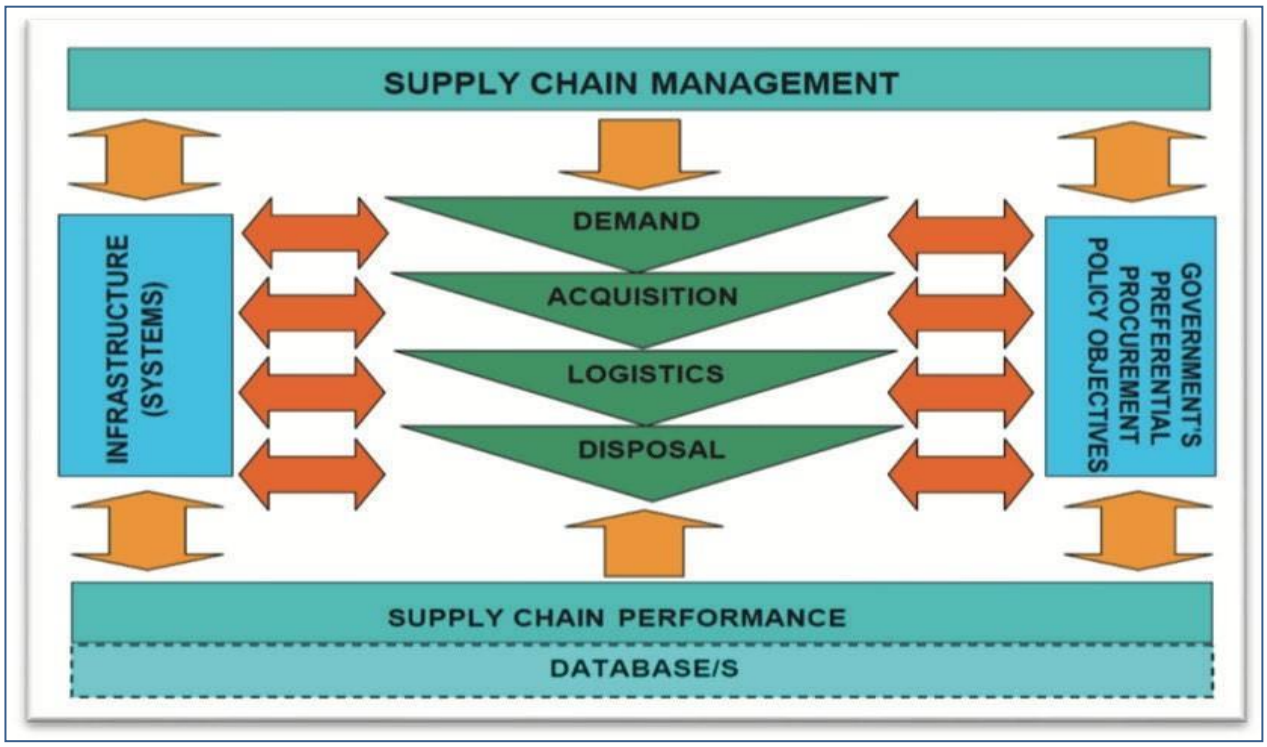

Figure 2.1: The generic elements of SCM Drivers classification (Adapted from National Treasury, 2015)

2.3.1 Demand Management

According to South Africa' National Treasury (2015), demand management is the assessment of needs upon which procurement processes of supply chain are based. The needs assessment precedes the implementation of other elements of SCM as it should be underpinned by rigorous planning and proper documentation that ensures a solid foundation for other elements of SCM to run smoothly (Wilson 2019). Liu, Remme, Hamel, Nong and Ren (2020) also affirm that the objective of demand management is to ensure that the goods and services, delivered consistently, comply with specifications of the identified needs.

For all the processes of acquiring goods and services, demand management is regarded as the first important element upon which ensuing procurement processes hinge (South Africa, 2015). Wilson (2019) attests that the Department of Higher Education and Training

(DHET) SCM policy directs that prior to the invitation of a bid or quotation, a needs assessment be conducted by ensuring the realistic estimation on costs for which the invitation for a quotation or bid is to be made. South Africa's National Treasury (2015) stipulates that the aspects of SCM that need to be considered include the following:

- All requirements must be linked to the approved budget.
- Specifications must be determined beforehand in conjunction with the end user.
- The need must form part of the strategic plan of the College.
- The frequency of requirements must be specified.
- Order quantity must be economical.
- Delivery times must be specified.
- Is there a real need for the goods or services?
- Does the need form part of strategic objectives of the College?
- Does the method determine how the need will be fulfilled?
- Has past experience been analysed?

This suggests that the selected CETC, as the offspring of DHET, is consequently subjected to this policy, which upholds demand management as a key element of SCM.

2.3.2 Acquisition Management

Akhavan and Beckmann (2017) define acquisition management as a combination of processes premised on SCM principles aimed at sourcing out the goods and services. Acquisition management entails the application of preferential procurement policy objectives and ensuring that they are mirrored against the conditions of the specific contract (Wilson, 2019). Wilding and Wagner (2019) claim that acquisition management further entails a stage where the following processes ensue:

- determination of the depreciation rate;
- making a decision on the life-cycle cost and inventory-carrying cost;
- compilation of bid documents;
- evaluation of bids; and
- tabling of recommendation to the accounting officer.

The above processes suggest a cycle of activities that mark the footprint of acquisition management as an integral part of the SCM processes of an organisation.

2.3.3 Logistics Management

Akhavan and Beckmann (2017) describe the process of logistics as entailing the strategic management of the acquisition, transportation and storage of inventory in an organisation and its marketing operations in a manner that upholds profitability and the cost-effectiveness of the orders made. Logistics management is that part of the SCM process that involves controls and ensures the flawless distribution of goods and services (Oppelt, 2020). According to Wilson (2019), activities that form part of logistics include, inter alia, the coding of items, the setting of inventory levels, placing of orders, receipt and distribution, storage or warehousing, expediting of orders, transport management, and vendor performance.

Logistics management is an indispensable aspect of SCM since, through it, the ensuring of the availability of goods and services at the right time, at the right place and to the right targeted recipient could be made (Wilding and Wagner, 2019).

2.3.4 Disposal Management

According to South Africa's National Treasury (2015), disposal management entails a public institution's strategy or plan of removing from the asset register all the assets that are: not repairable, not usable or even outdated. Wilson (2019) argues that disposal management is an integral part of SCM and when implemented, it should reveal the following:

- further explanation and description of the outdated material;
- the creation of a database of redundant material;
- the inspection of the material for potential reuse;
- the determination on a disposal strategy; and
- the putting in place of the execution of the physical disposal process.

Liu et al. (2020) agree that every institution or organisation should have a disposal plan in place as part of its SCM. This therefore suggests that the selected CETC is bound to be subjected to the disposal management requirement as these processes unfold even in public institutions.

2.4 SUPPLY CHAIN RISKS

Supply chain risk refers to the potential sudden or unforeseen occurrence of a problem along an institution's supply chain, which may lead to the prevention of provision of goods and services of that particular institution or company (Shahbaz, Rasi, Bin and Rehman, 2017). Supply chain risk is about potential supply chain disruptions having a negative impact on the overall supply chain processes of the organisation (Davis and Sullivan, 2017).

Wilson (2019) argues that supply chain risks are various forms of vulnerabilities from any quarter or sector that pose a threat to the supply chain processes of a particular institution, company or organisation (Collier and Sarkis, 2021). Based on the above literature review, an attempt to define SCM risks could be surmised as all conditions or circumstances from any quarter or participant, documented or physical, during the supply chain implementation process, which may prevent the ultimate delivery of the intended goods or services if remaining unmitigated against.

Wilson (2019) argues that prevalent risks could be summarised according to categories such as size, geographical location, regulatory framework, the institution's operations, etc., and that these can vary according to context and environment. This suggests that, as each organisation possesses a niche that differentiates it from another, the risks associated with each organisation also differ accordingly. The risks have negative and unwanted effects on the SCM as they affect the implementation processes (Shahbaz et al., 2017). Collier and Sarkis (2021) agree that even if risks may differ in terms of context and magnitude, they all translate into a threat to the SCM of an organisation. According to Wilson (2019), the following challenges or conditions translate into SCM risks:

- Lack of capacity

- Corruption
- Inadequate monitoring and evaluation of SCM
- Inadequate budget planning and demand linking
- Compliance with SCM regulatory frameworks

2.4.1 Lack of Capacity

Munzhedzi (2016) claims that across the South African government departments, there are evident challenges in the SCM capacity, occasioned by either the lack of qualified staff or by poorly trained officials. Ali, Moktadir, Kabir, Chakma, Rumi and Islam (2019) describe a lack of capacity as a risk to SCM processes. Wilson (2019) echoes that the shortage of skills, commonly prevalent in public institutions, requires some immediate intervention as many departments are lacking the skilled personnel to implement the supply chain processes properly. A Lack of skilled personnel is perceived as the key risk to SCM processes, which can lead to an institution's failure to achieve its mandate (Ali et al., 2019).

Therefore, the above literature review affirms the line of thinking that the lack of capacity in an institution is an important risk factor which should be mitigated against and should not be allowed to fester.

2.4.2 Corruption

Munzhedzi (2016) argues that corruption in the procurement practices sits as one of the major challenges facing South Africa government institutions, and which has also compromised the integrity of the entire SCM in these organisations. Ngcamu and Mantzaris (2023) define corruption as an act by an employee that is deliberately against the ethics, rules and regulations of the institution, which are aimed at achieving his or her self-centred and selfish needs as against those of organisation. This suggests that in an SCM environment that is riddled with corrupt practices, the SCM practitioners set aside or overlook regular SCM protocols, and substitute them with protocols that can only advance their desired self-centred gains.

Corruption, as the key SCM risk factor in public institutions, gives rise to latent procurement risks, which include processing of fraudulent petty cash vouchers, inflated subsistence and travel claims, and suppliers colluding with officials or bribing them in order to manipulate the tender processes (Wilson, 2019). Silvestre, Viana and Sousa Monteiro (2020) argue that the inherent results of corruption as an SCM risk include:

- A reduction or even eradication of overall trust levels ;
- a decrease in professional efficiency;
- the lowering of standards, quality and value for money on what was being procured; and
- the overall decrease in the organisation's performance.

Ngcamu and Mantzaris (2023) concur with the above as they view the impact of corruption in an organisation as having catastrophic effects. This suggests that organisations have a responsibility to ensure that the SCM processes are able to detect risks quickly enough to avoid their SCM divisions' processes being plunged into a catastrophic and irreparable condition.

2.4.3 Inadequate monitoring and evaluation of SCM

The National Treasury (2015) identifies monitoring and evaluation as an important aspect of the SCM processes. Monitoring is the tracking of the progress of a particular intervention, while evaluation is the analysis and interpretation of what has been achieved, how it has been achieved and why it was achieved to that identified level, while in the process making recommendations for possible changes and improvement (Oppelt, 2019). Monitoring and evaluation are two activities in the SCM that complement and reinforce each other (Kariuki & Reddy, 2017).

Inadequate monitoring and evaluation pose a risk to SCM implementation, and such risk is related to either the lack of, or a poorly, controlled environment (Wilson, 2019). Oppelt (2019) concurs that government entities face this risk, making it difficult for them to render effective services or to implement the SCM as prescribed by policy. Such difficulty could be mostly attributed to another risk factor, the lack of capacity, as departments lack

employees with requisite skills to monitor and evaluate various projects undertaken on behalf of the department by the service providers (Wilson, 2019). Charif (2017) declares that the lack of monitoring and evaluation cannot be isolated from the other SCM risk factors such as poor training, lack of capacity and poor planning. This suggests that the lack of monitoring and evaluation challenge present in an organisation's SCM cannot be eradicated if it is addressed in isolation from other SCM risk factors, as these are all interlinked.

Oppelt (2019) affirms that monitoring and evaluation of the SCM processes is viewed as a crucial determinant in the transformation of the public sector's procurement of goods and services, if it is to advance towards being perceived as efficient, effective and responsive.

2.4.4 Inadequate planning and demand linking

Inadequate planning can have a negative impact on the delivery of final services or goods (Charif, 2017). Wilson (2019) views inappropriate planning as a root cause to under-spending of budgets and ineffective procurement, which translate into service delivery retardation or service delivery stalling risk. Inadequacy in planning and demand linking therefore suggests inefficiencies to operations. According to Yunus and Tadisina (2016), an organisation with a culture of inadequate planning and demand linking may pose a risk to time targets, which can lead to an inability to maintain its relationship with its clients or customers.

Wilson (2019) contends that consistent lack of planning and poor demand linking remains a risk to the SCM of an organisation if it remains unmitigated against. This suggests that for public institutions, planning and linking demand management forms an integral part of the SCM processes, which when overlooked create a conducive climate for risks to prevail.

