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Impacts of supply chain integration on resilience in state-owned logistics enterprises in Namibia

By

Anatolia Tshanyengandje Shooya

Student Number

221115944

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Supervisor

Dr Patmond Thokozani Mbhele

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Declaration

I, **Anatolia Tshanyengandje Shooya student number 2211159** , declare that

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1. Exploring the interplay of supply chain integration and resilience in state-owned logistics enterprise in Namibia, Port of Walvis Bay

This manuscript paper directly corresponds to and supports the achievement of objective four outlined in the research .

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Abstract

The study investigates supply chain integration (SCI) strategy and its impact on supply chain resilience within Namibia's state-owned logistics enterprises, explicitly focusing on the Port of Walvis Bay in the Erongo region. Despite the recognised synergistic effect of SCI on enhancing resilience, its application in Namibia's state-owned logistics enterprises, especially in Port Walvis Bay, requires specific investigation. Motivated by the need to determine SCI's implementation extent and its impact on resilience in these enterprises, the study aims to (a) to establish the impact of internal integration, (b) to determine the effect of supplier integration, (c) to establish customer integration's impact, (d) to determine the impact of information integration, and (e) to examine the relationship between supply chain integration and resilience. The study employed a quantitative questionnaire survey in six logistics industries in Walvis Bay. Data analysis employed structural equation modelling with the partial least squares method. The findings indicate that supply chain integration significantly contributes to resilience and substantially affects state-owned logistics enterprises in the Port of Walvis Bay, Erongo region. However, this relationship is not linear but contingent on the level of supply chain resilience. The study highlights the critical role of supply chain resilience as a mediator between integration and state-owned logistics enterprises, contributing to a better understanding of industry dynamics. This insight is valuable for practitioners and policymakers aiming to enhance the performance and resilience of regional state-owned logistics enterprises.

Keywords: **supply chain integration, supply chain resilience, state-owned logistics enterprises, internal integration, and information integration**

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List of Acronyms and Abbreviations

AVE	Average Variance Extracted
COVID – 19	Coronavirus Disease
CI	Customer Integration
CEO	Chief Executive Officer
CRAN	Communication Regulatory Authority Namibia
CFA	Confirmatory Factors Analysis
CFI	Comparative Fit Index
DCT	Dynamic Capability Theory
DRC	Democratic Republic of Congo
ECA	Economic Commission for Africa
FTZ	Free Trade Zone
IIn	Internal Integration
II	Information Integration
ICT	Information Communication Technology
IoT	Internet of Things
IT	Information Technology
KMO	Kaiser-Meyer Olkin
IPT	Information Processing Theory
KPIs	Key Performance Indicators
Namport	Namibian Ports Authority
NDP	National Development Plan
NSA	Namibia Statistics Agency
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNCTAD	United Nations Conference on Trade and Development
PSCI	Port Supply Chain Integration
RBV	Resource-Based View
SADC	Southern African Development Community
SC	Supply Chain
SCI	Supply Chain Integration

SCM	Supply Chain Management
SCP	Supply Chain Performance
SCR	Supply Chain Resilience
SEM	Structural Equation Model
SI	Supplier Integration
PLS	Partial Least Squares
SSCI	Strategic Supply Chain Integration
SOLEs	State Owned Logistics Enterprises
SPSS	Statistical Package of Social Science
PRO	Public Relations Officer
PPMCC	Pearson's Product–Moment Correlation Coefficients
TEUs	Twenty-foot Equivalent Units
TLI	Tucker and Lewis Index
TOC	Terminal Operating Company
TOE	Technology Organisation Environment

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

In the emerging world, supply chain integration SCI is a common term that refers to the possible strategy of connecting partnerships and increasing supply chain management performance in logistics industries. This is particularly true for state-owned logistics enterprises, which play a vital role in facilitating trade and ensuring the smooth movement of goods within a country. In the case of Namibia, a country in Southwestern Africa with a growing economy and an increasing reliance on international trade, understanding the impact of SCI on the resilience of state-owned logistics enterprises is of utmost importance. SCI is a fundamental aspect of the success of an industry as it allows for cohesion and shared risk between members of the supply chain and the supply chain's subsequent resilience and responsiveness (Gu et al., 2021). Cui et al. (2022) define SCI as a collaborative effort and coordination between stakeholders in the supply chain, including suppliers, manufacturers, distributors, and customers. It encompasses the seamless flow of information, materials, and financial resources across the supply chain network. By integrating various components and actors within the supply chain, organisations can achieve greater visibility, agility, and responsiveness, enhancing their ability to withstand and recover from disruptions. The concept of supply chain resilience focuses on reducing uncertain risks and disruptions and recovering faster from obstacles in the supply chain process of logistics industries (Gu et al., 2021). These proponents of the four dimensions model supply chain integration as an effective enabler of resilience. This research investigates the impact of SCI on the resilience of Namibia's state-owned logistics enterprises. By exploring these enterprises' strategies, technologies, and practices and examining their challenges, this study provides valuable insights into how SCI can catalyse resilience in the face of adversity.

Furthermore, this research aims to identify opportunities and recommendations to strengthen SCI in the Namibian logistics sector, fostering its long-term sustainability and growth. The Port of Walvis Bay (for making Namibia a logistics hub in Southern Africa) is being used as an international supply chain integration to mitigate supply chain disruptions, reduce supply chain risk and build a responsive supply chain. The effectiveness of the existing state-

ownership model resonates with the strategic integration of internal integration, supplier, and customer and information models to entrench resilient supply chain capability. Understanding the relationship between SCI and resilience is paramount for policymakers, industry leaders, and practitioners (Razaghi & Shokouhyar, 2021). This research endeavours to shed light on this critical connection and to contribute to the ongoing efforts to enhance the resilience of state-owned logistics enterprises, ultimately fostering economic stability and sustainable development in Namibia.

1.2 Background of the Study

In this study, Supply Chain Integration (SCI) is defined as the extent to which various functions within a supply chain collaborate and coordinate their activities effectively. SCI encompasses dimensions such as information integration, coordination of processes, and strategic alignment among supply chain partners. For instance, information integration was measured by quantifying the frequency and depth of data exchange between stakeholders, coordination was assessed by evaluating the level of synchronization in production and distribution processes, and strategic alignment was determined by evaluating the degree to which organizational goals are aligned across the supply chain. Furthermore, supply chain resilience, another critical concept in this study, pertains to the ability of a supply chain to anticipate, respond to, and recover from disruptions effectively. Resilience involves multiple facets, including risk identification, contingency planning, and adaptive capacity. The study operationalized resilience by assessing the robustness of supply chain processes against various types of disruptions, the effectiveness of contingency plans in mitigating disruptions, and the agility of the supply chain in adapting to unforeseen circumstances. Methodologically, the study utilized quantitative metric assessments to capture the multidimensional nature of these constructs, with surveys being used to collect data on key performance indicators related to SCI and resilience. The significance of SCI in logistics cannot be overstated, as it determines the capability of transportation and distribution services. Notably, significant ports worldwide have benefited from high levels of SCI, contributing to their success (Cui et al., 2022; Lee, 2021). Internationally recognized ports such as Shanghai, Singapore, and Hong Kong are lauded for their efficiency, resilience, and responsiveness due to their robust SCI.

Similarly, in Africa, ports like Durban and Richards Bay in South Africa, as well as Kenya's port of Mombasa, have demonstrated resilience and responsiveness primarily due to their SCI (Benamara et al., 2019). Namibia, a vibrant and emerging economy in Southern Africa, has recognised the importance of building robust logistics capabilities to support its growth and development objectives. The state-owned logistics enterprises in Namibia play a pivotal role in facilitating trade, transportation, and warehousing activities within the country and beyond its borders (Namibia Development Plan, 2021-2022). However, these enterprises are not immune to the disruptions caused by various internal and external factors, such as natural disasters, economic volatility, and global supply chain shocks. Namibia's strategic location in Southern Africa, with a deep-water port located in the coastal town of Walvis Bay, positions it as a crucial hub for regional trade, serving landlocked countries in the Southern Africa Development Community (SADC) region such as Botswana, Zimbabwe, and Zambia (Simasiku et al., 2020). The Port of Walvis Bay handles a variety of cargoes, including containers, bulk cargo, and breakbulk cargo, as well as minerals like uranium, copper, and diamonds, facilitating trade with neighbouring countries. However, border procedures during COVID-19 and international restrictions have severely affected port performance, testing its resilience and responsiveness to disruptions.

The port handles a variety of cargoes, including containers, bulk cargo, and breakbulk cargo. It is also a central hub for exporting minerals such as uranium, copper, and diamonds, which are mined in Namibia and neighbouring countries. Namibia has successfully facilitated trade with neighbouring countries through its various ports. However, border procedures during COVID-19 and international restrictions have severely affected this performance and tested its resilience and responsiveness to disruptions. The Port of Walvis Bay has undergone significant expansion and modernisation in recent years to improve its capacity and efficiency. This includes the construction of a new container terminal, which was completed in 2019 and has increased the port's container handling capacity from 355,000 TEUs (twenty-foot equivalent units) to 750,000 TEUs per year. The port also has modern cargo-handling equipment and technology, including cranes, forklifts, and computerised cargo tracking systems. Additionally, the port has established a one-stop shop for customs clearance, reducing the time and cost of cargo clearance procedures.

The COVID-19 pandemic has awakened stakeholders on the resilience and responsiveness of Namibian Ports, such as the Namibian Ports Authority (Namport), to disruptions and to the possibility of improving this resilience and responsiveness through SCI (Namibia State of Logistics Report, 2020). The impact of SCI on resilience is poised to mitigate the supply chain risk in the state-owned enterprise (Port of Walvis Bay). At the same time, it intends to overcome the magnitude of disruptions in supply chain management to respond to transportation and distribution of services through integration with suppliers' and customers' extended enterprises. The Port of Walvis Bay is a crucial component of Namibia's logistics infrastructure and essential to economic development. It is strategically located to serve as a gateway to the SADC region, providing access to markets for Namibian goods and facilitating regional trade.

1.2.1 Port of Walvis Bay

In the decade of the 19th century, the Port of Walvis Bay was designated as belonging to the British Crown in 1878. At the same time, Germany occupied the remaining portion of what is now Namibia. Following the conclusion of World War I, the League of Nations bestowed mandate status upon present-day Namibia, thereby transferring administrative control to South Africa. Subsequently, Namibia achieved independence in 1990, and the newly formed state claimed sovereignty. The South African government rejected the proposition to transfer control of Walvis Bay at that time, which was operating under the apartheid regime. Following extensive discussions, the transfer of Walvis Bay to the Namibian Government was completed on 1 March 1994. The Port of Walvis Bay in Namibia is a profound deep-water maritime port known for its substantial depth and ability to handle huge ships. Its position is an essential port of entry for international trade in southern Africa. The Port of Walvis Bay, situated in a strategic location approximately halfway along Namibia's coastline, possesses advantageous proximity to major shipping routes, making it a natural conduit for global commerce (Namport Annual Report, 2021). With the country boasting approximately 1600 kilometres of coastline, two state-owned commercial ports are overseen by Namport, which was established by enacting the Namibian Ports Authority Act of 1994. Namport reports to the Ministry of Works and Transport and the State-Owned Enterprises Governance

Council. Namibia's largest commercial port is the Port of Walvis Bay, which is run under the "service port" model. The Port of Walvis Bay is along a central trading maritime corridor within the Atlantic. The harbour is a secure and well-protected deep-water port situated within a natural bay, enjoying the advantages of a temperate climate that eliminates disruptions caused by adverse weather conditions. The development of the port has been a deliberate endeavour to augment its capability, optimise efficacy, and elevate its significance as a pivotal logistics centre.