2.4.5 Compliance to SCM regulatory framework

According to the South Africa's Treasury Report (2015), each SCM process should be compliant to the regulatory framework in order to promote a transparent procurement of goods and services, which:

- Promotes a high standard of professional ethics;
- Encourages the efficient, economical and cost-effective use of resources;
- Are impartial, fair and equitable;
- Promotes accountability; and
- Advances the provision of transparent, accurate, timely, accurate, user-friendly and accessible information to the public.

Wilson (2019) argues that while public procurement and private procurement may be different, the procurement regulatory framework that applies in these sectors, seems to be advancing the same intended essence that seeks to contribute to the greater good of the citizens. Charif (2017) contends that the public sector implementation of the SCM applicable legislation, faces challenges and risks in complying with the regulatory framework. Ali et al. (2019) also concur that the challenges that government institutions experience are mainly litigation risks that emanate from non-compliance to SCM regulations. The South Africa's National Treasury report (2015) lists regulatory non-compliance risks in SCM as identified by the Auditor General (AG) to include the following:

- Appointment of 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;
- Use of unqualified suppliers;
- Passing over of bids for incorrect reasons;
- Use of incorrect procurement processes in relation to threshold values for quotations and competitive bidding;
- Extension of validity periods;
- Incorrect use of the limited bidding process;

- Inadequate controls and procedures for handling bids;
- Appointment of bid committees not aligned with policy requirements; and
- Insufficient motivation for deviations from SCM procedures.

The above issues suggest that public institutions, of which the selected CET college is part, have a responsibility of seeking ways of mitigating against these non-compliances.

2.5 SUPPLY CHAIN RISK MITIGATION

Supply Chain Risk Mitigation (SCRM) is an effort aimed at reducing or even eliminating whatever may cause uncertainty in the SCM processes by identifying challenges that may pose a threat to the SCM, and also possible mitigation to ensure effective and efficient SCM processes in an organisation (Shahbaz, Rasi, Bin and Rehman, 2017). Supply chain risk mitigation is also viewed as a systemic identification, assessment and description of potential supply chain disruptions aimed at controlling such risk exposure, or the minimising of its negative impact on the overall supply chain performance of the organisation (Davis and Sullivan, 2017).

Wilson (2019) argues that supply chain risk management is expected to create an effective system of identifying risks or challenges to SCM, and to also consider a mitigation plan to ensure an avoidance of such identified risks. SCM is exposed to various forms of vulnerabilities from a number of quarters, which cut across all sectors and spheres of institutions, translating into risks (Collier and Sarkis, 2021). According to Charif (2017), risk reduction or risk mitigation measures have to be implemented, and should start at senior management level. Talluri, Kull, Yildiz and Yoon (2013) claim that mitigating supply chain risk is a critical component of a company's overall risk management strategy and that its appropriateness and effectiveness of risk mitigation strategies rest on internal and external environments obtained in each institution. Rybnicek, Plakolm and Baumgartner (2020) also perceive risk mitigation as an important element of risk management, entailing actions taken to avoid, minimise, transfer or absorbing risks.

2.6 THE SUPPLY CHAIN PERFORMANCE MEASURES

According to Mhelembe and Mafini (2019), to understand the performance measures in supply chain management, there is a critical need to understand supply chain performance, which entails monitoring by an organisation, in order to determine whether the prescribed processes of supply chain system have been followed as per the desired objectives. Tshikovhi and Sibanda (2022) concur that supply chain performance is critical to today's competitive business environment, public or private, as it is also a critical measurement of supply chain management (SCM) effectiveness. This suggests that various performance measures can only be premised on the supply chain performance. The National Treasury Report (2015) identifies the following as an indication of a weakened supply chain management performance:

- Poor alignment between strategy, demand management and SCM planning;
- Poor decision-making about sourcing strategies;
- Lack of aggregation of procurement transactions;
- Poor bid specifications;
- Improper bid evaluation and adjudication;
- Poor contract management; and
- Insufficient supplier performance management.

Therefore, putting the performance monitoring measures in place assists in measuring the supply chain performance and the identification of possible SCM weaknesses (Hove, Sibanda and Pooe, 2018). Planning is one of the critical areas of monitoring performance measures and is indispensable to an organisation's SCM as it enhances risk detection and consequent enhancement of risk mitigation (Tsuro, 2020). Performance measures should not only be part of planning, but they should also indicate how policies governing supply chain are implemented (Munzhedzi, 2016).

2.7 THE SUPPLY CHAIN MANAGEMENT (SCM) DRIVERS

The drivers for SCM are described as motivators or influencers that catalyse or advance institutions to implement sustainable practices throughout supply chain processes

(Saeed, Waseek and Kersten, 2017). There is an advantage for an institution to establish the effect of internal and external drivers, directly and indirectly respectively, during the implementation of the SCM practices (Susanty, Sari, Rinawati and Setiawan, 2019). According to Mzembe, Lindgreen, Maon and Vanhamme, 2016), all drivers have an influence on the institutional implementation of its SCM practices.

Saeed et al. (2017) argue that the drivers of SCM are categorised into internal and external drivers, which may be further referred to as primary or secondary drivers respectively, depending on whether they have a direct or indirect influence to the organisation's SCM. Figure 2.2 below indicates the category of SCM drivers:

External Drivers	Internal Drivers
• Market Pressures Societal Pressures Regulatory Pressures	• Corporate Strategy Organization's Culture Organization's Resources Organization's Characteristics

Figure 2.2: SCM Drivers classification (Adapted from Saeed et al., 2017)

2.7.1 Internal Drivers

Internal drivers suggest an influence of the SCM processes by the various factors within the organisation. The SCM processes in a selected CETC, as a public institution, are bound to experience the influence of Internal Drivers contextualised by its location and environment. A summary of internal drivers is illustrated in 2.3:

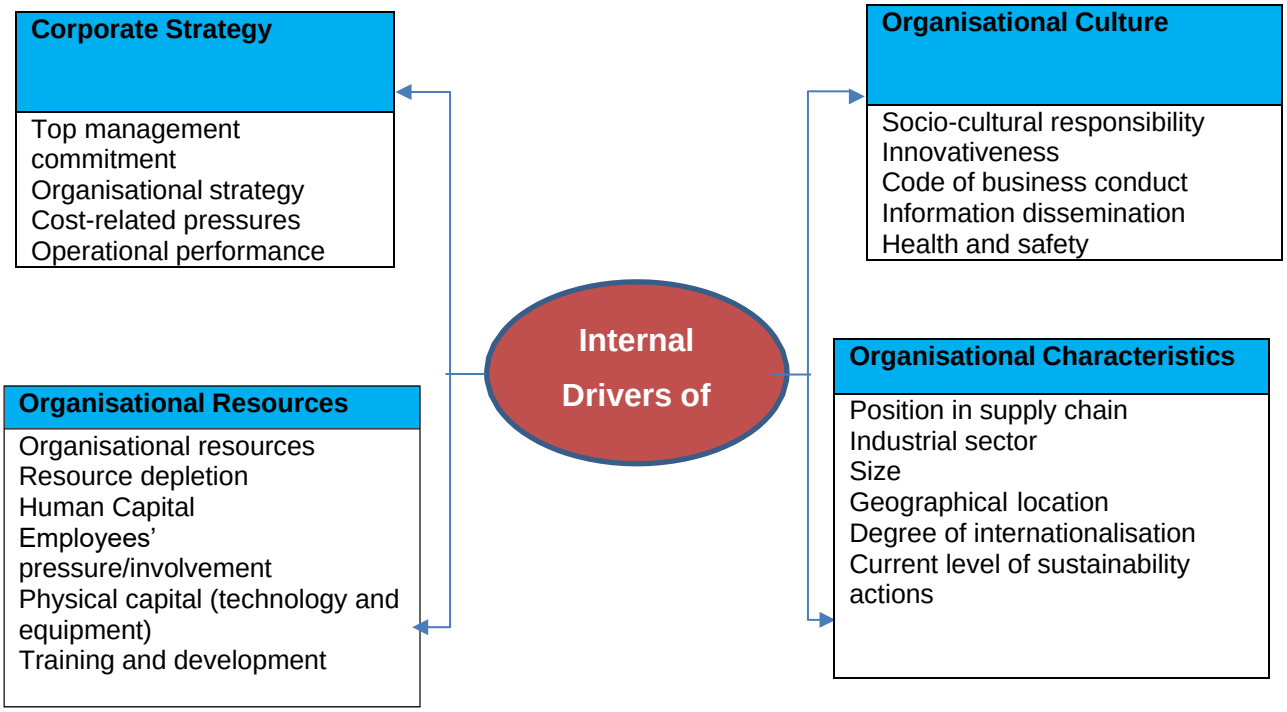

Figure 2.3: The Internal Drivers (Adapted from Saeed and Kersten, 2019)

Internal drivers suggest an influence on the SCM processes by the various factors within the organisation. The SCM process in a selected CETC, as a public institution, is bound to experience the influence of internal drivers applicable to its location and environment.

2.7.1.1 Corporate Strategy

Perry and Wood (2018) perceive corporate-driven internal support within the organisation as critical and integral to the operational and economic sustainable supply chain management (SSCM) of an organisation. SCM goals can only be achieved through effective internal support within the organisation, and by linking it to, and driving it with. the organisation's corporate strategy, including the organisation's top management (Saeed and Kersten, 2019). Figure 2.3 above lists other elements of the corporate strategy as being; organisational strategy, cost-related pressures and operational performance.

Perry and Wood (2018) argue that top management awareness and ability to provide internal support, in line with the corporate strategy, drive and sustain the SCM of an organisation. Saeed and Kersten (2019) agree that if top management has a clear understanding of the whole corporate strategy, and of all the sustainability-related pressures from stakeholders, this inevitably triggers sustainability practices within the organisation and across its supply chain network. Wilson (2019) affirms that top management is responsible for defining the vision and policies of the organisation, which is a significant step in achieving supply chain sustainability. This suggests that as corporate strategy is critical in shaping the SCM of an organisation, the selected CETC will be expected to inform its SCM, of the institution's annual performance plan.

2.7.1.2 Organisational Culture

Saeed and Kersten (2019) argue that the organisational obligations towards society to meet stakeholders' expectations, influence the organisations and their supply chain practices to adopt sustainability as part of their SCM. Perry and Wood (2018), lists and defines the following elements of organisational culture, as drivers of SCM in an organisation:

- **Innovativeness:** which is an organisation's willingness to change and improve the existing sustainability practices, involving the generation of new ideas to reach sustainability goals that also drive the organization toward adopting sustainability practices.
- I**nformation dissemination**: which entails the internal and external sharing of sustainability related information, making it a prerequisite for implementing sustainability practices, thus helping in the generation of new ideas and promotion of collaboration within the supply chain.
- **The organization's code of conduct**: which provides common and standardized decisions, procedures and systems that meet the expectations of its stakeholders during the supply chain processes.

- **Health and safety issues:** where an organisation faces pressure from different stakeholders (such as NGOs and media) to report on work-related health and safety incidents.

Van Pham, Nguyen and Huy (2020) argue that organisational culture embodies the organisation's strategic pillars, which ultimately underpin the organisation's SCM processes.

2.7.1.3 Organisational Resources

Organisations face pressure to undertake initiatives of attending to organisational resources across their supply chain practices, and this is triggered by the scarcity of resources (Saeed and Kersten, 2019). Perry and Wood (2018) argue that the scarcity and depletion of resources are considered as the main drivers of SCM practices that will advance sustainability. Wilson (2019) agrees that scarcity and depletion have influenced organisations across all sectors to look into ways of improving sustainability. The organisational resources, as adapted from Saeed and Kersten (2019) and listed in Figure 2.3, include: organisational resources; resource depletion; human capital; employees' pressure/involvement; physical capital (technology, equipment), and training and development.

Organisations have adopted sustainability practices, in seeking to gain better professional expertise and capabilities, to keep up to the expectation of meeting supply chain organisational expectation (Oppelt, 2019). Van Pham et al. (2020) attest that the scarcity and depletion of resources has become the main driver of supply chain sustainability initiatives. In line with this assertion, Saeed and Kersten (2019) cite human capital as an example of organisational resource, that drives SCM practices, as employees play a critical role in SCM processes.

Inevitably, a selected CETC, as a government organisation, is bound to be subjected to the conditions with similar driving effects on SCM, which should not be overlooked, as it's supply chain processes are, for example, dependent on its human capital.

2.7.1.4 Organisational Characteristics

Organisations from all sectors, based on their geographical location and size, face a diverse range of pressures from various stakeholders to implement sustainability initiatives in the implementation of their supply chains processes (Saeed and Kersten, 2019). Van Pham et al. (2020) argue that the SCM of an organisation is shaped by the characteristics of the very same organisation. The size of the organisation, which determines the staff complement and the geographical location with its inherent geographical conditions, are organisational characteristics which inevitably form and drive the SCM processes (Saeed and Kersten, 2019). Wilson (2019) claims that organisational characteristics drive organisation's SCM to be innovative in seeking to sustain an organisation's SCM in a manner that will ensure that the organisation stays relevant to its mandate and expected targets.