1.2.2 Port Operation Statistics

The Port of Walvis Bay receives approximately 1,592 vessel visits yearly, most of which consist of container ships, fishing vessels, and general cargo carriers. Primary commodities imported via Walvis Bay's port include petroleum, fish, wheat, sulphuric acid and vehicles. The Port of Walvis Bay primarily exports commodities such as salt, fish and fish products, and various mined goods. Lastly, the primary commodities transhipped at the Port of Walvis Bay include fish and fish products and general cargo (Namport, 2022, p.1). The 2022 Namport reports state that the Port of Walvis Bay handled cargo of 6,567,370 tonnes in total, which corresponded to a 6% increase in comparison to the same period in 2021. The total number of TEUs handled at the Port of Walvis Bay during the 2022 reporting period was 168,278 TEUs, which increased by 8% in comparison to 2021. This is despite the challenges posed by the global shortage of containers.

During the reporting period of 2022, the Port of Walvis Bay handled 168,278 TEUs, an increase of 8% from the previous year. Despite the difficulties caused by the worldwide scarcity of containers, this has been achieved. Transhipment volumes jumped 22% despite the continued decline in shipped and landed quantities. With a 10% increase from 1,464,100 metric tons last year, the cross-border volumes increased to 1,606,984 metric tons, making up 24% of the total cargo volumes processed. Of these totals, 551,113 metric tons were sent for the interior, while 1 56,872 metric tons were brought in from the interior. Total vessel calls to ports reached 1,592, an increase of 22%. Also, from 2020 to 2021, the total gross tonnage of vessels rose by 3.4 million tonnes, or 21.6%. This figure was 16,035,876 million tons. The Namport annual report for 2021 states that an increase in petroleum, research, dry

bulk, roll-on-roll-off, foreign tugs, and foreign fishing vessels caused the surge in vessel calls. (Namport Annual Report 2021).

1.2.3 Port of Walvis Bay Development

The Port of Walvis Bay has undergone significant expansion and modernisation in recent years to improve its capacity and efficiency. This includes the construction of a new container terminal (see Figure 1.1, Figure 1.2 and Figure 1.3), which was completed in 2019 and has increased the port's container handling capacity from 355,000 TEUs to 750,000 TEUs per year (Namport Annual Report, 2021). The development of the port has been a deliberate endeavour to augment its capability, optimise efficacy, and elevate its significance as a pivotal logistics centre. In order to facilitate the safe passage of larger vessels, the channels and basins of the port have undergone deepening and dredging activities. The expansion of the port facilitates the accommodation of larger vessels and enhances its capacity to manage more significant quantities of freight. The focal point of the logistics industry has been the development of the Port of Walvis Bay as a logistics hub. The process entails establishing a cohesive transportation and logistics system that interlinks the port with various other modes of inland transportation, including railways and roadways. Improving connectivity between the port and inland regions has been a top priority in establishing transport and logistics corridors (Shimuafeni, 2021). The Walvis Bay-Ndola-Lubumbashi Development Corridor (WBNLDC) is a significant transportation corridor that links Walvis Bay with Zambia and the Democratic Republic of Congo (DRC). This corridor provides access to global markets, creating opportunities for landlocked countries. Establishing the Trans-Kalahari Corridor, a transportation pathway linking Walvis Bay to Botswana and South Africa has significantly enhanced trade activities via the port. The establishment of this corridor has resulted in a transportation link that is both efficient and cost-effective, thereby promoting the growth of businesses and trade in the region. This infrastructure development aims to augment the port's connectivity and establish it as a favoured gateway for commerce.

The port has proactively advocated for transhipment services, establishing itself as an essential transhipment centre for commodities intended for neighbouring landlocked nations, including Botswana, Zambia, and Zimbabwe. Enhancements have been made to transhipment infrastructure and amenities to optimise the seamless transportation of commodities from the port to various inland locations (Savage et al., 2014; Simasiku et al., 2020). The Port of Walvis Bay has established a Free Trade Zone (FTZ) that offers several benefits to enterprises, such as the waiver of customs duties and taxes. The FTZ creates an enabling environment for commerce and entices international capital by providing advantageous conditions for conducting business. The initiatives mentioned above indicate Namibia's more comprehensive endeavours to capitalise on the Port of Walvis Bay's advantageous geographical position and augment its involvement in regional commerce and transportation. The objective is to foster economic expansion, entice capital inflows, and generate job prospects within the locality.

1.1 Figure New Container Terminal on Reclaimed Land Location

Source: Drewery Maritime Advisors, 2017

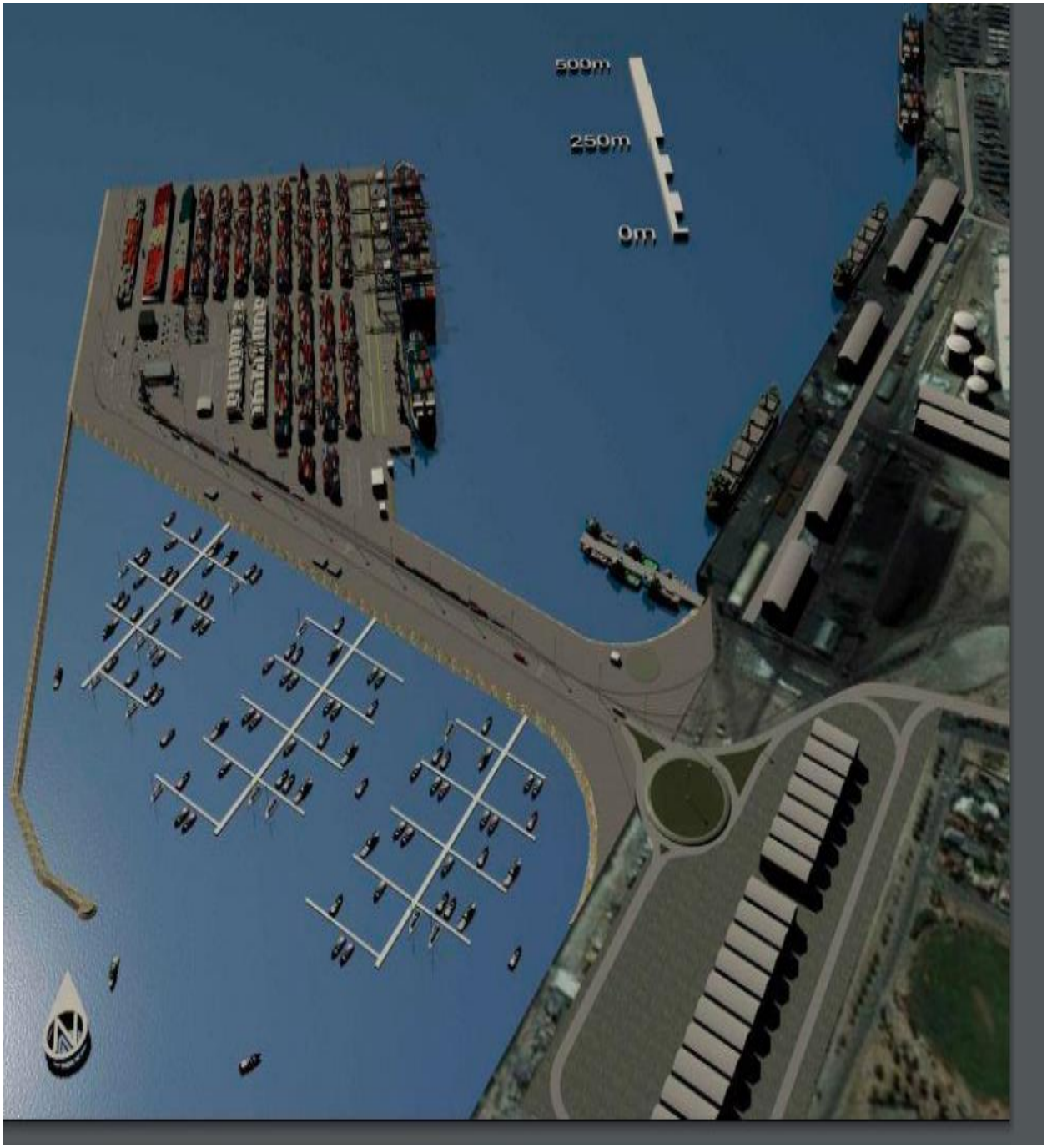


Figure 1.2 New Walvis Bay Container Development

Source: Urban Dynamics Town Regional Planner, 2017

Figure 1.3 New Terminal after Completion

Source: Urban Dynamics Town Regional Planner 2017

1.2.4 Background of Logistics in Namibia

Namibia, a country in Southwestern Africa, has a developing logistics sector critical to its economic growth and regional trade. The logistics industry in Namibia comprises various activities such as transportation, warehousing, freight forwarding, customs clearing, and value-added services. Namibia is strategically positioned geographically to provide transport linkages to other landlocked Southern African countries. The country has a well-developed transportation infrastructure: highways, railways, airports, and ports. The two major ports in Namibia are Walvis Bay and Luderitz, located along the Atlantic Ocean coast. These ports serve as gateways to neighbouring countries such as Zambia, Zimbabwe, and Botswana, providing a crucial link in the SADC trade corridor. According to a study by the Namibia Statistics Agency 2021, transportation companies lacked a level playing field due to the absence of government participation and knowledge about the role and importance of

logistics in Namibia. Some researchers have claimed that logistics and trade are closely intertwined since work cannot occur without logistics, and logistics would be unnecessary without work (Simasiku & Jackie, 2020). Namibia's overall merchandise trade fell to N$16 billion in December 2020, down 19.7% from December 2019, when it was N$20 billion, and down 0.5% from November 2020, when it stood at N$16.1 billion. The 20% drop in trade between November and December 2020 is substantial (Shimuafeni, 2021). The latter reflects a relatively constant situation year over year, with potentially a tiny drop in commerce. As the year goes on, COVID-19's influence begins to have a detrimental effect.

Namibia Statistics Agency (2021) observes that the negative impact on trade will be reflected in the country's logistics industry, comparable to the situation in the industries. However, if the data are to be believed, the negative effect has presented itself slightly more slowly. It appears that the full impact has yet to be felt and that this will likely continue until 2024 and beyond.

1.2.5 The Significance of Ports in Supply Chains

Considerable efforts have been dedicated to examining the evolving role of ports within supply chains. The Port of Walvis Bay's transformations have redefined the port's significance in supply chain networks. This study analyses the changes observed in port functions across generations, starting with the transition away from traditional ports. The Namibian Ports Authority initially focused on cargo storage convenience. Over time, the second-generation ports acknowledged the importance of providing further services such as cargo distribution, packing, and processing for both conventional and bulk cargo. In the third generation, ports adopted the developing ideas of collaboration and sharing of information, taking on the role of a facilitator and utilising technology to enable smooth information exchange among different parties involved. Significant changes in port ownership, port development policies, and the range of port activities are seen in these three generations (; UNESCAP, 2018).

Consequently, ports' objectives have significantly diverged from mere gateways for regions, evolving into systems that offer value-adding services and facilitate smooth operations (Namibia State of Logistics, 2020). Ports play a critical role as essential links within value-

driven chain systems, thereby altering their positions in business environments (Robinson, 2016). Their ability to administer the integration of logistics functions across supply chains profoundly influences the cargo flow. To remain competitive, ports are advised to become connectors between interacting parties or central hubs that generate value by offering a wide range of activities, thus retaining their clientele (Blanco & Perez-Labajos, 2016). Additionally, ports can transform into knowledge-based global supply chain management centres (Guan, 2020). However, these contextual changes also present challenges. Empirical studies examining the behaviour of supply chain actors have shed light on the challenges ports face in highly integrated supply chains (Carbone & De Martino, 2013; Saruchera, 2020), helping to define the business settings in which ports operate. To create more excellent value, ports are encouraged to adopt agility in their current processes, leading to the definition of agile ports' characteristics and recommendations for an agile approach (Tse et al. 2016). Research has also emphasised the importance of port strategies from a supply chain perspective, highlighting the significance of responsiveness, agility, and efficiency (Tse et al., 2016). The necessity for ports to embrace agility is driven by the consequences of port inefficiencies, which include additional operating and transportation costs.

1.3 Statement of the Problem

Namibia is important in the Southern Africa Development Community (SADC) region. Although South Africa and Angola have bigger ports, Namibia's strategic location and shortest and well-developed road connectivity to neighbouring landlocked countries (see Figure 1.4) give it very high strategic importance. SCI has been recognised as crucial in enhancing supply chain resilience (Ebrahimi & Ebrahimi, 2021). However, in state-owned logistics enterprises in Namibia (Port of Walvis Bay), the extent to which SCI has been implemented and its impact on resilience is still being determined. State-owned logistics enterprises in Namibia face various challenges in maintaining a resilient supply chain. Despite the potential benefits of SCI in improving resilience, there needs to be more understanding of its effectiveness in state-owned logistics enterprises in Namibia. It is evident, however, that SCI affects the ability of these enterprises to anticipate, respond to, and recover from supply chain disruptions such as natural disasters, geopolitical instability, and economic shocks (Lado & Zhang, 2021).

Currently, supply chains around the world are affected by disruptions as a result of the COVID-19 pandemic. It has raised questions regarding Namibia's resilience and responsiveness to such disruptions. Consequently, market demand has become more volatile, and managing the supply chain's uncertainty is crucial (Shekarian & Mellat, 2021). The resilience and responsiveness of Namibian state-owned logistics enterprises is a significant research domain. This is because the research community may learn about the benefits and limitations of state-owned logistics enterprise controls on Namibia's logistics infrastructure and ports in meeting the varying and complex needs of resilience and responsiveness capabilities.

A study of the benefits and limitations of state-owned controls from the perspectives of established theories and existing research studies will give practical importance to the outcomes. The benefits and limitations of the current government-operated model and any alternate models (Awasthi & Shankar, 2020) will be examined. This study will provide valuable insights for state-owned logistics enterprises in Namibia in the context of the Port of Walvis Bay and for other developing countries. By understanding the relationship between SCI and resilience, SOLEs can make informed decisions about improving their supply chains and protecting their businesses from disruptions.

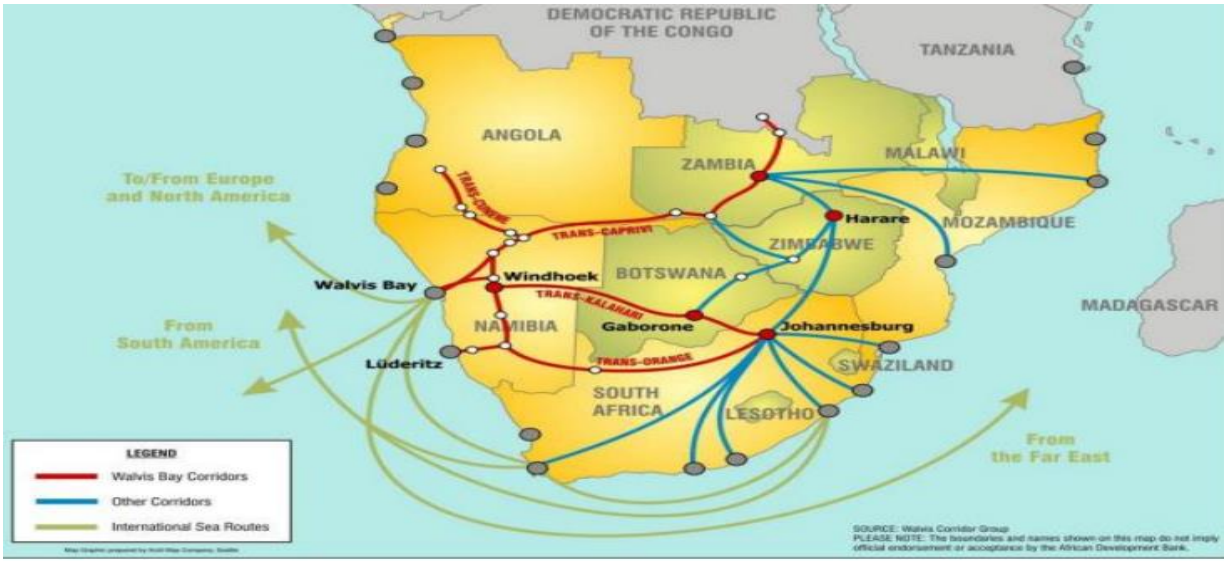


Figure 1.4 A Map Illustrating Port of Walvis Bay Connectivity's

Source: Adapted from Walvis Bay Corridor Group.

1.4 Conceptual Framework

A conceptual framework centred on the relationship between supply chain integration and resilience is proposed to guide this study. SCI is conceptualised as the configuration and coordination of the supply chain, activities, processes, and stakeholders through the chain, encompassing dimensions such as internal integration (IIn), supplier integration (SI), customer integration (CI), and information integration (II). Resilience, on the other hand, refers to the ability of logistics enterprises to withstand disruptions, recover quickly, and maintain performance in the face of adversity. By examining the impact of SCI on resilience, this study aims to shed light on the strategies and practices that can enhance the resilience of state-owned logistics enterprises in Namibia.

1.5 Research Objectives and Questions

The primary objective of this study is to investigate the impact of SCI on the resilience of state-owned logistic enterprises in Namibia. Specifically, the study objectives are:

- To establish the impact of internal integration on the SCI of state-owned logistics enterprises in Namibia.
- To determine the effect of supplier integration on the SCI of state-owned logistics enterprises in Namibia.
- To establish the impact of customer integration on the SCI of state-owned logistics enterprises in Namibia.
- To determine the impact of information integration on the SCI of state-owned logistics enterprises in Namibia.
- To examine the relationship between SCI and the resilience of state-owned logistic enterprises.

1.5.1 Research Questions

- How does internal integration impact the SCI of state-owned logistics enterprises in Namibia?
- How does supplier integration affect the SCI of state-owned logistics enterprises in Namibia?
- How does customer integration impact the SCI of state-owned logistics enterprises in Namibia?
- How does information sharing impact the SCI of state-owned logistics enterprises in Namibia?
- What is the relationship between SCI and the resilience of state-owned logistics enterprises in Namibia?

1.6 Researcher Hypotheses

The researcher will empirically test the following formulated hypotheses:

1.6.1 **H_{o1}**: Internal integration has no positive impact on the SCI.
H_{A1}: Internal integration has a positive impact on the SCI.

1.6.2 **H_{o2}**: Supplier integration has no positive impact on the SCI.
H_{A2}: Supplier integration has a positive impact on the SCI.

1.6.3 **H_{o3}**: Customer integration has no positive impact on SCI.
H_{A3}: Customer integration has a positive impact on SCI.

1.6.4 **H_{o4}**: Information integration has no positive impact on the SCI.
H_{A4}: Information integration has a positive impact on the SCI.

1.6.5 **H_{o5}**: SCI has no positive impact on supply chain resilience.
H_{A5}: SCI has a positive impact on supply chain resilience.

1.7 Significance of the Study

The impact of SCI on the resilience of state-owned logistics enterprises in Namibia, Port of Walvis Bay, is significant for the academic community, industry practitioners, and policymakers. This study aims to fill a notable void in the current body of research by investigating the correlation between SCI and resilience in state-owned logistics enterprises in Namibia. This research contributes to supply chain management and logistics by

broadening the comprehension of this subject matter. The results of this study offer valuable insights for optimising operational procedures, increasing productivity, and mitigating disruptions within state-owned logistics companies, thereby fostering competitiveness in the logistics industry from an economic standpoint. The study emphasises the significance of SCI in bolstering resilience, thereby providing valuable insights for policymakers to devise policies and initiatives that foster a resilient logistics sector in Namibia. The study has significantly enhanced academic comprehension, provided practical recommendations, and enabled policy-making that promotes a resilient and sustainable logistics industry in Namibia.

1.8 Justification of the Study

Several factors justify this study. The main objective of the study is to address the existing gap in knowledge by investigating the impact of SCI on the resilience of state-owned logistics enterprises in Namibia. The study's insights and empirical evidence within this context enhance comprehension of the relationship in question. The study focuses on the Port of Walvis Bay, a pivotal logistics hub in Namibia, and acknowledges the crucial role of state-owned logistics enterprises in bolstering Namibian growth. Through an analysis of the impact of SCI on resilience at the port, this study generates practical and implementable results that can guide decision-making within the logistics sector.

Moreover, the research outcomes are significant, transcend the scope of individual enterprises, and pertain to Namibia's logistics industry. The study underscores the potential benefits of bolstering the resilience of state-owned logistics enterprises employing effective SCI practices. These benefits include enhanced operational efficiency, reduced disruptions, and increased adaptability. Consequently, this contributes holistically to the sector's sustainability and competitiveness. Furthermore, the study aligns with Namibia's national development agenda, underscoring the significance of establishing robust logistics systems to facilitate economic diversification and international trade. The study directly supports the nation's strategic objectives and policy frameworks by examining the effects of SCI on resilience. In a nutshell, the study indicates its significance by addressing a knowledge gap, focusing on the unique setting of the Port of Walvis Bay, bolstering the resilience of state-owned logistics enterprises, and adhering to national goals. The results of this study provide

significant perspectives for various stakeholders in the industry, policymakers, and scholars, ultimately supporting the growth and development of the logistics industry in Namibia.

1.9 Contribution of the Study

The contribution of this research lies in its study of the impact of SCI on the resilience of state-owned logistics enterprises in Namibia, with a particular emphasis on the Port of Walvis Bay. The study is based on the relationships within Namibia's logistics industry context. This research addresses the significant gap in the existing literature, which needs more comprehensive research on state-owned enterprises in this geographic region. The results of this study are anticipated to contribute ideas and practical applications for decision-makers, managers, and interested stakeholders involved with the logistics industry in Namibia. This will assist in formulating strategies and techniques that enhance the resilience of state-owned logistics enterprises. Furthermore, this study enhances the broader understanding of the crucial role of SCI in strengthening resilience, which may have implications for global logistics enterprises. Overall, the main objective of this study is to enhance academic comprehension to foster informed decision-making regarding the development of resilient state-owned logistic enterprises in Namibia.

1.10 Aim of the Study

The study will investigate the impact of SCI on resilience in state-owned logistics enterprises in Namibia using a quantitative research approach.

1.11 Scope of the Study

This study was limited to six logistics industries associated with the Walvis Bay port, and the data were gathered in the Walvis Bay Erongo Region. The model's development involved considering four constructs to assess the effectiveness of SCI within the selected logistics industries. These constructs, including internal, supply, customer, and information integration, are classified as endogenous variables. The research population comprised of the personnel employed within the selected logistics industries. The size of the sampling frame

is 370. The study employed both a probability and non-probability sampling technique to gather quantitative data from 360 respondents. The study results apply to the logistics industries in Walvis Bay, Erongo region, and Namibia.