Oppelt (2019) affirms that the organisational characteristics are reflected in the organisational culture. The organisation's sustainable SCM processes can be effective and relevant if they are an embodiment of the organisational culture (Van Pham et al., 2020). This suggests that the SCM of institutions, like a selected CETC, is likely to be formed by organisational characteristics, namely the size and the geographical location of the institution.

2.7.2 External Drivers

Grosvold, Hoejmose and Roehrich (2014) affirm that external drivers elicit coercive, normative, and socio-cultural pressures that give rise to significant influence to the organisation's SCM practices. This suggests that sustainable supply chain management (SSCM) processes in an institution cannot be divorced from the influence brought about by external drivers namely; market pressures, societal pressures, and regulatory pressures.

Figure 2.4 highlights the schematic representation of the clustering of the external drivers of SSCM.

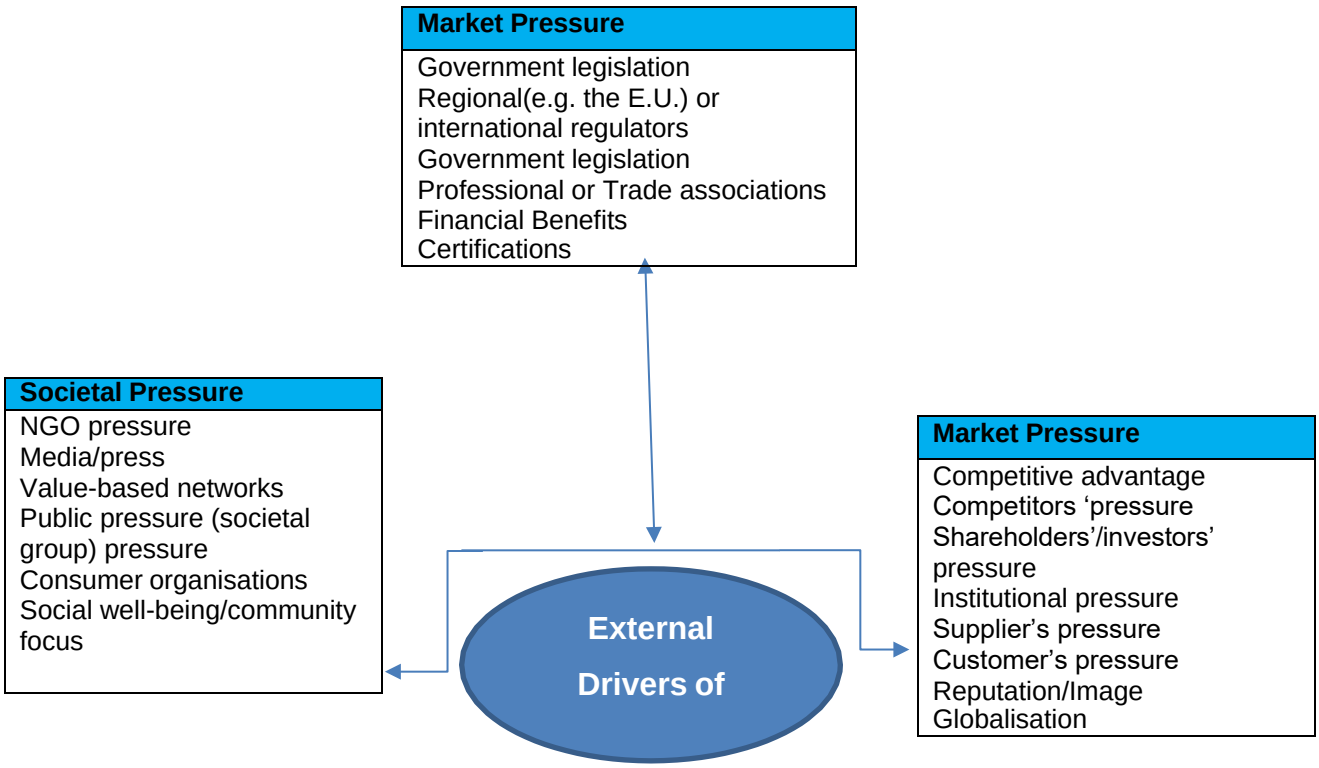

Figure 2.4: The External Drivers (Adapted from Saeed and Kersten, 2019)

The existence of these drivers suggests that the selected CETC, being an entity of government, is bound to be subjected to and affected by them.

2.7.2.1 Regulatory Pressures

According to Schrettle, Hinz, Scherrer-Rathe and Friedli (2014), regulatory pressures are exerted by both national and /or supranational (regional or international) regulatory institutions, in the form of standards, laws, procedures, and incentives. Luthra, Garg and Haleem (2016) argue that the regulatory entities are the most effective drivers leading to the implementation of various SCM practices. These drivers have a significant impact on the organization's sustainable SCM approaches and can have the ability to influence the organisation's SCM practices as a result of the expected compliance to that regulatory framework (Saeed, Waseek and Kersten, 2017).

The selected CETC has the Continuous Education and Training Act (CETA) of 2006 as its regulatory framework, which promulgates the CETC to be a public institution or organisation (South Africa, 2013). This implies that the selected CETC, like other public institutions, is also subjected to SCM regulatory pressures as it is expected to conduct its own SCM processes.

2.7.2.2 Societal Pressures

Societal pressures, are societal values and norms, expectations or demands, of different interest groups from organizations, to adopt sustainability practices in their operations (Saeed et al, 2017). Meixell and Luoma (2015), declare that societal pressures are derived from the role the stakeholders play in a number of ways in the supply chain, which result in some organisations being swayed towards adopting sustainable thinking or goals.

According to Schrettle et al. (2014), societal pressure drivers emanate from various stakeholders including from NGOs, media/press, societal groups (inhabitants, environmental organizations), value-based networks, consumer organizations, community, etc. These societal pressures have led to an increasing of the diversity of the SCM paradigm (Matthews, Power, Touboulic and Marques 2016). The diversity of SCM paradigms has accommodated an activism approach, which seeks to explore societal pressures in influencing the SCM processes that seek to deal with the disruption of the accepted world-order, especially on environmental issues (Toubolic and McCarthy, 2020). Societal pressures on the SCM are dependent on the quest of the public, becoming increasingly conscious of the challenges they face (Nyberg and Wright, 2016). Touboulic and McCarthy (2020) state that societal pressures to the SCM have an influence on the conceptual innovation towards addressing these challenges. Societal pressures in the SCM, shift the focus towards visions of alternative voices and perspectives, like those of suppliers, in seeking new ways to address social and environmental challenges (Matthews et al., 2016). Touboulic and McCarthy (2020) affirm that considering societal pressures in the SCM, creates a new re-imaging and critical SCM paradigm, that promotes more socially equitable and environmentally resilient

supply chain processes. This suggests that the SCM processes will not negate the mandate of responsiveness to societal needs.

According to the publication by South Africa (2015), the selected CETC has a responsibility to respond to the needs of the society. It is therefore in light of this that this study is undertaken to establish the SCM capacity of the selected CETC in addressing the expectation of meeting its societal needs or mandate through its supply chain practices.

2.7.2.3 Market Pressures

Market drivers are responsible for the market shape and how the SCM of an organisation seeks to address pressures pertaining to customers/consumers, competitors, shareholders or key stakeholders, the end product and suppliers (Schrettle, et al. 2014). According to Grekova, Calantone, Bremmers, Trienekens and Omta (2016), for the SCM unit process to be perceived as dealing with market pressures, it cannot ignore:

- the expectations of the clients who will be end-users to the SCM management processes;
- the character and capability of the suppliers to respond to the planned SCM induced processes;
- the ability to keep up with the potential competitors to ensure relevance and competitive urge; and
- the identification of and the partnering with the relevant stakeholders to create a sustainable SCM.

In light of the above, Carrasco and Fromm (2016) argue that market pressures shape the leadership and practices of the institution or organisation with regards to the SCM processes. Saeed et al. (2017) concur that market pressures on the SCM, have an influence in driving the sustainability goal of the organisation, which organisational leadership should advance. This suggests that the selected CETC as an organisation is bound to be affected by market pressures and it's SCM cannot be immune to them.

2.8 CONCLUSION

The discussion in this chapter reflected on the theory underpinning this study. It also reviewed the literature on supply chain management (SCM). It provided clarity on the mandate of the selected CETC in the geographical area of KwaZulu-Natal. The chapter further explored SCM in relation to public sector institutions and the category under which the selected CETC falls, by exploring the SCM in public sector institutions. It also discussed supply chain risk management focusing on supply chain risks, and supply chain risk mitigation. The chapter concluded by discussing supply chain performance measures.

The following chapter will discuss the methodology employed in this study, focusing on its empirical component.

CHAPTER THREE

EMPIRICAL RESEARCH DESIGN

3.1 INTRODUCTION

The previous chapter presented the literature review on supply chain management (SCM), focusing on the selected Community Education and Training College (CETC), which is in the third tier of institutions that fall within the post school education and training (PSET) system after Universities and Technical Vocational Education and Training (TVET) colleges. This chapter outlines the research methodology applied to this study, and therefore focuses on the following:

- the research design,
- target population,
- data sampling,
- data collection method,
- data analysis,
- validity and reliability,
- the delimitations of the study,
- the perceived limitations, and
- the ethical considerations.

The research methodology is presented against the background of the research problem and the research questions, which forms the core of this study. The research problem identified in this study encapsulated the challenge on the effectiveness of the supply chain management function, after the devolving of this function to the CETCs. The research methodology is therefore presented against the backdrop of establishing whether this challenge occurs in the selected CETC, as it is also responsible for providing supply chain management services to all the community learning centres (CLCs) and satellite learning centres (SLCs) falling within their jurisdiction. The key research question of this study is formulated as follows: What is the effectiveness of the supply chain management system at a selected CETC in KwaZulu-Natal?

The research objectives of this study are crafted as follows:

3.1.1 To examine human and physical resources that enable effective supply chain management system implementation at a selected CETC;

3.1.2 To explore supply chain management risks prevalent in the acquisition and distribution of goods and services of the selected CETC;

3.1.3 To assess the performance measures to supply chain practices in the selected CETC; and

3.1.4 To examine the supply chain risk mitigation strategies in achieving efficiency in the selected CETC.

3.2 RESEARCH DESIGN

According to Daniels (2018), a research design is a method that links theoretical research issues with practicable and pertinent empirical research. The purpose of a research design is to provide sufficient information and ensure an understanding that enables readers to evaluate the study in light of the stated research aim (Kazdin, 2021). Asenahabi, Busula and Ronoh (2019) declare that there are three main categories of research designs: qualitative, quantitative and mixed method. A qualitative research approach, according to Clark and Vealé (2018), is the process of documenting information that is not numerical, such as opinions, sentiments, and experiences. Comparatively, a mixed method approach comprises collecting and analysing both qualitative and quantitative data, whereas quantitative research relies on numerical data and statistical techniques (Apuke, 2017).

Moodley (2021) claims that a research design is a framework which guides the processes and procedures for conducting and executing research activities, with the intention of acquiring relevant scientific findings needed to address an identified research problem. This framework also guides the processes that involve many interrelated decisions, including the decision regarding the research approach, which can ultimately determine how relevant information for a study will be obtained (Sileyew, 2019). Moodley (2021) affirms that the choice of a research design is also guided by the depth of information

needed, and the amount of that information available to the researcher. The above therefore underlines the importance of the research design as an indispensable component of any research project to be undertaken.

For this research on the effectiveness of the supply chain management process in a selected CETC in KwaZulu-Natal, a quantitative study, which is cross-sectional and descriptive in nature, was selected. It was envisaged that a quantitative study would provide a statistical understanding of the current pattern and practice of the supply chain management process in the selected CETC. The quantitative research emphasises measurement, causality and generalisation of findings (Sileyew, 2019). Moodley (2019) also argues that quantitative research focuses on observable phenomena and aims at revealing the universal relationships through the use of mathematical tools in analysing collected data. Based on the above theoretical perspective, it emerged that the quantitative approach would be suitable for this study.

The cross-sectional nature of this study was influenced by and premised on the theoretical framework narrative by Clow and James (2014:163), who argue that the cross-sectional study is relatively more economical and convenient. Saunders, Lewis and Thornhill (2019:449) also agree that the cross-sectional study is a snapshot, being conducted only once, and describing what is happening at a particular time. This also influenced the choice of the cross-sectional approach in this study.

This study has embarked on using data to describe characteristics of people and situations, making it descriptive in nature. According to Sekaran and Bougie (2016), descriptive studies play a critical role in explaining attributes of a particular scenario, and further provides insights for wider scrutiny. This suggests that the descriptive approach, which was adopted in this study, is not confining for the researcher in his or her quest for further insight on the collected data.

3.3 TARGET POPULATION

Creswell and Creswell (2018:150) perceive the target population as individuals or objects who are intended to be involved in the study. For this study, the target population were 205 all officials involved in supply chain processes of the selected CETC at the central office and at CLCs throughout all the districts of the KZN province.

3.4 DATA SAMPLING

The sample in a study refers to a group representing and constituting a fraction of a population that is targeted (Sekaran and Bougie 2016, 241). According to Saunders et al. (2019: 294), sampling is a possible alternative way to access information about all the members of the population without directly interacting with all of them.

Moodley (2021) attests to two sampling techniques, namely probability and non-probability sampling. Probability sampling occurs when all elements of a sample have equal chance to be of being selected (Sekaran and Bougie, 2016: 241). Non-probability sampling relies heavily on the decision of the researcher to choose a sample which may include the application of convenience, quota consideration, snowballing and purposiveness.

For this study, a probability random sampling technique was used. Etikan and Bala (2017) state that probability random sampling is associated with quantitative research, and involves selecting a total of units from a given population. Probability random sampling technique also allows for the sample population to be arranged according to strata, while maintaining equal opportunity for each stratum of the population to be selected (Iliyasu and Etikan, 2021). This technique is used in this study to stratify respondents into two segments of the sample, namely those that are involved in SCM at the central office and those that are involved in SCM at the centre management level. Both groups formed part of the target sample of respondents, covering all the units of the population where SCM processes occur. The Kaiser-Meyer-Olkin (KMO) test was also applied to determine the measure of sampling adequacy.

A sample was selected for this study. A sample is a selection of individuals, teams, or objects that the researcher wants to examine because they have certain characteristics (Taylor, 2017). The sample size applicable to this study was calculated using the Calculator.net sample size calculator, with the following parameters: 205 staff, 90% confidence interval, 5% margin of error, and 50% response distribution. Therefore, to produce reliable results, a total of 118 replies was required.

For this study, inclusion and exclusion criteria were used to recruit the potential respondents. The inclusion criterion used were:

- All management officials at the central office of the selected CETC, and
- All CLC managers and satellite supervisors on the PERSAL system of the selected CETC.

On the other hand, the exclusion criterion consisted of the following:

- All the staff that are not part of the management cohort at the central office of the selected CETC.
- All the staff that are not part of the management at the CLC or satellite learning centre level.
- All staff not on the KZN CET PERSAL system.

The process of recruiting the relevant officials was sending out an email to each of them with gatekeeper's letters, first informing them about the intention to conduct this study. The gatekeeper's letter was to serve as a confirmation to the would-be respondent that permission has been granted for the study to be conducted. The email also explained that they would be receiving the data collecting instrument, which they were requested to voluntarily complete following a data collecting method. The intention of the email was also to encourage each one, and recruit them, to freely participate in this study. The consent form was also attached for each official to sign and return, confirming that they accede to such recruitment.

3.5 THE MEASURING INSTRUMENT

The researcher utilised a questionnaire adapted from the study conducted by Ngazire (2020), which focuses on the assessment of the impact on supply chain risk management. The content of the questionnaire from that study seemed to match and address all the objectives of this intended research. The questionnaire consisted of a demographic section of questions; supply chain risks questions and performance measure questions that also probe possible risk mitigation.

3.6 DATA COLLECTION

A questionnaire was used to collect the data for this study. The respondents with emails with guidance to respondents on questionnaire, were furnished with the electronic version of the questionnaire. The email also assured respondents that permission to conduct the interviews was sought from the authorities of the selected CETC where the researcher requested the permission to use specific sites within the jurisdiction of the selected CETC as the nodal points for controlling the distribution and returning of questionnaires. The email also entailed the assurance of safeguarding the privacy of the respondents during the data collection process.

3.7 DATA ANALYSIS

The data was analysed using the Stata 17 statistical package and the necessary statistical test was conducted to elicit descriptive and inferential understanding of the data. Moodley (2021) argues that the descriptive statistics summarises patterns in the responses and are presented in three general forms, namely:

- tabulation,
- graphical, and
- statistical.

The Statistical analysis involves the use of numbers in the presentation of results (De Vaus, 2014, 207). In addition, for this study, consistent with the above outlined theoretical framework, the use of tabulation which involves tables to present the results on the findings; and the presentation of results using graphical analysis was applied.

3.8 VALIDITY AND RELIABILITY

Saunders, et.al (2019, 213), affirm that validity and reliability are integrally central to establishing the quality of the quantitative research. Both validity and reliability are outlined further in the below discussion.

3.8.1 Validity

Validity in research refers to how well an instrument measures a concept of what was intended to be measured. (Feinberg, Keanear and Taylor, 2013). Saunders, et Al. (2019:214) also affirm that validity occurs when finding out that the questionnaire actually represents the reality of what is being measured. There are various types of validity, but for this study, face validity was used. This form of validity was addressed when the questionnaire was scrutinised by the following people: an academic in the field- who also happens to be the supervisor of the study; a practitioner or expert in supply chain management and a statistician. Validity was also addressed during the data analysis of the questionnaire through the use of a factor analysis.

3.8.2 Reliability

Reddy (2018) defines reliability as determining whether the measurements of results are stable over a period of time, meaning that if the study was to be conducted on numerous occasions using the same instrument, the same results would be arrived at. Creswell and Creswell, (2018:154) also concur that reliability is the consistency and error-free repeatability of measure that is obtained when using a measuring instrument.

For this study, Cronbach's Alpha was calculated to measure reliability. Maree (2020:261) attests that Cronbach' Alpha value ranges from 0 to 1 and is based on inter-item correlations of the responses in the questionnaire, with 0.7 or any score near it being the acceptable benchmark.

3.9. DELIMITATIONS OF THE STUDY

Tight (2017:153) claims that a delimitation of the study is necessary to mitigate against the constraints of time and resources. In consideration of this, the study was confined to the selected CETC under the Department of Higher Education and Training (DHET), located in KwaZulu-Natal province. This implies that the study only focused on one province and its context, as the other eight CETCs are located in each province of South Africa.

In addition, the study was also confined to establishing the effectiveness of supply chain management (SCM) after the devolvement of this function to each individual CETC by the DHET's national office. This further suggests that the study only focused on SCM as one area of CETC operations, and was not covering other areas which are, but are not limited to:

- marketing,
- labour relations,
- recruitment
- examination and assessment,
- corporate governance,
- financial management, and
- student support services.

The above-listed areas suggest that the current research project cannot include findings on how the selected CETC fares in the above mentioned areas.

3.10 LIMITATIONS OF THE STUDY

With the selected CETC being in the category of a relatively new third tier of Higher Education institutions (compared to the other two categories of PSET institutions, namely; Universities and TVET colleges), there was no study found to have been conducted in another CETC on the aspect of SCM. This made this study to fall short of comparative perception and corroboration from another CETC with a different context, but on the same SCM aspect.

3.11 ETHICAL CONSIDERATIONS

According to Sekaran and Bougie (2016: 321), the perceived trustworthiness of a research study depends on the ability of the researcher to establish a favourable relationship with the respondents, which is premised on trust and confidence by the respondents. Moodley (2021) also contends that the research participants are more comfortable if they participate in studies where anonymity and confidentiality are ensured.

It is in light of this theoretical framework that, for this study, the identity and contact details of the respondents were not recorded during the data collection process, to ensure that their anonymity and confidentiality remained intact. The data was collected under strict conditions of anonymity and extra careful consideration was made to ensure that no section of the questionnaire inadvertently solicited the divulgence of the identity of the respondents. An Ethical Clearances Certificate was also obtained from the Institutional Research Ethics Committee (IREC), which granted approval for the researcher to conduct this study

3.12 CONCLUSION

In this chapter the research methodology followed in this study has been presented by providing a reminder of the background of the research problem and research objectives that formed the basis of this research. In the process, a discussion of the research methodology, more specifically, the research design, identification of the targeted population, sampling and instrument design was included. In addition, the data collection method, data analysis, validity and reliability techniques applied in this study were then outlined. The delimitations of the study were discussed, followed by limitations of the study. Finally, the ethical considerations in this study were also presented. The next chapter presents the analysis and discussion on the findings of the empirical component of the study

CHAPTER 4

PRESENTATION OF RESULTS, ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

In the previous chapter, the research design used in this study was outlined. This chapter outlines the presentation of the quantitative data and the analysis of the results of the data presented. In doing so the following is covered:

- The response rate which also highlights the four objectives for which the study was intended;
- The demographic profile of the respondents;
- Frequency of responses on supply chain management (SCM);
- Cronbach's alpha test interitem correlation; and
- Factor analysis results.

Relevant tables and figures are also used to present an analysis of the data and to also present the results of such analysis.

4.2 RESPONSE RATE

The questionnaire was used to solicit responses from respondents. The questionnaire was distributed through Google forms using emails and respondents were able to complete and submit the questionnaire online. Howard (2021) states that online data collection is becoming popular as it is perceived as being convenient to respondents, accurate and allowing quick feedback. This persuaded the researcher to opt for an online questionnaire. The questionnaire was premised on the objectives of the study which were:

4.2.1 To examine human and physical resources that enable effective supply chain management system implementation at a selected CETC.

4.2.2 To explore supply chain management risks prevalent in the acquisition and distribution of goods and services of the selected CETC;

4.2.3 To assess the performance measures to supply chain practices in the selected CETC;

4.2.4 To examine the supply chain risk mitigation strategies in achieving efficiency in the selected CETC.

The questionnaire was distributed to 118 respondents who formed the sample targeted. Only 86 respondents were received out of 118 targeted respondents, which translates into 73% response rate. Draglia (n.d.) argues that a response rate of 60% and above is a good response and considered sufficiently representative of the sample. The response rate achieved in this study, therefore, suggests that it satisfies and meets the response rate expectation standards.

4.3. DEMOGRAPHIC PROFILE OF THE RESPONDENTS

The data collection instrument in this study was used to gather information on the demographic analysis of the sample population. Mills (n.d.) affirms that demographic information refers to data on the characteristics that describe a population using variables which, inter alia, include age, gender, race or ethnicity, marital status, family structures, education level, socio-economic status, employment status and religion.

Hayes (2022) argues that demographic analysis is useful in describing the population, thus enabling the researcher to learn more about a particular population about which the study is conducted. Verrof (n.d.) argues that demographic information can be conveniently packaged into categories that may include, but are not limited to the following:

- **Basic features** – age, gender, race/ethnicity
- **Social features** – households/families, education, veteran status
- **Economic features** – income, poverty, employment, commuting
- **Housing features** – owner/renter status, type, value

Demographic information can help the researcher gain a better understanding of communities regarding where they are, where they have been before and where they are headed in future (Mills, n.d.). This suggests that the demographic information can be used in various ways to interpret and learn about the generalities of a particular population. For the purpose of this study, the demographic variables used in the data

collection instrument were gender, age, education level, experience and the area of operation. These are listed in the table below.

Table 4.1: Descriptive statistics (N = 86)

		Statistics
Gender (%)	Male	35
	Female	65
Age (%)	18 – 25 years	01
	26 – 30 years	05
	31 – 35 years	15
	36 – 40 years	17
	41 years and above	62
Education level (%)	Secondary school	-
	Professional certificate	23
	Diploma	36
	Degree	15
	Postgraduate	26
SCM Experience (%)	2 year or below	43
	3 – 5 years	17
	6 – 10 years	13
	11 – 15 years	13
	16 years and above	14
Area of operation (%)	Central office	07
	Durban metro – Umlazi	12
	Majuba district	07
	Durban metro – Pinetown	-
	Ilembe district	05
	Harry Gwala district	06
	King Cetshwayo district	07
	Ugu district	14
	Umkhanyakude district	13
	Uthukela district	07
	Umzinyathi district	-
	Zululand district	10

Source: Author's own table

4.3.1 Gender

From Table 4.1, females constituted most of the respondents with a total of 65% while male formed only 35%. Dominance in the number of female respondents in the study is

evident in the general staff cohort of the selected CETC. Reddy (n.d.) declares that a staff compliment dominated by females, has several advantages and attributes, which include:

- their flexibility or agility,
- having effective communication for collaborative workforce,
- being able to maintain a healthy work-life balance,
- being able to influence a well-rounded force,
- bringing in diversity and multidimensional interest at the workplace,
- proponents of strong team spirit and feeling of togetherness,
- being able to deal with a tough situation while maintaining good temperament,
- have excellent management skills,
- have very strong ethics,
- have an ability to motivate others to excel, and
- have an ability of remaining positive and optimistic.

The above attributes suggest that the dominance of staff by females has great potential if discovered and taken advantage of. This implies that the female cohort dominance has a potential of mitigating against possible risks or challenges that may be discovered to be prevalent at a selected CETC .