1.12 Dissertation Structure

This dissertation consists of six chapters, structured as follows.

1.12.1 Chapter One: Introductory Chapter and Problem Statement

The study's starting point, problem statement, research objectives, the ground of the study, port operation, port development, research objectives, research questions, hypotheses, rationale, and relevance are all presented in this chapter. It also stipulates the trajectory of the study.

1.12.2 Chapter Two: Literature Review

Chapter Two includes a review of the relevant literature. The present study provides an extensive overview of the historical development of the state-owned logistics enterprises in Namibia, and this chapter also includes an overview of relevant literature about the state-owned logistics enterprises in Namibia and sustainable development. Chapter Two comprehensively reviews the existing literature on SCI and resilience and its application in Namibia. The literature review about SCI in Namibia holds significance in comprehending the necessity of implementing efficacious SCI strategies to confront the disruptions occurring from ports.

1.12.3 Chapter Three: Methodology

The several approaches used to accomplish the study's objectives are deliberated in this chapter. A deductive approach was recommended after discussing inductive, abductive, and deductive approaches to research; after carefully weighing the different research approaches, a cross-sectional research strategy was deemed suitable for this study. Priority has been given

to the quantitative data in the study design. For the quantitative data, respondents were chosen using probability .

1.12.4 Chapter Four: Data Analysis and Presentation

The chapter focused on the examination and display of the quantitative data acquired from a survey questionnaire. Descriptive statistics were applied to analyse the demographic data. The research inquiries were investigated utilising a Pearson Moment Correlation analysis, and the formulated hypotheses were tested using inferential statistics. Hypotheses one through four were tested using regression analysis. Structural Equation Modelling (SEM) was employed to assess the offered hypotheses.

1.12.5 Chapter Five: Discussion of Results

This chapter gives a comprehensive and in-depth evaluation of the study findings, connecting them closely with the research questions, objectives, and hypotheses. The analysis offered in the prior chapter has formed the basis for the presentation of these findings. Moreover, this chapter has thoroughly substantiated the significance of the theoretical framework to the study findings. The forthcoming chapter will centre on devising suggestions and the final inference derived from this investigation.

1.12.6 Chapter Six: Recommendations and Conclusion

This chapter serves as the culmination of the research endeavour, offering conclusions and recommendations. It begins with an overarching review of the thesis chapters. Subsequently, it delves into the presentation of research findings, offering recommendations based on these findings. The chapter further clarifies the contribution of the research to the existing body of knowledge. In addition, it addresses the limitations intrinsic to the study. Finally, the chapter provides avenues for future research by suggesting potential areas of exploration.

1.13 Chapter Summary

The introductory section of Chapter One emphasised the crucial significance of integrating supply chains and enhancing resilience in state-owned logistics enterprises, acknowledging their pivotal contribution to Namibia's logistics industry. The chapter presented a research challenge that emphasized the need to examine the correlation between SCI and resilience in the context of state-owned logistic firms in Namibia. The research specifically focuses on the Port of Walvis Bay. The study delineated its objectives to enhance comprehension of the relationship and provide perspectives for amplifying the resilience of state-owned logistics enterprises. Additionally, the chapter presented a comprehensive outline of the structure and content of the dissertation, establishing the framework for the following sections. The study elucidated the importance of its findings, encompassing both scholarly advancements and practical implications for the logistics sector in Namibia. The chapter acknowledged the dearth of research in the literature and emphasised the significance of addressing this gap through meticulous empirical research.

Chapter One laid out the fundamental underpinning for studying the research subject matter, objectives, and rationale. The chapter provided a clear framework for the research. It highlighted the importance of examining the influence of SCI on the resilience of state-owned logistics enterprises in Namibia, with particular emphasis on the Port of Walvis Bay. The forthcoming chapters will comprehensively explore the literature review, research methodology, data analysis, and findings, culminating in providing valuable insights and recommendations to enhance the resilience of state-owned logistic enterprises in Namibia.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The global business landscape is characterised by increasing complexity, volatility, and uncertainty, necessitating organisations to build resilience in their operations. In the logistics industry, where supply chains are at the forefront of economic activities, the ability to withstand disruptions and maintain operations is crucial for sustainable growth and competitive advantage. As a result, the concept of supply chain resilience has gained significant attention in both academic research and industry practice. This section thoroughly examines the literature on the impact of SCI on the resilience of state-owned logistics enterprises in Namibia.

2.2 Background of Supply Chain Integration and Resilience

The competitiveness of supply chains has been considerably influenced by global business operations, which can be attributed to various factors, including technological advancements. Technology is evolving customer expectations and shorter product lifecycles (Gligor et al., 2019). Consequently, market demand volatility has increased, making it imperative to handle the unpredictability of supply chain operations proficiently (Alkahtani et al., 2021). Supply chain integration (SCI) is widely acknowledged as a crucial factor for organizations to efficiently traverse a continuously changing market environment (Flynn et al., 2010; Huo et al., 2019; Hussain et al., 2023). Increased levels of SCI promote improved communication and adaptability, making organizations nimbler. Recognizing the necessity for logistics firms to go beyond relying exclusively on Supply Chain Integration (SCI) in order to achieve long-term supply chain resilience is crucial. The literature must provide a coherent and uniform set of findings regarding the correlation between SCI and SCR, as indicated by Golan et al. (2020) and Ivanov and Dolgui (2020). The presence of non-linear interactions can be ascribed to multiple reasons, including risks and uncertainties, as highlighted by Lu et al. (2018) and Remko (2020 the significance of supply chain resilience (SCR) has been recognized by both

scholars and professionals in the business. It is an essential talent that allows organizations to anticipate, prepare for, and effectively handle supply chain interruptions (Gligor et al., 2019). Ali et al. (2022) state that resilient organisations can endure challenging and tumultuous circumstances, enhancing their competitiveness. The literature highlights several companies that have demonstrated resilience in disruptions. For instance, as Azadegan (2020) reported, Nokia could promptly shift to alternative suppliers during disruption. Similarly, de Oliveira (2021) notes that Cisco effectively responded to a tsunami and earthquake in Japan, showcasing its resilience.

Specific resilience experts have considered SCI to be one of the abilities that assist organisations in overcoming supply chain disruptions (Kang, 2018; Khanuja, 2021; Azadegan, 2020). Efficient information that flows throughout the network improves organisations' ability to react effectively (Balakrishnan & Ramanathan, 2021; Bejlegaard, 2021). However, there needs to be more investigation into the link between SCI and supply chain resilience. This study addresses a research gap by studying how supply chain resilience mediates the relationship with SCI. Previous research (Liu & Lee, 2018) looked into the relationship between integration and resilience; however, this study focuses on the influence of SCI on supply chain resilience measures and examines the impact of SCI on SRC measures. This research also examines the components of the SCI's internal, customer, supplier, and information dimensions and looks at how these dimensions of SCI impact supply chain resilience.

The study focuses on Namibian state-owned logistics enterprises operating at the Port of Walvis Bay. In the Namibian context, state-owned logistics businesses, the Port of Walvis Bay, transportation, and logistics are critical for commerce, industrialisation, socioeconomic development, and regional integration. Over the last two decades, the Namibian government has invested in transport infrastructure development to fulfil national demand and position Namibia as a logistical centre in the SADC. The transport and logistics industry now employs around 25,700 people, accounting for 3.6% of the workforce, and contributes 4.7% of GDP (National.Planning.Commission, 2017/18-2021/22). Despite global demand and industrial potential, Namibia's logistics industry has recently experienced substantial risks (Bermes, 2021; Belhadi et al., 2021). The effects of the COVID-19 pandemic, economic growth challenges, decreased consumer demand, dropping commodity and oil prices, increasing

electricity costs, a lack of stated investment plans, adverse business environments, and an unfavourable currency rate are among the risks at stake Because of these problems, port throughput was reduced, and the country's ecosystem was left vulnerable Namibia's logistics businesses need to be more resilient since the country ranks 118 out of 130 in the 2017 Resilience Index Annual Report. This study focuses on understanding the impact of SCI on the resilience of state-owned logistics enterprises in Namibia, specifically in the Port of Walvis Bay. The transportation and logistics sector is vital for Namibia's development and regional integration (see Figure 2, 1). However, the sector has faced challenges, and there is a need to overcome disruptions and improve competitiveness. By exploring the relationship between SCI and resilience, this study aims to provide insights and recommendations to strengthen the resilience of state-owned logistics enterprises in Namibia.

Figure 2.1 Transport and Logistics Strategies

Source: Adapted from 5th National Development Plan (NDP5) 2017/18-2021/22,p.40

In order to remain competitive in Namibia's logistics market, businesses must build strong supply chain capabilities. As a result, including supply chain resilience as a mediator becomes essential, especially in this study. The continuing research is intended to benefit the logistics industry in Namibia and other emerging countries. Furthermore, the research intends to add to the scarce knowledge of supply chain resilience in developing countries with limited resources. Despite the significant presence of developing countries in global supply chains and their exposure to systematic risks such as political volatility, corruption, inadequate infrastructure, and unethical business practices, Huo et al. (2019) report a need for empirical research in this specific study area. As a result, this study's objective is to address that research gap.

Supplier integration (SI) and customer integration (CI) are crucial to SCI Namibia. Supplier integration measures manufacturer-supplier's collaboration in capacity planning, demand forecasting, inventory management, replenishment, and material flow. In contrast, CI involves producers and customers working together on demand forecasting, production planning, order tracking, and product delivery (Piprani et al., 2020). SCI's primary goal is to unify a supply chain business process competitive advantage. Huo et al. (2019). Scholars and practitioners have stressed the importance of supply chain partner integration and cooperation (Piprani et al., 2020; Cui et al., 2022). Some studies (Huo, 2019; Piprani et al., 2020) have shown contradictory empirical results on the link between SCI and performance. These inconsistencies might be related to differences in the conceptualisation of SCI utilised in various research. Huo et al. (2019) (and Chunsheng et al., 2020) divided SCI into multiple constructs, such as internal, supplier, and customer integration, but other empirical studies approach SCI as a single concept.

According to the Resource-Based View (RBV) theory often used to analyse the link between SCI and supply chain performance (SCP) (source), having plentiful, limited, and imitable resources may not be enough to maintain competitiveness in a dynamic and chaotic environment. Instead, manufacturers must modify their supply chain strategy to be more responsive. Consequently, the RBV explanation may need to explain thoroughly how SCI leads to SCP, particularly given the conflicting findings in earlier research (Piprani et al., 2022). A key research topic is the influence of SCI on the resilience of state-owned logistics

firms in Namibia's Port of Walvis Bay. The logistics business in Namibia is critical to commerce, industrialisation, and regional integration. Understanding the link between SCI and resilience in this situation requires the addition of supply chain resilience as a mediator. The research aims to add to the little literature on supply chain resilience in developing countries by providing significant insights into the logistics industry in Namibia and other developing countries. The research will explain how integration promotes resilience by investigating SCI factors such as supplier and customer integration. Furthermore, the research recognises the RBV theory's inadequacies in describing the SCI-SCP link and tries to shed light on this.