4.3.2 Age

Table 4.1 illustrates that 79% of the respondents are above the age of 35 years with 62% of these well over 41 years. This suggests that the staff cohort of the selected CETC, who are 35 years and younger, constitutes the minority of 6% and this further implies that the majority of staff is over 35 years. The challenge that comes with older SCM workforce prevalent in institutions, is how to retain their experience and work ethics which, when unchecked, may compromise the functionality of SCM processes (Merkel, Ruokolainen and Holman, 2019). This implies that an institution’s capacity to remain vigilant on coming up with an effective succession plan sustain the experience of the ageing SCM staff can ensure that institutional brain-drain and work culture depletion are mitigated against. This suggests that the selected CETC will have to monitor the impact of the older staff cohort

to ensure that there is no risk of institutional brain-drain, which may ultimately compromise the effectiveness of the institution's SCM processes.

4.3.3 Education Level

Table 4.1 illustrates that all respondents have post-secondary school qualification. Most of the respondents (77%) possess qualifications ranging from a diploma to post-graduate degrees. This suggests that the SCM processes of the selected CETC are handled by a staff cohort that is educationally enlightened. Harries (n.d.) argues that the educational capacity of staff, well established or under resourced, has a bearing on the staff ability and agility to drive SCM processes in an institution. Considering this, an inference may be made that the more qualified the staff is in an institution, the more effective and efficient the institution's SCM processes may become. This suggests that the effectiveness of SCM in a selected CETC, notwithstanding the issue of availability of staff cohort, may also be leaning on the educational capacity such staff cohort possesses.

4.3.4 SCM Experience

Table 4.1 above shows that most respondents (57%) have experience ranging from 3 to beyond 15 years. Merkel et al.(2019) declare that institutions with experienced staff can deal with the impact of the shortage of adequate staff as SCM operations continue unhindered. Most respondents being qualified accords the selected CETC the advantage of continuing SCM operations in spite of having limited staff. Vige (2022) however warns that perpetual understaffing results in staff burn out. This implies that even if the selected CETC has the benefit of SCM operations continuing as normal in spite of being understaffed, the risk of staff being overworked should not be ignored.

4.3.5 Area of Operation

Table 4.1 also shows that most of the districts (83%) were represented. This implies that the responses covered most of the areas where the SCM operations in a selected CETC occur. This implies that the data collected has a balance of all contextual SCM operational issues as experienced in each district. The data from different perspectives and contexts allows the researcher to avoid data bias and prevents data being dominated by limited

views (Howard, 2021). The responses from most of the districts in a selected CETC, is therefore consistent with that inclusiveness and avoidance of bias.

4.4 FREQUENCY OF RESPONSES ON SUPPLY CHAIN MANAGEMENT (SCM)

The questionnaire included a section that sought responses on SCM. The responses on SCM are therefore discussed and analysed in two key themes, namely:

- SCM risks and SCM capacity.
- SCM risk management and performance management

4.4.1 Responses on SCM risks and capacity

This theme is premised on the two objectives of the study. It encapsulates objective one which covered human and physical resources that enable effective supply chain management. It also covers objective two of the study, which looks at the prevalent SCM risks or challenges. The descriptors used to elicit responses on SCM risks and SCM capacity are: transport risks, storage facilities, inflated prices, poor information, demand of goods beyond budget, lack of human resources, delivery risks, bureaucratic risks, poor communication infrastructure, and service providers. The responses to all these descriptors are illustrated in Figure 4.1.

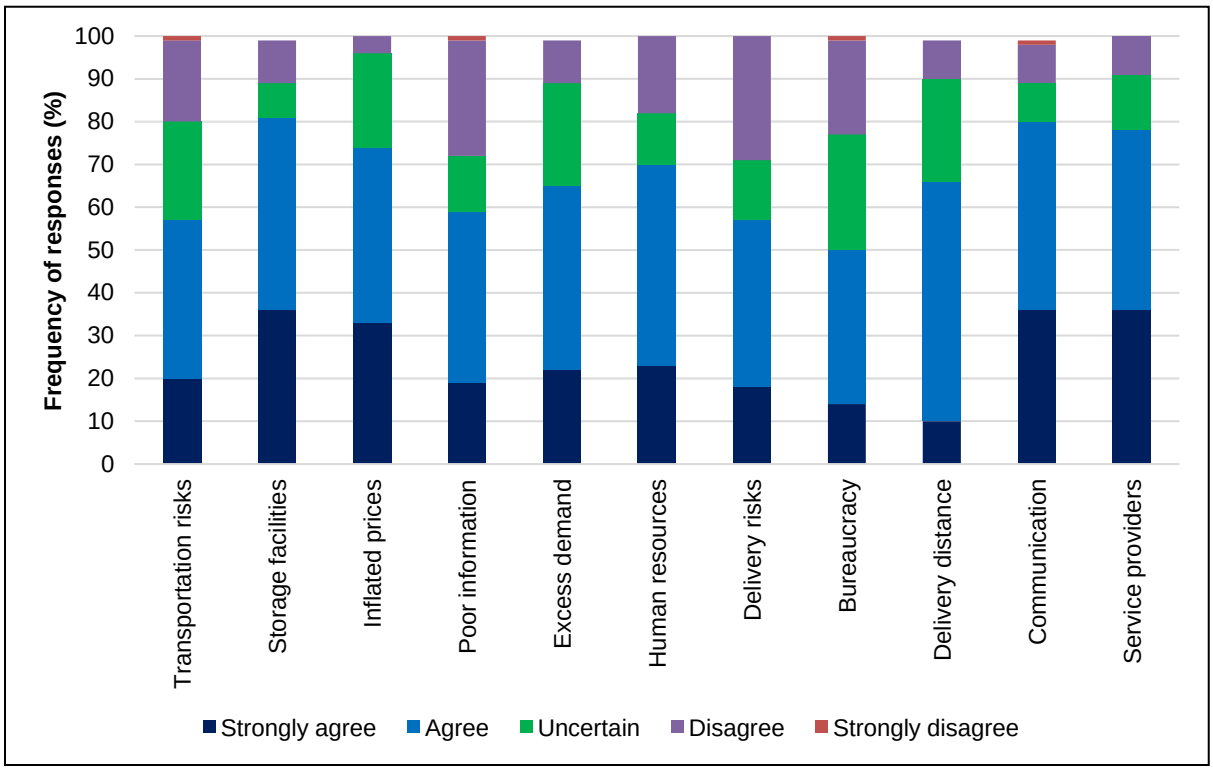

Figure 4.1: Responses on SCM risks and capacity (N = 86) - source: author's own diagram

The responses illustrated in Figure 4.1 indicate that most respondents affirm the prevalence of each of the risks as per each descriptor. As indicated in Figure 4.1, all responses suggest inherent risks which also fit with objective two. To be specific and consistent with the objectives of the study, the responses illustrated in Figure 4.1 are grouped and discussed according to the objectives of the study as per the theme alluded to above. Consequently, they are grouped as follows:

- Responses highly linked to the first study objective
- Responses highly linked to the second study objective.

4..4.1.1 Responses linked to study objective one: to examine human and physical resources that enable effective supply chain management system implementation at the selected CETC

The responses that describe the transportation, storage facilities, human resources, delivery and poor communication infrastructure issues, address human and physical resource matters, consistent with objective one of this study. Figure 4.1 illustrates the following response rate per descriptor: transportation – 57%; storage facilities – 81%, human resources deficiency – 70%, delivery – 65% and poor communication infrastructure - 80%. This suggests that most of the respondents agree that there are physical and human resource deficiencies in the SCM operations at a selected CETC.

The higher percentage rate of responses further suggests that the storage facilities, lack of human resources, delivery of procured goods and poor communication, pose an increased challenge or risk to SCM processes at the selected CETC. The challenge in human and physical resources is consistent with the background to this study. This further suggests that the lack of resources may plunge the selected CETC to inherit resultant consequences of lack of capacity to implement SCM; inadequate monitoring and evaluation of SCM; and non-compliance to SCM regulatory framework.

The responses in affirming lack of human and physical resources at a selected CET College is consistent with the view by Groener and Land (2022), who affirm that there is a lack of human and physical resource capacity in CETCs. This is also testament to the researcher's observation that SCM resources in a selected CETC are currently deficient.

4.4.1.2 Responses linked to study objective two: to explore supply chain management risks prevalent in the acquisition and distribution of goods and services at the selected CETC.

From table 4.1 the following responses have stood out, as per each indicative response rate, to be challenges that most respondents agree prevail at a selected CETC. These, together with response percentages, are: inflated prices – 74%; excess demand beyond

budget - 65%; and service providers – 78%. The responses confirm and address the second objective on the prevalence of SCM risks in a selected CETC.

The risks agreed to by the respondents may have the same adverse effect which all risks pose, as per assertion in the literature review of this study, which outlined lack of capacity, corruption and inadequate planning and demand linking as common risks in SCM. This suggests that without seeking ways to mitigate these risks, at a selected CETC, the SCM processes may be compromised.

Vige (2022) affirms that SCM risks identified, should be mitigated against to avoid these spiraling into adverse effects that may compromise the SCM operations. In institutions that are proactive on risk mitigation, the impact of the risk is not felt even though such risk may continue to prevail (Lutkevich, n.d.). This suggests that for the selected CETC, the identified risk may not have impacted on its SCM processes if mitigating factors are in place.

4.4.2 Responses on risk and performance measurement.

The responses were analysed under this theme which is premised on the last two objectives of the study. It therefore covered the third objective, which sought to establish the performance measures for SCM processes. It also covered the fourth objective which covers the risk mitigating effort in the SCM processes of the selected CETC. The responses received are presented in Figure 4.2 below.

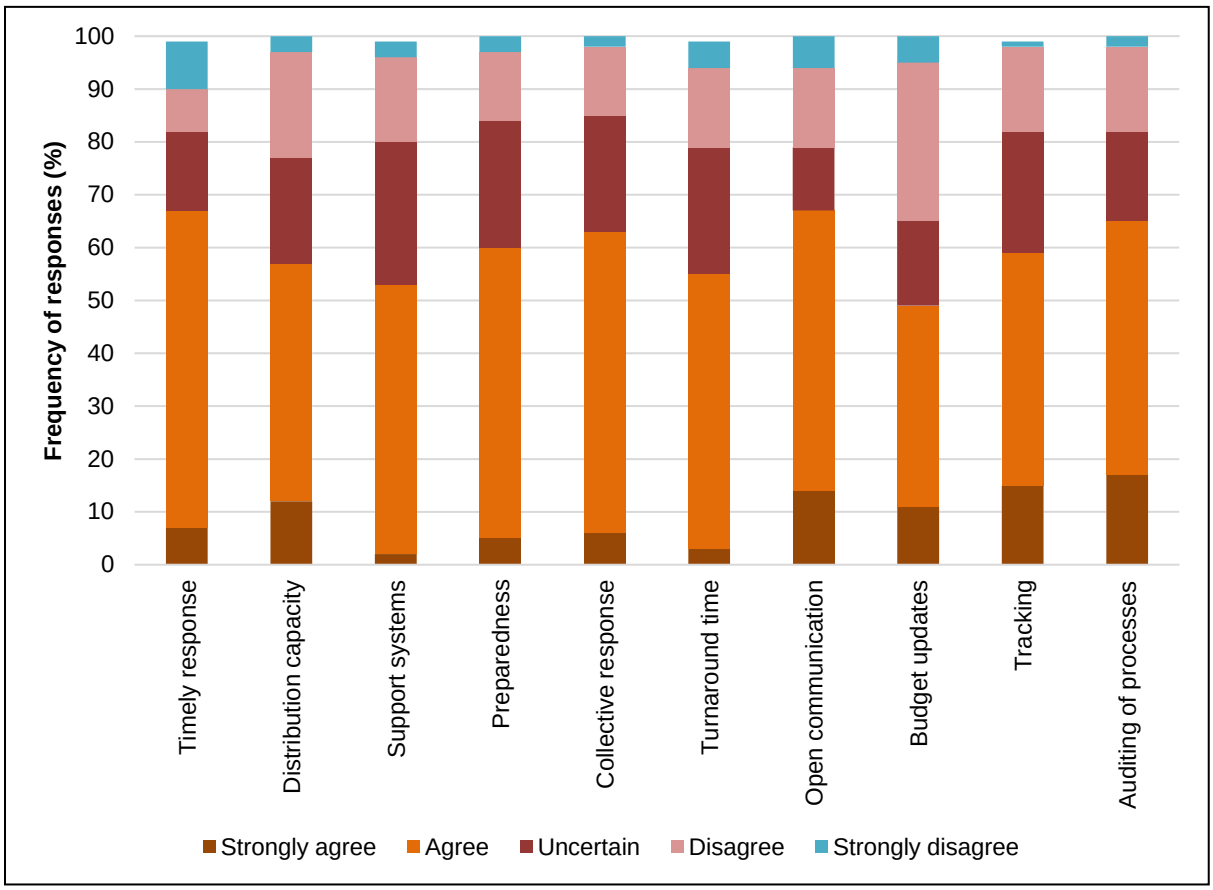

Figure 4.2: Responses on risks and performance management (N = 86): source: author's own diagram

The above responses are relevant to seeking answers to the research questions covering both the third objective on performance measures and the fourth objective on SCM mitigating strategies. The presentation of the responses below is therefore aligned to each of these objectives.

4.4.2.1 Responses from study objective three: to assess the performance measures applicable to supply chain practices in the selected CETC.

The descriptors in Table 4.2 have been designed to elicit responses that indicate how the SCM processes in a selected CETC unfold. The responses were intended to assist the researcher to gauge how the selected CETC is perceived to be doing regarding the SCM performance measures as per the third objective of the study. All the descriptors have a

bearing and relevance to the performance measurement of SCM processes at a selected CETC.

In all but one of the ten descriptors, most respondents agree that in a selected CETC the performance measures of SCM processes by the team involved, are effective. The nine responses affirming the effectiveness of SCM scored as follows: timely response to procurement needs – 67%; distribution capacity – 57%; support systems – 53%; SCM preparedness – 60%; collective response (teamwork) – 67%; turnaround time improves – 54%; open communication about SCM – 67%; tracking of procurement – 59% and auditing of SCM processes – 62%. Based on these responses, it could be deduced that the selected CETC has some performance measures that influence a resultant view on SCM processes being effective.

The higher percentage responses suggest that such performance measures are driven by:

- timely response to procurement requests;
- having an SCM unit that is well prepared;
- putting procurement tracking mechanisms; and
- auditing the SCM processes.

It could therefore be deduced that the above-listed performance measures have become an integral part of the SCM processes of the selected CETC. This is consistent with the literature review, which highlighted that organisational culture and organisational characteristics underpin and direct the relevance and effectiveness of the SCM processes. The responses further suggest performance measures that seek to address pressures brought about by external drivers, which is consistent with the literature review.

Vige (2022) attests that for performance measures to have a positive influence on the effectiveness of SCM processes, they should be aligned to the contextual external drivers. The affirmative view elicited by the responses suggests that the performance measures of the selected CETC are consistent with this view.

4.4.2.2 Responses linked to study objective four: To examine the supply chain risk mitigation strategies in achieving efficiency in the selected CETC.

The responses were used to establish the risk mitigation in the SCM processes against the backdrop of the identified risks and challenges. The responses aligned to the first and second objectives indicated the prevalence of both human and physical resources and SCM risks. However, the responses aligned to the third objective of the study indicate that SCM processes remain effective in a selected CETC. This suggests that the SCM performance measures nullify the impact of lack of resources and that of prevalent risks.

From the perspective of risk mitigation, the performance measures could imply some mitigation against the potential risks. Most responses suggest that there is existence of risk mitigation in the SCM processes of the selected CETC. The responses also emphasize that supply chain risk mitigation as also highlighted in the literature review (cf. 2.4) is indispensable. The discussion of performance measures as alluded to in the third objective of the study, suggests the emergence of risk mitigation, from each of such performance measures.

In addition to such performance measures, which also induce risk mitigating factors, the responses suggest support systems and teamwork as other risk mitigation factors. Vige (2022) also affirms that having a united SCM team is a plus factor to risk mitigation effort. Considering that the identified risks seem not to have an impact on the SCM processes, suggests that the selected CETC, has some form of risk mitigation. It is also hoped that such risk mitigation could be monitored and sustained to enable SCM operations to continue to draw positive affirmation by respondents as elicited from their responses.

4.5 CRONBACH'S ALPHA TEST INTER-ITEM CORRELATION

The data was tested for reliability using the Cronbach's alpha test inter-item correlation. Cronbach's alpha is a statistic, from 0 to 1 (0-1), that is used to measure or assess reliability or of a set of scale (Taber, 2017). The reliability test for all the constructs was run and the results are reflected in the table below:

Table 4.2: Cronbach's alpha reliability test results

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Average interitem correlation	alpha
TRPRSK	86	-	0.4787	0.4120	0.2814	0.8916
STRGRSK	86	-	0.4379	0.3683	0.2838	0.8927
PRICERSK	86	-	0.2325	0.1531	0.2957	0.8981
POORINFO	86	-	0.6356	0.5829	0.2722	0.8871
WHOUSE	86	-	0.6001	0.5438	0.2743	0.8881
BUDGT	86	-	0.3960	0.3238	0.2862	0.8939
LHR	86	-	0.6941	0.6479	0.2688	0.8853
DELIVERY	85	-	0.6331	0.5803	0.2723	0.8871
BUREACRA	86	-	0.6176	0.5630	0.2733	0.8876
VASTNSS	86	-	0.4674	0.3997	0.2820	0.8919
PCOMM	86	-	0.5451	0.4837	0.2775	0.8897
SERVPROV	86	-	0.6260	0.5723	0.2728	0.8874
OPPROC	86	+	0.4884	0.4223	0.2808	0.8913
SCMUNT	86	+	0.5777	0.5192	0.2756	0.8888
SCMSYT	86	+	0.6306	0.5774	0.2725	0.8872
SCMCPCT	86	+	0.6649	0.6153	0.2705	0.8862
COLRESP	86	+	0.6133	0.5583	0.2735	0.8877
TARSTR	86	+	0.5317	0.4692	0.2783	0.8901
OPENCOM	86	+	0.4965	0.4310	0.2803	0.8911
BUDGUPD	86	+	0.6374	0.5848	0.2721	0.8870
PROCTRCK	86	+	0.6086	0.5531	0.2738	0.8879
PROCAUD	85	+	0.6292	0.5761	0.2725	0.8872
Test scale					0.2768	0.8939

Source: Author's own table

The overall reliability score is 0.9 (0.8939) and for all the constructs Cronbach's alpha value is averaging above 0.8. Abbadia (2023) states that according to the rule of thumb, a 0.7 alpha score is the acceptable value, and, the higher the value the closer the reliability is to excellence, or the higher the internal consistency is. Considering this, the reliability test score for this study is therefore excellent.

4.6 FACTOR ANALYSIS RESULTS

Factor analysis (FA) has for over a century been used as a multivariate statistical procedure derived by Pearson and Spearman, to reduce a big number of variables (factors) (Taherdoost, Sahibuddin and Jalaliyoon, 2014). Vige (2022) also affirms that FA establishes underlying dimensions between measured variables and latent constructs, and, in the process, it catalyses the development and refinement of theory. Taherdoost et al. (2014),also attest that FA can be used to provide validity evidence.

FA was run in this study to test the effectiveness of variables and to attempt to identify themes that are effective to SCM. FA was therefore aligned to the variables of the first and second objective together and the third and the fourth objectives together. These then were:

- Effectiveness of risk and capacity variables on supply chain management.
- Effectiveness of risk and performance management.

The results of the FA are therefore presented and discussed below.

4.6.1 Effectiveness of risk and capacity variables on supply chain management

FA was run for all the variables that addressed the first and the second objective of this study. FA rule of thumb suggests that the model identifies only those factors with a variance that is greater than 1.00 (Taherdoost et al. 2014). FA results are presented in the table below.

Table 4.3: Factor analysis results on risk and capacity variables

Factor analysis/correlation — Number of obs = 85
Method: principal factors — Retained factors = 6
Rotation: orthogonal varimax (Kaiser off) — Number of params = 51

Factor	Variance	Difference	Proportion	Cumulative
Factor1	1.99973	0.81292	0.4492	0.4492
Factor2	1.18681	0.03128	0.2666	0.7158
Factor3	1.15553	0.43534	0.2596	0.9754
Factor4	0.72019	0.61493	0.1618	1.1372
Factor5	0.10526	0.05554	0.0236	1.1608
Factor6	0.04972	.	0.0112	1.1720

LR test: independent vs. saturated: chi2(55) = 315.01 Prob>chi2 = 0.0000

Source: Author's own table

Of the variables against which the FA test was done, only three variables are identified as they were above a variance score of 1. This implies that Factor 1, Factor 2 and Factor 3 are the only important factors or themes that influence the effectiveness of SCM. Table 4.3 also gives a proportion of importance of each theme towards effectiveness on SCM. Theme 1 contributes 45% of the variance of the data, theme 2 contributes 27% and theme 3 contributes 26%. This implies that, out of the three themes; theme 1 has the highest proportion of importance of effectiveness on SCM. The cumulative contribution also reflects that theme 1 and theme 2 contribute 72% and all three themes together contribute a 98% proportion of effectiveness. This suggests that these three themes present a significant proportion of what is occurring within this data. This further implies that (the results obtained in the data, regarding the effectiveness of risks and capacity on SCM, is dependent on these three themes.

Factor loadings show the various variables contributing to each theme on the effectiveness of supply chain management. Factor loadings are key elements of factor analysis which identify the latest factors that correlate with observed variables, by showing the extent at which each variable contributes to the identified factor or theme

(Collimator, 2023). Table 4.4 shows the loadings, where any loading below 0.3 was considered insignificant and therefore omitted.

Table 4.4: Rotated factor loadings (pattern matrix) and unique variances

(blanks represent abs (loading) <.3)

Source: Author's own table

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Uniqueness
Transport Risk			0.5610				0.4571
Strategy Risk			0.3164	0.4761			0.5756
Price Risk			0.4963				0.6552
Poor Information	0.6512						0.4645
Budget Deficiency	0.3801		0.3348				0.6779
Lack of Human Resources	0.5628			0.4216			0.3913
Delivery Challenges	0.6651						0.4312
Bureacratic Delays	0.4001	0.4163		0.3103			0.4899
Vastness			0.3469				0.6400
Poor Communication		0.5771					0.5086
Service Provider Delays	0.4201	0.5349					0.4914

Table 4.4 indicates the variables that load into these identified factors or themes. For each theme or factor, these are listed below together with what they constitute:

FACTOR 1:

- Poor or inadequate information
- Budget deficiency
- Lack of Human Resources
- Delivery challenges
- Bureaucratic delays
- Service provider delays

From the above variables covering objectives one and two, and loading into factor one, the study identified supply chain resource provisioning (SCRP) as a key finding resonated by these loadings together. SCRP is the finding appealing directly to objective one of the study, and indirectly appeals to the second objective of the study if it is not addressed at all. Barhmi (2019) claims that the lack of resource provisioning yields risks. Considering this, the selected CETC as custodian of SCM operations may have to suggest a way of avoiding a ripple risk effect.

FACTOR 2:

- Bureaucratic delays
- Poor communication infrastructure (IT)
- Service provider delays

The variables feeding into factor 2, identifies new finding themed supply chain management medium (SCMM). Vige (2022) argues that for smooth SCM operations, the messaging of SCM processes is important. This suggests that the selected CETC has a responsibility of addressing the issue of messaging SCM processing in a well thought through protocol to ensure smooth SCM operations.

FACTOR 3:

- Transport risks
- Storage risks
- Price risks
- Budget deficiency
- Vastness of delivery sites

From these variables loading into factor 3, the study identified these as constituting supply chain risk management (SCRM) determinants. Bailey, Barriball, Dey and Sankur (2019) affirm that SCRM is a necessity for both private and public organisations operational sustainability. The finding on SCRM determinants therefore suggests that implementation of SCM processes in a selected CETC should accommodate this finding.

It is important to test for the appropriateness of factor analysis as a model given the nature of the data. To do this, the study estimated the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The results of the test are presented in Table 4.5.

Table 4.5: Kaiser-Meyer-Olkin measure of sampling adequacy results

Variable	Kmo
Transport Risk	0.8617
Strategy Risk	0.8612
Price Risk	0.8488
Poor Information	0.8770
Budget Deficiency	0.8720
Lack of Human Resources	0.8834
Delivery Challenges	0.8816
Bureacratic Delays	0.9039
Vastness	0.9201
Poor Communication	0.8577
Service Provider Delays	0.8580
Overall	0.8759

Source: Author's own table

The score ranges from 0 to 1, where 0 means factor analysis is not an appropriate model for the data, while 1 means that factor analysis is the ideal model. The rule of thumb is that the overall KMO test result should be greater than 0.5. The result of the researcher gave an overall score of 0.9, which means that the sample is extremely adequate to allow the use of factor analysis.

4.6.2 Effectiveness of risk and performance management

FA was also run for all the variables that addressed the third and the fourth objective of this study. From the table 4.6 below, the FA test was done and only three variables are identified as they were above a variance of score of 1. This implies that Factor 1, Factor 2 and Factor 3 are the only important factors or themes. Theme 1 contributes 34% of the variance of the data, theme 2 contributes 32% and theme 3 contributes 29%. This implies that of the three themes; theme 1 and theme 2 share a significant proportion of importance

which, combined, adds up 66%. The cumulative contribution of all the three themes together is 95%. This suggests that these three themes present a significant proportion of the data trends. This further implies that in the information obtained from the data, regarding the effectiveness of risk mitigation and performance management on SCM, is dependent on these three themes. Table 4.6 below depicts FA results.