2.3 Supply Chain Integration (SCI)

SCI, as shown in Figure 2.2 of the conceptual framework of this study, entails bringing together and organising the many aspects of a supply chain (Ishaq et al., 2022). According to Alzoubi et al. (2022), efficient operations involve stakeholder cooperation, coordination, and alignment. According to Frederico et al. (2021), the central purpose of SCI is to build a unified business process across the supply chain, which may serve as a competitive advantage. According to Reid and Sanders (2019), SCI is the long-term goal of a company to build alignment and interconnection with its supply chain partners. The convergence of manufacturers, distributors, suppliers, and consumers facilitates improved supply chain coordination. Reid and Sanders (2019) state that a mapping framework links a manufacturing company's operations and information systems to its suppliers, significant supply chain partners, and consumers. However, establishing integration in the supply chain resulted in separate material flow periods. Financial flows include payments to suppliers and subcontractors for products and services and consumer fees when acquiring the final product from retailers.SCI is divided into various dimensions:

Internal Integration (IIn) is the coordination of several departments inside an organisation, such as procurement, manufacturing, marketing, and finance, which is called internal integration. It lets managers get precise information on client orders, production plans, work-in-process items, inbound and outbound products, and financial and accounting data (Shakeel et al., 2018; Cui et al., 2022). Internal integration increases internal process efficiency, reduces disruption risks through cross-functional collaboration, enables

organisational responses to market changes, improves supply chain transparency, and manages unforeseen risks through collaboration with upstream and downstream partners (Alzoubi et al., 2022; Chunsheng et al., 2022).

Supplier Integration (SI) is the cooperation of manufacturers and suppliers in capacity planning, demand forecasting, inventory management, replenishment, and material flow (Cui et al., 2022). Piprani et al. (2020), SI entails managing suppliers and creating long-term solid connections. Supplier integration involves collaborating closely with major suppliers to jointly develop business processes and address challenges in order to achieve strategic benefits (Qu & Liu, 2022). When companies engage and integrate their resources with suppliers, it broadens their innovation potential. Suppliers play a significant role in enhancing information-sharing capabilities among supply chain partners, promoting environmental collaboration, eliminating information imbalances, and enhancing environmental practices within the supply chain (Pham & Pham, 2021). Close collaboration and information sharing with suppliers reduce uncertainties and risks, enabling companies to rapidly develop products and enter emerging markets, especially given the data-intensive nature of green innovations (Lau et al., 2010). To effectively manage information related to environmentally friendly practices, companies must employ high-capacity information processing systems. Consequently, businesses need to work closely with their suppliers, offering support, guidance, and sharing expertise and knowledge to assist them in adopting more environmentally sustainable practices (Chiou et al., 2011)

Customer Integration (CI) is the degree to which manufacturers and their customers collaborate in demand forecasting, production planning, order tracking, and product delivery choices (Alzoubi et al., 2022). It promotes mutual understanding, collaboration, and coordination among supply chain partners. According to Wu (2013) and Wong et al. (2020), customer integration improves knowledge sharing, dispute resolution, and innovation, eventually enhancing organisational performance (Piprani et al., 2020; Lee, 2021; Kulp et al., 2004; Lee & Wang, 2004; Rai et al., 2006). Collaboration and information sharing enhance closed-loop procedures and logistics planning activities. When information capacity is expanded, it helps to identify and shape customer preferences. This extra information can enhance eco-friendly product design, packaging, and logistical operations (Wong et al., 2020).

Information integration (II) is the degree to which a corporation communicates data relevant to its supply chain operations with its channel partners. It is called information integration. (de Vass, 2018; de Oliveira, 2021). It entails exchanging sales, inventory management, manufacturing, and delivery schedules throughout the supply chain. Information integration is critical to good supply chain management and may be aided by technologies like the Internet of Things (IoT) for data collection and exchange. SCI greatly influences the durability of state-owned logistics firms. SCI improves an organisation's capacity to react to market changes and adapt to changing circumstances by fostering stakeholder coordination and communication. It increases agility, flexibility, inventiveness, and robustness, increasing operational resilience. Internal and external aspects must be considered to establish a balanced approach to resilience development.

SCI is critical for the long-term viability of Namibia's state-owned logistics firms in Walvis Bay. It allows for better collaboration and communication across stakeholders, resulting in more agility and response. Internal, supplier, customer, and information integration are critical to organisational resilience. However, a thorough evaluation of internal and external elements is required to minimise overdependence and control possible disruption risks. To generate more solid results and insights, more studies are required to investigate Namibia's particular setting and state-owned logistics enterprises.

2.3.1 Port Supply Chain Integration

The integration of supply chains in ports, commonly called Port Supply Chain Integration (PSCI), is essential in enhancing the efficiency and cost-effectiveness of port operations. As noted in the literature (World Bank, 2019), port resilience has multiple beneficial effects, as per the report by the port. Rotterdam. In 2020, implementing PSCI enhanced risk management practices by offering a comprehensive outlook of supply chains. This, in turn, empowers ports to recognise and alleviate probable risks. The network's flexibility is improved through the effective response of ports to changes in demand or supply, achieved by diverting cargo to other ports within the network. Furthermore, the field of Political Science emphasises the importance of cooperation among stakeholders within the port supply chain, resulting in enhanced decision-making processes and more efficient allocation of resources.

The effective functioning of ports necessitates their integration into the wider supply chain. The concepts of intermodalism and organisational integration in port supply chains have been highlighted by scholars such as Han (2018) and the World Bank (2019). Successful integration necessitates utilising information technology (IT), incorporating value-added activities, and implementing lean and agile logistics practices. According to Han (2018) and the World Bank (2019), ports must demonstrate efficient communication, waste reduction, cost minimisation through Just-in-Time methodologies, interconnectivity, infrastructure and operational interoperability, and delivering value-added services to augment customer contentment. The scholarly literature has presented measurement indicators to evaluate the effectiveness and resilience of ports. Panayides (2017) and Marlow and Paixao (2003) have identified several indicators encompassing operational systems, infrastructure resources, and logistical objectives. These indicators include reliability, information processing, cost-effectiveness, efficiency, and adaptability. Ports are widely acknowledged as crucial elements of supply chains, as they enable the convergence of various modes of transportation and provide value-added logistics services. Various scholars have indicated that while SCI within the port industry has garnered considerable attention, there exist research lacunae that require further investigation (e.g. Carbone & De Martino (2003), Panayides & Song (2008), and Woo et al. (2013). Prior research has predominantly concentrated on investigating PSCI tactics and their influence on port efficiency without thoroughly analysing the fundamental mechanisms involved (Song & Panayides, 2008; Tongzon et al., 2009; Woo et al., 2013). It is imperative to systematically categorise diverse PSCI strategies and construct comprehensive assessment tools to gauge the extent of PSCI's influence on port efficacy.

This study attempts to address the gaps by introducing novel instruments for measurement that consider customers and suppliers operating within the Port of Walvis Bay. The study focuses on terminal operating companies (TOCs) as the most significant entities of interest and encompasses a variety of services rendered by the port. This study strives to enhance the existing body of knowledge on the subject of PSCI and its influence on the resilience of ports. The findings of this research are anticipated to provide valuable insights to port managers and other relevant stakeholders, thereby making a significant contribution to the academic literature.

2.4 Supply Chain Resilience

An organisation's capacity to recover after encountering setbacks by enhancing its operations is called supply chain resilience. (Meyer et al., 2020). Neboh and Mbhele (2020) define it as a supply chain's ability to anticipate and minimise unanticipated risks, effectively handle any interruptions, and swiftly return to its initial condition or adapt to a more favourable one. Improving supply chain resilience aims to improve customer service, market share, and financial performance. Regardless of the exact definition of SCRES, evaluating supply chain resilience requires considering two factors: product transportation resilience and typical delivery distance resilience. Resilience in supply chain management has been a scholarly topic for many decades, but its significance has grown in response to the instabilities and uncertainties caused by the COVID-19 pandemic (Chowdhury et al., 2021). Alfarsi et al. (2019) and Ali et al. (2021) agree on the need for supply chain resilience to incorporate solutions for fast resumption of operations after interruptions. Sources that highlight the most often recognised aspects of resilience in supply chain management include Sawyer and Harrison (2020) and Martins et al. (2021).

Sawyer et al. (2020) emphasise several resilience factors frequently cited in supply chain management, including collaboration, flexibility, redundancy, agility, integration and avoidance, sustainability, and logistics capability. Understanding and applying these elements are critical for developing a robust supply chain structure. These safeguards are fundamental in developing nations that are more vulnerable to supply chain disruptions.

The broad aims of this research are matched with contributions from academics to explore the influence of SCI on the resilience of state-owned logistics firms in Namibia, with a particular focus on the Port of Walvis Bay. This study aims to give valuable insights for improving the performance and efficacy of state-owned logistics firms in the face of disruptions and uncertainties by investigating the impact of SCI in strengthening resilience.

Resilience is a multifaceted and multidisciplinary notion crucial in supply chain management. Supply chain resilience necessitates measures such as integration and considering different resilience aspects. This study will help better understand the effect of SCI on the resilience of Namibia's state-owned logistics firms, notably at the Port of Walvis Bay. The study's results will give important insights and suggestions for improving the

resilience and overall performance of state-owned logistics enterprises in a demanding and dynamic business environment.

2.4.1 Collaboration

Collaboration is pivotal in attaining resilience and enhancing overall supply chain management within Namibia's Port of Walvis Bay. Supply chain collaboration relates to the engagement of external partners in developing and managing diverse value-added business processes (Ukiewska et al., 2021). Establishing risk sharing and cooperation is widely acknowledged as crucial in achieving competitive supply chain management, as evidenced by scholarly works such as those authored by Allan (2019) and Walker-Munro (2021). The attainment of cost savings, operational flexibility, and enhanced performance is contingent upon collaborative endeavours, including shared decision-making, resource-sharing, and information-sharing, as posited by Mofokeng and Chinomona (2019) and Łukiewska et al. (2021). The development of efficient collaboration in supply chain management is contingent upon establishing trust and commitment among its partners, as posited by Bhaskar et al. (2019). By cultivating a collaborative partnership and aligning shared objectives, organisations can effectively collaborate to improve supply chain transparency and ethical and environmental standards and mitigate risks associated with resistant supply chain elements (Al-Doori, 2019). Research has shown that a firm's performance can be significantly enhanced through collaboration within the supply chain

The importance of collaboration in attaining supply chain resilience cannot be overstated. The coordination and cooperation among entities within the supply chain enhance the overall system's resilience. According to Ukiewska et al. (2021), the collaborative efforts of supply chain partners in sharing information, aligning decisions, allocating resources, and creating collective knowledge can improve their capacity to address disruptions and sustain optimal performance levels. Collaborating can cultivate resilience within an organisation by promoting a proactive approach to addressing challenges and facilitating the necessary adjustments to supply chain processes. Effective information management and the optimal utilisation of information technology are imperative for successful collaboration within the supply chain, owing to its inherent complexities (Gu, 2021). The acquisition of IT integration skills has the potential to augment redundancy in the supply chain, albeit it may not

necessarily result in an improvement in flexibility. Hence, meticulous examination and analysis are imperative to comprehend the ramifications and interconnectedness of cooperation, information technology, and the robustness of the supply chain. Table 2.1 illustrates the SCR strategies as adapted from Perea et al. (2021). The Port of Walvis Bay acknowledges the significance of collaboration as a crucial element in attaining supply chain resilience and enhancing supply chain management. Through efficient collaboration, partners within the supply chain can augment their capacity to react to disturbances, enhance their overall performance, and collaborate towards shared objectives. Additional investigation is required to examine this milieu's fundamental constituents and interconnections of cooperation, information technology, and supply chain durability.

Table 2.1 Supply Chain Strategies

Supply Chain Resilience Strategies	Supply management	Backward integration, outsourcing, appropriate supplier selection, alternative transportation, multiple sourcing, supplier development, maintaining strategic stocks, buying instead of making (temporarily), effective contracting, local sourcing, order splitting, enhancing proximity to suppliers, procurement management, quality management, exclusive sourcing, inter-branch stock transfer
	Demand management	Creating customer flexibility, customer incentives, inventory management, product recalls, demand forecasting
	Information management	Risk communication, market intelligence, increasing product knowledge, improving visibility, using information communication technology

Source: Adapted from Perea et al. (2021), p.259

2.4.2 Flexibility

The ability of the Port of Walvis Bay in Namibia and its related supply chain to quickly and effectively react to unforeseen conditions and environmental changes is called "flexibility." The idea is integrally linked to resilience and is crucial for enabling port operations to respond to and recover from disruptions. Flexibility and resilience are connected since both deal with the capacity to respond to unforeseen events and shifting conditions (Ivanov & Dolgui, 2020; Cui et al., 2022). According to Jelicic et al. (2020), the Port of Walvis Bay needs the flexibility to adjust its production capacities, change product designs, and manage delivery adjustments in response to interruptions. The port may quickly modify its production levels and use various marketing strategies to meet the needs of its stakeholders and environmental circumstances.

Introducing various forms of flexibility could improve the Port of Walvis Bay's supply chain resilience. The strategies mentioned earlier include flexible order fulfilment, adaptable supplier networks, flexible work schedules, and transportation options that can be changed to suit changing conditions. They also include postponement strategies that allow for delayed decision-making. Stevenson and Spring (2018) and Chopra and Sodhi (2015) have examined these tactics. By incorporating these flexibility measures, the port is better equipped to adjust quickly to changing conditions during disruptions and maintain operations as standard. Agus (2018) asserts that the port's flexibility enables it to be swift and adaptive to changes in the supply chain environment, permitting prompt and rapid responses to disruptions. Being adaptable is seen as a risk management tactic by the port because it enables rapid answers to market changes and possible interruptions while minimising negative impacts on time, costs, and performance quality. Braunsheidel and Suresh (2019) and Mhelembe and Mafini (2019) have noticed this. The creation of flexibility in the Port of Walvis Bay's supply chain operations may help to increase supply chain resilience. This strategy helps the port to manage risks better, react to unanticipated occurrences, and increase overall operational effectiveness.

Utilising research tools like those developed by Fantazy and Kumar (2008) and Mhelembe and Mafini (2019) may make monitoring supply chain flexibility easier and analyse its relationship to strategy and performance. The techniques mentioned above highlight the relationship between flexibility and various elements of the supply chain environment.

According to Braunsheidel and Suresh (2019), implementing flexibility as a supply chain strategy helps ports effectively manage risks, adjust to market swings, and increase their operational efficiency and capacity to endure disruptions. It is impossible to stress the importance of flexibility in the Namibian port of Walvis Bay's supply chain resiliency. By exhibiting adaptability and flexibility in its operations, production capabilities, and delivery processes, the port can successfully react to unforeseen occurrences while serving the needs of its stakeholders and controlling disruptions. When flexibility is used as a risk management strategy, the port can quickly adjust to market changes, reduce possible risks, and improve the supply chain's overall resilience.

2.4.3 Redundancy

According to Singh et al. (2019), redundancy pertains to surplus critical resources, such as equipment, spare parts, or essential supplies, which can be utilised during disruptions or unforeseen circumstances. The excess inventory is a protective measure, enabling the port to sustain its activities in case of disturbances or insufficiencies. Implementing redundancy measures enables the Port of Walvis Bay to effectively alleviate the adverse consequences of unexpected occurrences, such as natural calamities or supply chain disruptions, and ensure the uninterrupted continuation of its activities. In order to assess the degree of redundancy in port operations, it is crucial to incorporate redundancy recovery strategies, real-time monitoring mechanisms, and visibility systems, as suggested by Singh et al. (2019). These measures aid in identifying potential vulnerabilities and guarantee that adequate redundancy measures are implemented to mitigate disruptions effectively. Through consistent monitoring and evaluation of the supply chain operations, the port can recognise opportunities for enhancing redundancy and proactively implementing measures to bolster its resilience.

Catastrophic occurrences like the COVID-19 pandemic in 2020 resulted in significant damage and financial losses for several industrial facilities, including ports (Shekarian &Parast, 2022). The COVID-19 pandemic has brought attention to the importance of incorporating redundancy in supply chains, given that the disturbances in global trade and logistics networks considerably impacted port operations. Ports with well-established redundancy systems were more adept at managing the obstacles presented by the pandemic

and guaranteeing the uninterrupted provision of their services. The Port of Walvis Bay holds significant importance as a primary entry point for global commerce in Namibia, thus necessitating the implementation of redundancy measures as a critical investment. The port can mitigate the likelihood of supply chain disruptions and mitigate the potential adverse effects on its operations by upholding excess inventory. The capability of a port to handle unforeseen circumstances that could impede the smooth flow of goods and services is contingent upon the availability of additional equipment, spare parts, and crucial supplies.

Furthermore, integrating redundancy strategies is consistent with the requirement for versatility and adjustability in managing supply chains. Implementing redundancy facilitates prompt and efficient responses by the port in the face of unexpected events, thereby reducing disruptions and enhancing the supply chain's resilience. Implementing this strategy enables the port to recuperate from any disturbances promptly, reinstate its standard procedures, and fulfil the requirements of its clientele and interested parties.

Redundancy is crucial in bolstering the resilience of the Port of Walvis Bay. The port can ensure operational continuity and mitigate the effects of disruptions by maintaining excess inventory and developing expertise in its utilisation during unforeseen events. In conjunction with other resilience factors, redundancy significantly enhances the overall strength and efficiency of the port's supply chain management. This enables the port to effectively respond to dynamic situations and sustain its competitive advantage in the global trade market.

2.4.4 Agility

Agility pertains to the capacity of a port and its associated supply chain to promptly and effectively react and adjust to any disturbances or modifications in the operational milieu. Achieving resilience is contingent upon agility, facilitating the prompt recovery and restoration of standard port operations following a disruption. The concept of flexibility pertains to the capability of an entity to conform and modify itself according to the situation at hand. On the other hand, agility takes this notion to the next level by underscoring the potential to recuperate and flourish amidst disturbances (Wieland & Wallenburg, 2019). Resilient supply chains, such as those operating at the Port of Walvis Bay, aspire to recover their former state and enhance their progress by assimilating knowledge from the disruption.

According to Dolgui et al. (2020), the concept of agility extends beyond the restoration of regular operations. Instead, it promotes the investigation of novel operating frameworks and methodologies that may offer superior effectiveness and efficiency. By adopting a flexible and adaptable approach, the port can modify its operational procedures, technological infrastructure, and overall business tactics to respond to shifting market conditions and effectively manage unforeseen challenges and disturbances. From a practical standpoint, achieving agility at the Port of Walvis Bay may necessitate implementing various practical measures. The feature may encompass the capacity to swiftly readjust operations and resources to accommodate fluctuating demands or unforeseen circumstances. This could entail various measures such as resource reallocation, schedule adjustment, shipment rerouting, or alternative transportation implementation. Agility encompasses efficient communication and decision-making mechanisms, facilitating stakeholders' swift and efficient coordination in the face of disruptions. Implementing agile practices enables the Port of Walvis Bay to mitigate the effects of disturbances, diminish periods of inactivity, and sustain operational continuity. The agility attribute enables a port to capitalise on opportunities, promptly adapt to dynamic market conditions, and sustain competitiveness amidst unpredictable circumstances. This feature facilitates the port's ability to adjust to emerging trends, technological advancements, and evolving customer preferences, enhancing its prospects for sustained prosperity and durability.

2.4.5 Agility, Postponement, and Information Management

A port's efficient and effective operation and integration into supply chain management are influenced by crucial factors such as agility, postponement, and information management. Magagula et al. (2020) define *agility* as the capacity of a port to promptly and adaptively react to alterations and uncertainties in the commercial milieu. Due to the uncertain and variable nature of demand conditions, the port must exhibit agility in resource allocation and operational adjustments to its customers' changing demands effectively.), Attaining relevant skills and the amalgamation of enterprises and a skilled labour force is essential for attaining agility (Leask & Ruggunan (2021; Makudza et al. 2023. Adopting an agile approach enables the port to respond effectively to dynamic market conditions, enhance its resource allocation strategies, and optimise its overall operational performance.

A *postponement* is a strategic approach implemented by the port to augment the fulfilment of customer availability requirements, as noted by Shukor (2021). The postponement in the supply chain refers to the deliberate delay of certain activities or processes until there is a greater degree of accuracy and specificity in the customer's requirements. The implementation of postponement strategies can result in a reduction of lead times, a minimisation of inventory holding costs, and an improvement in port customer satisfaction. Customising and tailoring services by the port to customers' specific requirements are instrumental in enhancing operational efficiency and responsiveness.

Celikkol and Yikilmaz (2021). Have observed that the successful incorporation of a port into supply chain activities is highly dependent on efficient information management. Efficient information management involves using communication systems and information technology to enable seamless coordination and collaboration among many stakeholders in the port and the broader supply chain. The integration enables the harmonization of plans between port authorities and logistics principles, enhancing the efficiency of the movement of goods, services and information. Through the utilisation of information management systems, the port has the potential to optimise its efficiency, transparency, and visibility throughout its operations, ultimately resulting in enhanced overall performance. Furthermore, incorporating value-added practices, such as agility, postponement, and information management, can decrease costs and enhance the overall effectiveness of the port, as suggested by Notteboom et al. (2021). Ports play a crucial role in supply chain management by enabling the integration of diverse transportation modes. Implementing logistics-centred approaches to evaluate port performance and integrating value-added logistics activities can improve the port's efficacy and harmonise its tactics with supply chain management demands. The successful integration of the Port of Walvis Bay in Namibia into supply chain management requires the implementation of critical factors such as agility, postponement, and information management. The agility attribute empowers the port to promptly and adaptively react to alterations.

In contrast, the postponement strategy facilitates tailoring services to meet customers' requirements. Effective information management ensures seamless coordination and collaboration among stakeholders. By integrating these tactics, the port has the potential to

optimise its operational efficacy, reactivity, and all-around performance within the broader scope of the supply chain.

2.4.6 Supply Chain Agility and Robustness

Establishing a resilient supply chain that can effectively respond to diverse challenges heavily relies on implementing supply chain agility and robustness. The term *supply chain agility* pertains to the ability of a supply chain to quickly and effectively respond to changes in its environment, as noted by Fadaki et al. (2020). The concept comprises two crucial elements, namely visibility and velocity. The concept of visibility pertains to transparency in exchanging information among stakeholders within the supply chain. Meanwhile, velocity denotes the pace at which goods or services traverse the supply chain (Kumar, 2019; Zhao & Wang, 2019 ;). The supply chain gains greater agility by augmentation of visibility and acceleration of velocity, facilitating prompt responses to alterations and disturbances.