Table 4.6: Factor analysis results on risk and performance management

```
Factor analysis/correlation                      Number of obs    =         85
    Method: principal factors                    Retained factors =          6
    Rotation: orthogonal varimax (Kaiser off)    Number of params =         45
```

Factor	Variance	Difference	Proportion	Cumulative
Factor1	1.96276	0.11918	0.3393	0.3393
Factor2	1.84358	0.17955	0.3187	0.6580
Factor3	1.66403	1.23138	0.2876	0.9456
Factor4	0.43265	0.04732	0.0748	1.0204
Factor5	0.38532	0.34873	0.0666	1.0870
Factor6	0.03660	.	0.0063	1.0933

LR test: independent vs. saturated: chi2(45) = 485.15 Prob>chi2 = 0.0000

Source: Author's own table

Further tests on the data were done to identify link variables to the identified data. Loadings show the various variables contributing to each theme on the effectiveness of supply chain management. The table below identifies which of the variables are contributing to themes 1, 2 and 3, where a loading below 0.3 is considered as being insignificant. Factor loadings indicate the various variables contributing to each theme on the effectiveness of supply chain management.

Table 4.7: Rotated factor loadings and unique variances

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Uniqueness
OPPRO	0.5897	0.3598					0.4002
SCMUNT	0.7677						0.2546
SCMSYT	0.4160		0.3972		0.4695		0.3603
SCMCPCT	0.4732	0.3479	0.6214				0.2535
COLRESP		0.4500	0.6273				0.2788
TARSTR	0.4391		0.4447				0.5138
OPENCOM	0.3187	0.4930		0.3878			0.4130
BUDGUPD		0.5915	0.3992				0.3964
PROCTRCK	0.3618	0.6607					0.3297
PROCAUD	0.3412	0.4571	0.3064	0.3048			0.4748

(blanks represent abs (loading)<.3)

Source: Author's own table

The variables feeding into the factors taken from table 4.7 are therefore presented and discussed as follows:

FACTOR 1:

- Operations and procurement needs
- SCM unit procurement capacity
- Systems supporting SCM practices
- SCM unit capacity in handling demands
- Improved turnaround strategy
- Open communication protocol
- Procurement tracking
- Procurement auditing

The above variables all feed into factor one. Factor one variables point to risk mitigation to induce effective SCM operations. Organisations that sustain effective SCM processes prioritise the setting up of risk mitigation strategies (Raj 2023). This suggests that risk mitigation for effective SCM operations is a necessity for the selected CETC to ensure that it remains relevant and effective.

FACTOR 2:

- Operations and procurement needs
- SCM unit capacity in handling demands
- Collective response and collaboration
- Open communication protocol
- Budget updates aligned to procurement
- Procurement tracking
- Procurement auditing

The study identified these variables feeding into factor two as prompting a finding on the SCM team's agility and responsiveness. Barhmi (2019) attests that agility and responsiveness in SCM are key to ensuring capability of living up to clients' demand and being able to manage and control the demand-supply processes. A deduction could be made that SCM team's agility and responsiveness stands out as being indispensable to effective SCM performance measurement.

FACTOR 3:

- Systems supporting SCM practices
- SCM unit capacity in handling demands
- Collective response and collaboration
- Turnaround strategy improved
- Budget updates aligned to procurement
- Procurement auditing

The study found these factors loading into Factor 3 to be consistent with monitoring supply chain performance. Monitoring supply chain performance is a fundamental component of SCM performance measurement (Raj, 2023). These factors dubbed monitoring supply chain performance, suggests that for this study, monitoring supply chain performance is the core element against which, the SCM operations in a selected CETC can be benchmarked. It also therefore suggests an avenue that could be pursued by the selected CETC to sustain effectiveness of SCM processes.

Given the nature of the data and the appropriateness of factor analysis as a model, it was important that it be subjected to being tested. To do this, the study estimated the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The results of such adequacy test are captured in the table below.

Table 4.8: Kaiser-Meyer-Olkin measure of sampling adequacy results

Kaiser-Meyer-Olkin measure of sampling adequacy

Variable	Kmo
OPPROC	0.8941
SCM Unit	0.7788
SCM System	0.8302
SCMCPCT	0.8983
COLRESP	0.8456
TARSTR	0.8978
OPENCOM	0.9079
BUDGUPD	0.8987
PROCTRCK	0.8921
PROCAUD	0.9336
Overall	0.8745

Source: Author's own table

The score ranges from 0 to 1, where 0 means factor analysis is not an appropriate model for the data, while 1 means that factor analysis is the ideal model. The rule of thumb is that the overall KMO test result should be greater than 0.5. The result of the researcher gave an overall score of 0.9, which means that the sample is extremely adequate to allow the use of factor analysis.

4.7 CONCLUSION

In this chapter, the presentation of data and analysis of the results was outlined. The discussion on the analysis of the results was also made through the use of applicable tables and figures, and it covered:

- The response rate which also highlighted the four objectives for which this study was intended;

- The demographic profile of the respondents;
- Frequency of responses on supply chain management (SCM);
- Cronbach's alpha test interitem correlation; and
- Factor analysis results.

The following chapter focuses on the summary of the findings and the recommendations of the study.

CHAPTER 5

SUMMARY OF THE FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter focused on the presentation of results and data analysis. This chapter summarises the key findings of the study and provides recommendations in accordance with such findings. Furthermore, this chapter also aims at outlining the limitation of the study, and to provide an indication on the direction for future research.

5.2 SUMMARY OF THE FINDINGS AND RECOMMENDATIONS

The summary and recommendations covered are presented in alignment with the four objectives of the study. Consequently, discussions seek to address the following four themes: examining human and physical resources that enable effective supply chain management system implementation at a selected CETC; exploring supply chain management risks prevalent in the acquisition and distribution of goods and services in a selected CETC; assessing the performance measures to supply chain practices in a selected CETC; and examining the supply chain risk mitigation strategies in achieving efficiency in a selected CETC.

5.2.1 Theme 01: Human and physical resources for effective SCM

The responses on data collected from respondents indicated a perception of the existence of a deficiency in both human and physical resources. The study corroborates this finding of lack of resources with the results of Factor Analysis (FA), which highlighted lack of resources as prevalent in a selected CETC. The finding was also consistent with the literature review, as Munzhedzi (2016) confirms the prevalent dominant challenge of a lack of human resources in public institutions. The finding was also corroborated by Groener and Land (2022), who affirm that there is a lack of human and physical resource capacity in CETCs. A deduction was drawn that the selected CETC, being one of the nine

CETCs in the country, inevitably also bears the brunt of human and physical resources deficiency.

5.2.2 Theme 02: Prevalent SCM risks

The data collected from the respondents affirmed the prevalence of various risks in a selected CETC with inflated prices, service provider delays and demands exceeding budgets, being on top of the list. This suggested that the SCM process cannot be immune from the prevalent risks without proper mitigation strategy. Avelar-Sosa, García-Alcaraz and Castrellón-Torres (2014) postulate that risk factors have an effect on supply chain performance. This is corroborated in the literature review of the study by Davis and Sullivan, (2017) who also contend to the potential negative impact of risks on supply chain performance.

The Factor Analysis (FA) method supported and affirmed the prevalence of risks. The FA identified variables that were grouped together as prevailing risks and summed up as a finding, referred to in this study as supply chain management medium (SCMM). This finding was derived from or induced by the following risks; bureaucratic delays; poor or lack of information technology (IT) assisted communication infrastructure, and service provider delays. The other finding affirmed from the respondents as existing due to prevalent risks, was identified as a need for supply chain risk management (SCRM) in a selected CETC. The SCRM finding is induced by the following, prevalent in a selected CETC: transport risks; storage risks; price risks; budget deficiency and vastness of delivery sites.

5.2.3 Theme 03: Assessment of performance measures to SCM

The responses from data collection suggested that the performance measures perceived to be important for the selected CETC could be premised on: timely response to procurement requests; having an SCM unit that is well prepared; putting procurement tracking mechanisms; and auditing the SCM processes.

Consistent with the responses from data collection, FA corroborated this by affirming the following variables as influencing performance measures: operations and procurement needs; SCM unit capacity in handling demands; collective response and collaboration; open communication protocol; budget updates aligned to procurement; procurement tracking; procurement auditing. Based on the above, study identified and summed these to be converging on key finding on the SCM team's agility and responsiveness. This finding suggested that the effectiveness of SCM performance measures in a selected CETC is dependent on SCM team's agility and responsiveness.

In addition to this finding, FA method distilled monitoring supply chain performance as another finding that influences the performance measurement. This finding was induced by the following variables: systems supporting SCM practices; SCM unit capacity in handling demands; collective response and collaboration; turnaround strategy improvements; budget updates aligned to procurement; and procurement auditing. Habib and Saleheen (2018) perceive monitoring supply chain performance as one of the critical performance measures for effective SCM processes in an organisation. This finding therefore suggests supply chain monitoring as a catalyst for ensuring effective performance measures.

5.2.4 Theme 04: Supply chain risk mitigation

In line with the fourth objective, this study also sought to focus on how responses appealed to risk mitigation. Through the responses from data collection, the variables contributing to risk mitigation were highlighted. Using the FA method, the study identified risk mitigation to be dependent on, and (in)formed by the following variables: operations and procurement needs; SCM unit procurement capacity**;** systems supporting SCM practices; improved SCM unit capacity in handling demands; improved turnaround practices; open communication protocol**;** procurement tracking**;** procurement auditing. The finding therefore suggests that risk mitigation is a key element of SCM practices in an organization, without which SCM processes could be grossly compromised.

5.3 RECOMMENDATIONS OF THE STUDY

For each of four findings in this study outlined in 5.2 above, the recommendations are discussed as follows:

5.3.1 Recommendation One

Consistent with the finding on a lack of resources, it is recommended that the human resources deficiency in SCM be addressed. Attending to the challenge of a lack of human resources, is envisaged to strengthen human resource capacity needed for the vast SCM processes in the entire province. It is also envisaged that having sufficient human resource capacity for SCM processes in the selected CETC could prevent overworking the limited staff capacity.

Consistent with the lack of resources was a need to address the lack of physical resources. The study therefore recommended that infrastructure be prioritised in a selected CETC. The provision of storage facilities and communication infrastructure is envisaged to strengthen and improve efficiency of SCM processes in a selected CETC. Providing the physical resources is projected to nullify the adverse impact of infrastructure deficiency, which Groener and Land (2022) perceive to have a devastating effect if left unattended.

5.3.2 Recommendation two

In line with objective two, the study identified prevalent risks in the selected CETC. It is therefore recommended that supply chain risk integrated management (SCRIM), be put in place. The SCRIM sought to address both SCMM and SCRM findings by emphasising the strengthening of risk identification capacity. Habib and Saleheen (2018) argue that risk identification should form the basis of risk management strategy. It is envisaged that through risk identification, the selected CETC can conjure how to manage the prevalence of such risks, which inevitably constitute the core of SCRM.

It is further projected that the SCRIM plan could bode well with and consequently inform the risk mitigation of a selected CETC to ensure synergy and coherence. It is therefore envisaged that the SCRIM of the selected CETC, premised on risk identification, can ensure relevance and responsiveness, which are building blocks of effective SCM processes.

5.3.3 Recommendation three

The study identified team's agility and responsiveness, as well as the monitoring of the supply chain, as critical for effective SCM processes. The double-edged recommendation for this finding is need for a dedicated effort and strategy to sustain the SCM team's agility and responsiveness, coupled with a tool for monitoring supply chain performance. Having an SCM team that is agile and responsive is bound to heighten and sustain organisational performance (Vige, 2022).

The advantage of applying this recommendation is that the agile and responsive team could nullify the negative impact of the human resource capacity deficiency, identified earlier as another finding of this study. The tool for the monitoring of supply chain performance, could prove to be a tangible mechanism for ensuring that performance measures are in place. It is therefore envisaged that, with this double-edged recommendation in place, the effectiveness of SCM in a selected CETC could be fostered.

5.3.4 Recommendation Four

The study recommends that a risk mitigation strategy be set up as a deliberate, planned and targeted component of SCM processes for a selected CETC. It is also recommended that a risk mitigation plan or strategy should be accommodating and responsive to all possible risk inducing aspects. This implies that a risk mitigation strategy is to be flexible enough to allow it to be customised for any particular eventually.

The elements identified through FA, envisaged to be an integral part of risk mitigation, are also recommended to be the building block of risk mitigation of a selected CETC. The recommendation of the risk mitigation plan or strategy for the selected CETC highlights

the indispensability of risk mitigation and is consistent with the view by Barhmi (2019), who affirms that institutions need to prioritise risk mitigation to advance SCM processes.