Conversely, the concept of supply chain robustness pertains to the capacity of the supply chain to persist in operation despite both external and internal disruptions (Miroudot, 2020). The quantification of this phenomenon can be achieved by evaluating two fundamental dimensions, namely resistance and resilience. The concept of resistance in the context of supply chain management pertains to the ability of the supply chain to endure disruptions. In contrast, resilience pertains to its capacity to mitigate vulnerabilities and implement appropriate remedies when faced with hazards. This is supported by the works of Lumineau and Oliveira (2020) and Kumar (2019). A resilient supply chain is distinguished by its ability to anticipate and prevent potential risks and its capacity to implement alternative strategies to alleviate potential disruptions. According to Fadaki et al. (2020), empirical evidence indicates a significant correlation between the resilience of a supply chain and its agility and robustness. A supply chain that is considered resilient is characterised by its ability to react efficiently and adjust to external disruptions. The Port of Walvis Bay can bolster its capacity to endure and recuperate from disturbances, guaranteeing the uninterrupted movement of commodities and amenities by enhancing its supply chain agility and robustness.

It is noteworthy that despite the widespread discourse on supply chain agility and robustness, more empirical evidence must be found to establish a correlation between these factors and the supply chain's resilience. Additional investigation and empirical analyses are required to

furnish conclusive proof within the framework of the Port of Walvis Bay and the management of supply chains.

2.5 Resilience for Port Disruptions

Adapting and recovering from port disruptions is paramount in efficiently managing supply chain operations, highlighting the significance of resilience. Namibia‘s port is a crucial contributor to the facilitation of trade and transport operations in the region. Therefore, it is imperative to ensure resilience measures are in place to mitigate disruptions and sustain economic activities. Wei et al. (2020) investigate the application of the resilience concept in the Port of Walvis Bay context. The concept of static economic resilience in the context of the Port of Walvis Bay pertains to the capacity of the port and its affiliated businesses to effectively allocate their existing resources in the face of a disturbance. The ability to maintain operations to the best of their capacity despite encountering challenges indicates the resilience exhibited by these entities. In the case of a port shutdown or disturbance, it is imperative for the port and its associated parties to efficiently handle their resources, including labour, equipment, and infrastructure, to minimise the effects of the disturbance and ensure the uninterrupted continuation of business operations (Rose et al., 2021). This may entail reallocating resources, operational adjustments, and implementing contingency plans to mitigate potential disruptions to the port's operations.

The Port of Walvis Bay's supplier-side resilience pertains to its capacity to maintain service provision and deliverables to its clientele despite potential disturbances. The process entails the preservation and upkeep of the port's operational capability, the execution of contingency measures, and the establishment of alternative systems to mitigate the effects of the disruption on the supply chain. To sustain its customer base, which includes shipping companies, importers, and exporters, the Port of Walvis Bay must maintain a resilient infrastructure, optimise logistics operations, and establish reliable communication channels. By preserving supplier-side resilience, the port can reduce interruptions in transporting commodities and amenities, thereby lessening the adverse effects on commercial operations. Enterprises that depend on the Port of Walvis Bay may implement diverse adaptive strategies to address any disturbances in their import or export activities, as perceived by their

customers. Mitigating the effects of the disruption may entail identifying substitute transportation routes or modes, modifying production timetables, broadening the range of suppliers, or adopting inventory management tactics. Other entities in the broader supply chain, which experience indirect ramifications from the port disturbances, may implement adaptive strategies to sustain their activities and mitigate potential disruptions. Collaborative endeavours and proficient communication among stakeholders within the supply chain are paramount in managing disruptions and identifying alternative solutions. To bolster resilience at Namport, port authorities, enterprises, and stakeholders involved in the supply chain must thoroughly comprehend the diverse options and strategies available for enhancing resilience and implement them effectively. The investigation by Rose and Wei (2013) and Rose et al. (2021) can offer significant perspectives on these alternatives and facilitate the recognition of effective methods for proficiently handling port disturbances. The Port of Walvis Bay and its associated supply chain can manage and mitigate disruptions by improving resilience and preparedness.

2.6 Managing Supply Chain Resilience by Using Industry 4.0 Concepts

Industry 4.0, often known as the fourth industrial revolution, is a brand-new economic frontier that can impact several sectors and revolutionise how goods are created and marketed (Tiwari, 2020). Adopting cutting-edge information and communication technologies is required to allow intelligent networking of goods and processes across the value chain (Ivanov et al., 2019). Adopting the Industry 4.0 idea is crucial to improving supply chain resilience, such as the Port of Walvis Bay. The emergence of an internet presence and urbanisation trends have highlighted the need for effective urban logistics (Celikkol & Yikilmaz, 2021). However, weather, traffic congestion, and IT failures may all disrupt urban logistics, forcing quick adaptability within the supply chain (Celikkol & Yikilmaz, 2021). Industry 4.0 promotes the creation of intelligent systems capable of self-adapting and evolving while utilising human inputs without continual management and monitoring (Ivanov et al., 2019). These intelligent systems enable cross-organisational communication and problem-solving to relieve disturbances and avoid future concerns (Ivanov et al., 2019). The integration of the Internet of Things (IoT) is a critical component of Industry 4.0. IoT provides digital connectivity and real-time information exchange of supply chain equipment,

devices, and processes (Ivanov et al., 2019; Jacome, 2021). The Port of Walvis Bay may use IoT technology to improve visibility and data collection on numerous operations, allowing stakeholders to make informed choices and react quickly to disruptions (Ivanov et al., 2019). Collaboration and compatibility between supply chain partners are critical for successful resilience (Shukor, 2020). The Port of Walvis Bay may boost collaborative supply chain operations using Industry 4.0 concepts such as seamless data sharing, real-time communication, and coordination (Shukor, 2020). This cooperation and improved visibility increase the speed with which the supply chain can respond to disruptions and return to its original form (Ralston & Blackhurst, 2020).

Furthermore, IT integration may improve the Port of Walvis Bay by enabling real-time monitoring, fast reaction, and decision-making during interruptions (Sohal, 2020). The port may successfully use the Industry 4.0 concept and react swiftly to disturbances by embracing IT integration across the capabilities management process (Sohal, 2020). Adopting the Industry 4.0 concept at Namibia's Port of Walvis Bay may improve supply chain resilience by using IoT, encouraging cooperation and compatibility among partners, and integrating IT systems. These initiatives improve visibility, optimise operations, and improve the supply chain's reaction to interruptions, eventually enabling the smooth flow of commodities and economic activity in the area (Vandalia et al., 2021; Wang et al., 2020).

2.7 Information and Communication Technology ICT in Supply Chain Management

Utilising (ICT) within the supply chain management domain is paramount in bolstering the resilience of enterprises, such as the Port of Walvis Bay, located in Namibia. ICT facilitates the ability of companies to tackle obstacles and arrive at well-informed strategic determinations through capturing, gathering, and analysing data (Sodero et al., 2019; Bimha & Munapo, 2020). Implementing ICT has been observed to enhance the flexibility of supply chain management, affecting multiple facets such as product development, manufacturing, and logistics (Hosseini & Ivanov, 2019; Karmaker & Ahmed, 2020; Yadav, 2020). Incorporating blockchain technology in supply chains can improve resilience by facilitating a pre-emptive and proactive strategy toward risk management, thereby mitigating the effects of unforeseen disruptions (Dutta, 2020; Walker & Muno, 2020).In order to optimise the advantages presented by digital technologies, organisations must integrate them with

professional recruitment and training of their human capital (Elibal & Ozceylan, 2020; Hosseini & Ivanov, 2019; Samson, 2020). According to Kostiuchenko (2020), using E-Business systems enables companies to enhance their service quality and competitiveness by providing access to support from multiple locations at any given time. This optimises the effectiveness of supply chain procedures and promotes customer engagement.

Even with the increased availability of information, effectively obtaining, organising, interpreting, and distributing such information continues to pose a significant challenge (Sodero et al., 2019). Consequently, striving to optimise ICT capabilities and maximise the value derived from data is imperative. According to Zhou et al. (2020), empirical evidence suggests that the integration of ICT in logistics operations can lead to improved operational and financial efficiency through the facilitation of customer collaboration. Furthermore, the provision of supportive policies by the government can enhance the favourable outcomes of customer involvement in operational achievements.

The utilisation of ICT in supply chain management is of great importance as it facilitates decision-making based on data, proactive management of risks, and improved operational efficiency. Using digital technologies such as blockchain and E-Business systems can bolster the Port of Walvis Bay's ability to withstand disruptions and optimise its supply chain operations.

2.7.1 Technological Context

According to a study by Jere and Ngidi (2020), several theoretical frameworks suggest that technology plays a crucial role in determining the acceptance of new technological innovations. Baker (2019) argues that organisations require a robust IT infrastructure, technically skilled staff, and a user-friendly system to adopt new technologies effectively. Knowledgeable organisations in technology are more likely to implement advancements. An organisation's technological adoption level is influenced by its existing infrastructure (Joseph & Ngedi, 2020). However, it is emphasised that technological competency goes beyond maintaining competitiveness; it also requires the right equipment and a creative and knowledgeable workforce (Baker, 2019).

State-owned logistics enterprises have relative advantages in employing ICT, as highlighted by the business benefits derived from its utilisation. The adoption of ICT is influenced by

various factors, including financial benefits (Chiu et al., 2019). According to Chiu et al. (2019), comparative advantage significantly affects ICT adoption. The CEO and management should consider factors such as compatibility and complexity when evaluating the viability of new technology. Management's perception of technological feasibility and its impact on business processes plays a role in technology adoption. More complex innovations will likely be gradually embraced due to concerns about risks and potential abandonment (Abualrob & Kang, 2019). Logistics service providers are vital in helping online retailers enhance consumer order fulfilment. They facilitate communication between online retailers and various logistical organisations, utilising hub features to connect flow and operations throughout the supply chain (Duong, 2020)

2.7.2 Organisational Context

The organisational context, which encompasses factors such as inter-firm communication, employer-employee relationships, business size, and resource availability, influences the characteristics and accessible resources of an organisation, thus impacting its decision-making process (Fernando et al., 2022). Within this framework, supply chain management plays a vital role by employing SCI and performance to establish connections between the company and its customers. The adoption of technology in an organisation is influenced by its scope, scale, and managerial support for organisational strategies and objectives, particularly in state-owned logistics enterprises where the influence of CEOs is significant (Mawet, 2020). Djatikusumo (2019) suggests that small and medium enterprises (SMEs) adopt new ICTs when understanding the potential benefits and can minimise associated risks. Increased need for financial resources, often resulting from inefficient organisational governance, poses a challenge for state-owned enterprises (Djatikusumo, 2019).

The availability of financial resources is considered a significant factor in adopting new ICTs, according to research on ICT adoption (Dolgui et al., 2020). Furthermore, competitive pressure, external support, firm size, and knowledge of information and communication contribute to ICT adoption, although their significance may vary (Christopher et al., 2019). In the context of the port of Walvis Bay, these factors and influences shape the decision-making process and adoption of ICT, impacting the efficiency and effectiveness of logistics operations.

2.7.3 Environmental Context

The environmental context of the Walvis Bay pot includes factors such as the organisational structure, the presence or absence of technology services, and the monitoring of the internal and external environment (Ahmed, 2020). The firm's value chain influences the ecological aspects of supply chain management. Comparing the organisational life cycle, fast-growing companies tend to adopt more innovative technologies, particularly in low-performing industries (Djatikusumo, 2019). In contrast, mature and declining sectors are less inclined to adopt new technology. The regulatory authority, such as the Communications Regulatory Authority of Namibia (CRAN), plays a role in assessing the use of specific technologies to meet requirements (Braunsheidel et al., 2019). Government support is crucial in ICT adoption, especially for state-owned enterprises that often need more resources. Establishing laws and regulations and providing assistance are ways in which governments aid state-owned enterprises (Bimha & Munapo, 2020).