5.4 THE LIMITATIONS OF THE STUDY

This study was conducted in one selected CETC out of nine existing CETCs in all nine provinces. Therefore, the results of the study are premised on the contexts and conditions prevalent in a selected CETC. The study was also limited to one aspect of a selected CETC, namely, SCM operations. The findings of this study were, consequently, limited to the effectiveness of SCM in a selected CETC.

The other segment of limitation is the time taken to conduct the research. For this research, the time to conduct and conclude this research, with findings and recommendations, was approximately six months. The study was limited to only a mini-dissertation level, as a partial requirement for the intended degree. Both the number, and depth of the findings, are therefore confined to the conditions dictating research by mini dissertation.

5.5 THE DIRECTION FOR FUTURE RESEARCH

While the study has limitations, it also contained potential opportunities for future research. The future research may be extended to cover a number of, or even all of the nine CETCs, located in all nine provinces. This could require more resources and time, but could provide a comparative analysis of the findings on a limited scope, against the findings on a broader scope. Another potential direction that this research could take in future is a broader research focus in a selected CETC, to include areas beyond SCM, namely human resource management, financial management and corporate governance.

In addition to the above, the potential future research direction is envisaged to include dedicating a full dissertation study on the selected CETC. This could allow more time and more resources to be applied. This can, consequently, lead to an increased depth and number of findings. Generally, the mini-dissertation produced in this study will be a useful reference on any future research covering the effectiveness of SCM in CETCs.

5.6 CONCLUSION

In this chapter, a summary of the findings of the study was presented. The summary was aligned to the four objectives of the study, which were also used as the basis of themes upon which the summary was premised. For each of the findings, the recommendations and conclusions were drawn. In addition, this chapter presented the limitations of the study, and the opportunities presented by the findings and recommendations of this study, in contributing to the direction of future research on this topic.

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ANNEXURE 1: CONSENT LETTER

CONSENT

Full Title of the Study: The effectiveness of the supply chain management system at a selected Community Education & Training College in KwaZulu-Natal.

Names of Researcher: Bhekefini Sibusiso Vincent Mthethwa

Statement of Agreement to Participate in the Research Study:

I hereby confirm that I have been informed by the researcher, Bhekefini Sibusiso Vincent Mthethwa, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: **IREC 098/23**

- I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Respondent	**Date**	**Signature**

I, Bhekefini Sibusiso Vincent Mthethwa (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks the above study.

Bhekefini Sibusiso Vincent Mthethwa 15 February 2023

Full Name of Researcher	**Date**	**Signature**
Full Name of Witness (If applicable)	**Date**	**Signature**
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

ANNEXURE 2: LETTER OF INFORMATION

Title of the Research Study: The effectiveness of the supply chain management system at a selected Community Education & Training College in KwaZulu-Natal.

Principal Investigator/s/researcher: Bhekefini Sibusiso Vincent Mthethwa, MA

Co-Investigator/s/supervisor/s: Dr S Jugmohan, Doctorate & Dr K Shonhiwa, Doctorate

Brief Introduction and Purpose of the Study: The study is aimed to investigate the effectiveness of the supply chain management system at a selected Community Education & Training College in KwaZulu-Natal.

Greeting: Dear Participant

Introduce yourself to the participant: I am a Master's student at the Durban University of Technology conducting a research study on the efficacy of supply chain management in KZN CET College.

Invitation to the potential participant: I request you to take part in the study that I'm conducting by responding to the questionnaire.

What is Research: Research is a systematic search or enquiry for generalized new knowledge. You will be taking part in the enquiry of new knowledge about the effectiveness of supply chain management in the selected CET college. There is no age restriction, specific use of language nor the required level of education for you to participate. The target population for the study are the staff members of selected CET College who are direct recipients of the SCM end results. The study population will be all officials at the central office directly involved in the SCM and the CLC managers who are the extension of SCM practitioners at the centre level. The time to taken to complete this questionnaire will be about 15 minutes.

Outline of the Procedures: The aim of the study is to assess the effectiveness of supply chain management in selected CET college. It is envisaged that the study will suggests recommendations for improved SCM practices at SCM. Your participation therefore will contribute in towards such recommendations and improvement of SCM processes from which the staff of the selected CET

college stands to benefit. A quantitative research approach has been selected for the study, therefore a questionnaire shall be used. The expected respondents will be a CLC managers and supply chain management practitioners at the central office involved in the supply chain management processes. The total of those who will participate is 118 and as this form is sent to you, you are requested to participate and be part of these 118 respondents. There will be no specific reference to the respondent's name on the report. Questionnaires will be stored in a safe storage for five years and thereafter be shredded/Electronic records will be password protected and kept for five years and thereafter be deleted.

Risks or Discomforts to the Participant: There will be no physical risks that you might experience by participating in this study, as the researcher will be making arrangements to disseminate the questionnaire to you via email or by WhatsApp. Utmost care shall be taken to ensure that the information you shall contribute with will be treated with high confidentiality and that you will not suffer any prejudice for participating in this study.

Explain to the participant the reasons he/she may be withdraw from the Study: The respondents are free to withdraw from the research if there's no adherence to ethical research processes a written communication would be appreciated. If the researcher decides to withdraw the study, necessary communication processes will be applied and reasons will be provided to all the respondents.

Remuneration: There will be no remuneration to the respondents to take part on the study and the researcher will not receive any remuneration for conducting the study.

Costs of the Study: You will not incur costs by participating in this research. The costs that will only be incurred have been earmarked by the researcher and shall not be borne by the respondent.

Confidentiality: There will be no specific reference to your name as the respondent in the report as anonymity will be strictly guaranteed. The data will be kept in a secure place and deleted or shredded after 5 years from the date of completing the study.

Results: If you are interested in the results of the study you be will be able to access them from the DUT repository where the dissertation can be located, in approximately 12 months after the survey.

Research-related Injury: There are no envisaged injuries related to the study, however, the DUT indemnity cover will apply if there could be any injuries. The postgraduate research support unit can be contacted for any assistance regarding research related injuries.

Storage of all electronic and hard copies including tape recordings: Interview records will be electronically stored on the one drive platform until the study is completed and the data will be accessed only by the researcher, this includes the transcribed data. After the study the electronic and hard copies will be destroyed.

Persons to contact in the Event of Any Problems or Queries: For any challenges that might be experienced by the respondents, thee researcher may be contacted at 076 513 1171 or the supervisor at 031 373 2863 or the DUT-Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support on researchdirector@dut.ac.za.

ANNEXURE 3: QUESTIONNAIRE

Please tick/circle the most appropriate response in the boxes provided below:

SECTION A: Demographic Information:

Please tick/circle the most appropriate response in the boxes provided below:

SECTION A: Demographic Information:

Gender of Respondent

Male	Female
01	02

Age of respondent

≤ 25 years	01
26-30 years	02
31-35 years	03
36-40 years	04
≥ 41years	05

Highest level of education

Secondary School education	01
Professional certificate	02
Professional Diploma	03
Degreed	04

Post graduate qualification	05

Experience in Supply Chain Management

≤ 2 years	01
3-5years	02
6-10years	03
11- 15 years	04
16 years and above	05

5. Area of Operation.

The following table shows area of operations where this research is undertaken within the jurisdiction of the selected CET college. Kindly indicate your place of operation by placing a check mark (√) or circle the appropriate box below.

Central Office	01	King Cetshwayo District	07
Durban Metro (Former Umlazi District)	02	Ugu District	08
Majuba District	03	Umkhanyakude District	09
Durban Metro (Former Pinetown District)	04	Uthukela District	10
Ilembe District	05	Umzinyathi District	11
Harry Gwala District	06	Zululand District	12

SECTION B: SCM Risks and Capacity

Below is a list of possible challenges that pose supply chain risks in the selected CET college. In your opinion, please rate how strongly you agree or disagree that the following supply chain risks have been affecting goods acquisition and distribution in the CET college by placing a check mark (√) or circle the appropriate box below.

Operational Supply chain risks	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. Transportation risks	01	02	03	04	05
2. Shortage of storage facilities	01	02	03	04	05
3. Highly inflated prices	01	02	03	04	05
4. Poor and inadequate Information	01	02	03	04	05
5. Shortage of warehouses	01	02	03	04	05
7. Excess demand of goods beyond the allocated budget.	01	02	03	04	05
8. Lack of human resource capacity in the selected CET supply chain unit.	01	02	03	04	05
9. Delivery and Transportation risks	01	02	03	04	05
10 CET College policies pose a Bureaucratic delay risks (Bureaucracy in operations)	01	02	03	04	05
11 The vastness of the delivery sites of the selected CET college	01	02	03	04	05
12 Poor communication infrastructure and lack of internet connectivity in the selected CET college sites	01	02	03	04	05
13. Service providers delays	01	02	03	04	05

Supply chain risk management and Performance Management.

Supply Chain Risk Management (SCRM) is "the implementation of strategies to manage both every day and exceptional risks along procurement, based on continuous risk

assessment in order to reduce vulnerability and ensuring the continuity" of efficient supply chain management practices. Indicate your view on the following statements on supply chain risk management strategies by crossing the appropriate box.

Flexibility strategy	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
14. in the selected CET college, the operations Enhance timely response to Procurement needs	01	02	03	04	05
15. Supply chain unit in the selected CET college has developed distribution capacities at all levels.	01	02	03	04	05

(i)Preparedness strategy.

In your opinion indicate how strongly you agree or disagree to preparedness of supply chain unit to undertake a quicker response in meeting the procurement demands from the sites of the selected CET college.

Preparedness strategy	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
16. There are available systems to support supply chain practices in the CET college.	01	02	03	04	05
17. The supply chain unit is prepared to handle supply chain demand for goods and services even from the far-flung sites of the selected CET	01	02	03	04	05

(ii). Collaboration

Collaboration by other units or sites in a selected CET college is intended to produce more public value than what could be realised when the units in organizations work in silos. In your opinion indicate if this has been evident during the procurement process.

Collaboration strategies	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
18. There is collective response to supply chain demands of the CET College	01	02	03	04	05
19. There is improved turnaround time to supply chain management requests from the various units of the selected CET College.	01	02	03	04	05
20. There is open communication protocol amongst the various stakeholders involved in the SCM processes of the selected CET college(e.g. between the central office and the centres)	01	02	03	04	05

(iii) Financial Strategy

Use of finance as a strategy enables supply chain management unit to process the procurement of goods to beneficiaries without glitches. In your opinion, indicate how strongly you agree or disagree that financial capacity is important in supporting supply management practices in your selected CET college.

Financial strategies backed SCM	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
21. The budget updates are communicated to ensure that SCM processes are in line with the available budget.	01	02	03	04	05
22. In the selected CET College procurement tracking is done to monitor the delivery of goods to the relevant beneficiaries	01	02	03	04	05
23. The Procurement processes are audited and reported per each site	01	02	03	04	05

Thank you

ANNEXURE 4: GATEKEEPER PERMISSION

higher education & training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

TO: Bhekefini Sibusiso Vincent Mthethwa (22176483)

Dear Bhekefini S V Mthethwa

Re: PERMISSION TO CONDUCT RESEARCH

I have pleasure in informing you, on behalf of the Council, that your request to conduct research in KwaZulu-Natal Community Education and Training College has been granted for the year 2023/2024. You will be requested to share the outcome of your study as all research findings are welcome to assist the CET College to improve its service delivery.

Yours Sincerely

Prof ZG Buthelezi
KZN CETC CHAIRPERSON OF COUNCIL
DATE: 26/01/2023

ANNEXURE 5: ETHICAL CLEARANCE

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

19 June 2023

Mr B S V Mthethwa
P.O. Box 9307
Richards Bay
3900

Dear Mr Mthethwa

The effectiveness of the supply chain management system at a selected Community Education & Training College in KwaZulu-Natal
Ethics Clearance Number: IREC 098/23

The DUT-Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.

Please note that you are required to submit a Notification of Completion of Study form together with an abstract to the DUT-IREC office on completion of your study.

Yours Sincerely

Prof J K Adam
Chairperson: DUT-IREC

ANNEXURE 6: LANGUAGE EDITOR'S CLEARANCE LETTER

EDITOR'S LETTER

Researchers Beyond-Borders (Pty) Ltd
Umhlanga, Durban
South Africa
31 August 2023

To whom it may concern

Editing of Masters Dissertation: Bhekefini Sibusiso V. Mthethwa (Student number -22176483)

Title of dissertation: The effectiveness of supply chain management system, at a selected CET Community Education and Training college in KwaZulu-Natal.

This letter serves as confirmation that the aforementioned dissertation has been language edited.

Any queries may be directed to the author of this letter.

Regards

Maleni Pillay
Researchers Beyond-Borders
consult@researchersbeyondborders.com
www.researchersbeyondborders.com

ANNEXURE 7: TURNITIN REPORT

ORIGINALITY REPORT

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