Organisational resilience is recognised as a competitive advantage, and research focuses on promoting and strengthening employee resilience (Leask & Ruggunan, 2021). The interest in employee adaptation and resilience stems from the need to develop organisational processes and infrastructure and ensure corporate sustainability, which relies on employees' ability to maintain performance levels (Roumpi, 2021). An agile and resilient workforce is crucial in innovative organisations, as it is quick to adapt to change and adaptable to new opportunities and market conditions (Muduli, 2020). Workforce agility and resilience have gained attention in the literature as part of organisational change and IT system deployment through the TOE (Technology-Organisation-Environment) theory (Jelicic et al., 2020). Employee adaptability is vital in corporate performance and change management, contributing to organisational agility and success (Muduli, 2020; Warner & April, 2019). Therefore, employee resilience and agility are critical factors enabling businesses to reorganise for survival.

2.8 The Design of the Supply Chain

The strategic setup of the supply chain plays a crucial role in guaranteeing its ability to withstand and respond to unexpected disturbances. The significance of resilience cannot be overstated, as it empowers the supply chain to aptly address any disruptions, thereby preserving its operational efficacy and output (Dabo, 2020). The supply chain framework at the Port of Walvis Bay comprises several levels: suppliers of raw materials, producers of components or parts, primary product manufacturers, storage facilities, distributors, and vendors. The hierarchical structure of the supply chain enables a smooth conversion of raw materials into final products and services. This process involves moving materials and fulfilling customer demands within the supply chain's upstream and downstream directions (Charles, 2020).

Given the fluidity of contemporary supply systems, the Port of Walvis Bay supply chain must demonstrate the capacity to adjust to disturbances stemming from diverse social and environmental factors. These rapid, ambiguous, complex, unpredictable, uncertain, and volatile disruptions require agile responses from the supply chain, as noted by Lumineau and Oliveira (2020) and Shukor (2020). The development of essential supply chain competencies is crucial for bolstering the resilience and responsiveness of the supply chain. The establishment and management of supply chain networks in a proficient manner, along with the ability to anticipate and respond to unexpected events or unfavourable situations, enhances the resilience and organisation of the supply chain (Gunjan & Badhotiya, 2019; Singh et al., 2019).

The Walvis Bay port has prioritised the integration of the complete supply chain, which was initiated by globalisation trends. The objective of this integration is to enhance the efficiency of resource allocation, promote the advancement of skills, and guarantee the continuous functioning of business operations. Effective and sustainable improvements in the production network necessitate the cooperation of scholars, stakeholders, and management entities involving all agents functioning within the network (Martins et al., 2022; Dwivedi et al., 2020).

The design of the supply chain plays a crucial role in promoting resilience, managing structural aspects, adapting to disruptions, cultivating essential supply chain skills, and fostering continuous improvement through collaboration, particularly in the Port of Walvis

Bay context. The undertakings mentioned above cumulatively enhance the productivity and proficiency of the supply chain, empowering it to overcome obstacles proficiently and adjust to fluctuations in the ever-evolving commercial landscape.

2.9 The Impact of COVID-19 on Logistics Companies' Supply Chain Resilience

The global dissemination of COVID-19 has resulted in substantial disturbances in ports worldwide, including the Port of Walvis Bay in Southern Africa. The epidemic has given rise to consecutive stages that have significantly influenced worldwide trading and logistical networks, impacting ports and their functionalities. At the onset of 2020, the implementation of lockdown measures in China, a significant global trading centre, resulted in a supply shock that curtailed production and caused disturbances in the labour force and industrial infrastructure (WHO, 2020a). The heightened demand and inventory diversion led to scarcities of crucial commodities such as medical equipment and pharmaceuticals, as reported by the World Health Organisation in 2020. The perturbations in the supply chain caused a reverberating impact on ports across the globe, including the Walvis Bay port.

The onset of the pandemic's second phase, which commenced in mid-March 2020, resulted in a worldwide demand shock, as Baschuk (2020) and the World Trade Organisation (2020) reported. Implementing lockdown measures on a global scale resulted in a decrease in worldwide demand. This can be attributed to decreased consumer and business confidence, which reduced retail activity (Baschuk, 2020). The demand reduction notably impacted various industries, including tourism and other service sectors dependent on transportation services. The Port of Walvis Bay experienced a direct impact on its operations and the transportation of goods due to the decrease in travel and tourism.

Ports enable global commerce by serving as entry points for transporting commodities across nations. The COVID-19 pandemic has caused a decline in shipping volumes, hindrances in cargo handling, and logistical predicaments, as reported by UNCTAD (2020). According to UNCTAD (2020), ports encountered various obstacles, including establishing employee health and safety measures, handling disturbances in worldwide supply chains, and guaranteeing uninterrupted transportation of vital commodities. Like many other ports,

Walvis Bay port faced a challenging situation due to the COVID-19 pandemic and the subsequent decrease in worldwide demand. The port had to modify its operations to counteract the effects of these disruptions.

The COVID-19 pandemic significantly impacted regional trade and connectivity in Southern Africa, notably in the Port of Walvis Bay. Based on the findings of the Economic Commission for Africa (ECA) in 2020, the curtailment of movement and reduction in trade in the movement of goods impeded endeavours towards regional integration. The Port is a crucial trade conduit for landlocked nations in Southern Africa. Any disruptions in its operations have far-reaching implications for the entire regional supply chain.

To address the challenges posed by the pandemic, ports globally, including the Port of Walvis Bay, have implemented various measures. The measures mentioned above encompass the implementation of health and safety measures, the digitisation of processes to facilitate operations that do not require physical contact, and the establishment of partnerships with relevant parties to guarantee the uninterrupted flow of crucial commerce (UNCTAD, 2020). The ability of ports to withstand and adjust to the challenges posed by the COVID-19 pandemic has played a vital role in sustaining commercial activities and promoting financial recovery in the Southern African region. The global outbreak of COVID-19 has caused significant disruptions to ports worldwide, including the Port of Walvis Bay in Southern Africa. The prevailing disturbances have been distinguished by disruptions in both supply and demand, leading to a decline in the transportation of goods and complications in the management of operations. The Walvis Bay port, being a crucial trade gateway, has encountered distinct obstacles in enabling regional trade and connectivity. Notwithstanding the challenges posed by the pandemic, ports have endeavoured to minimise its effects and maintain the uninterrupted flow of vital trade in the area by implementing measures aimed at bolstering resilience and adaptability.

2.10 Supply Chain Performance in Logistics Enterprises

Businesses are increasingly expanding their product and service offerings to provide more excellent consumer choices and opportunities to outperform the competition in today's business environment (Yang & Burns, 2019). This transition has prompted academics and supply professionals to focus on SCP (Yang et al., 2019). Yang et al. (2019) further suggest

that supply chain professionals must work together to respond to changing customer demands. More specifically, it is crucial to determine how proactive supply chain partners are and how they strive for sustainability (Schaltegger & Burritt, 2018). Supply networks are widely acknowledged as necessary for generating value. Only by improving the performance of a supply chain can something be valuable. When supply chain efficiency improves, value is created through better collaboration and organisation (Yang et al., 2019).

Mhelembe and Mafini. (2019) assert that longer delivery lead times, more significant inventory levels, higher production overheads, and more direct labour and material expenses are all contributing reasons that may impact production and delivery. Fu et al. (2022) define SCP as the execution of a set of functions within the supply chain. For the principal objective of serving the end customer's needs, supply chain efficiency is the supply chain's ability to carry out its tasks efficiently while lowering costs (Oduro et al., 2020). It is determined that key performance indicators (KPIs) in SCP assist supply chain professionals in monitoring the effectiveness and efficiency of multiple activities in the supply chain. KPIs for the supply chain might be limited to the organisation's supply network or can span the whole external supply chain network (Singh et al., 2019). Supply chain resilience primarily addresses transient disruptions (Mawet 2020). Supply chain resilience is anticipating unforeseen hurdles or unfavourable occurrences and adapting to disturbances while preserving network and structural management (Chih-Hung, 2021).

Dubois et al. (2019) examine the relevance of transport logistics service providers focusing on the supply chain when connecting suppliers, manufacturers, vendors, and customers. Dubois et al. (2019) contend that transportation logistics service providers should concentrate on supply chain and organisational performance. Supply chain efficiency is optimised when all chain partners use an inter-organisational and inter-functional strategic approach. This method improves the supply chain excess, making it accessible to all supply chain members to share (Butner, 2019).

2.11 Theoretical /Conceptual Research Model Development and Hypotheses Formulation

2.11.1 Theories Underpinning the Study

Due to the emergent nature of the themes found in the quantitative analysis, theorising is necessary to include additional pertinent ideas in the suggested framework. This research investigates the effects of SCI on the resilience of state-owned logistic enterprises in Namibia, focusing on the Walvis Bay port. The study draws upon various theories to achieve its objectives. These theories include Dynamic Capability, Resource Orchestration, Contingency, and Information Processing Theory, all of which will be discussed below. The purpose of this part is to examine how theories are formed during the creation of the conceptual framework by analysing the influence of SCI principles on resilience. Following Ralston and Blackhurst's (2020) findings, it has been established that theory plays a pivotal role in augmenting researchers' comprehension of their investigation. While the precise definition of theory may not always be readily apparent, it serves the purpose of discerning the interrelationships and regularities within the world, accentuating significant phenomena, and facilitating predictions for the future (Brunner, 2019).

The evolution of theories results from the diverse perspectives of researchers, which subsequently leads to the development, experimentation, and improvement of theories, concepts, and models (Archer & Harrigan, 2016; Brunner, 2019). Applying organisational theories has proved useful in comprehending and examining occurrences within particular domains by arranging arbitrary incidents into significant associations and progressions (Kumar et al., 2020). Within management disciplines or specialisations, grounded theory is stressed due to the requirement of identifying explanatory ways to comprehend and forecast occurrences (Kwasi, 2020), requiring a solid foundation in scientifically categorised theories (Spina et al., 2016; Kwasi, 2020). The supply chain management field is multifaceted, and its efficacy as an academic discipline is contingent upon the methodology employed, underscoring the necessity for a more thorough comprehension of supply chain management concepts (Lui & McKinnon, 2019).

In addition, supply chain management can leverage diverse management disciplines to enhance its efficacy, enabling it to attain parity with other well-established professions by

applying intricate theories derived from domains such as economics and management (Wynstra et al., 2019). The initial investigations in supply chain management were predominantly centred on theoretical inquiry. However, Bittner et al. (2019) and Elman et al. (2020) noted a substantial shift in this approach. The field of supply chain management has integrated various theoretical frameworks, including Dynamic Capabilities, Resource Orchestration Theory, Contingency Theory, and Information Processing Theory, to demonstrate a correlation between the fields of strategic management, economics, and organisational behaviour (Lui & McKinnon, 2019). Numerous literature studies emphasise the significance of creating and employing concepts in supply chain management research. This study employs various theoretical frameworks to examine the influence of SCI on the resilience of state-owned logistic enterprises operating in the Port of Walvis Bay, Namibia.
The theories mentioned above provide a theoretical underpinning for comprehending how implementing SCI practices can augment the resilience of logistics enterprises owned by the state when confronted with disruptions and uncertainties.

2.11.2 The Dynamic Capabilities Theory

The Dynamic Capabilities Theory (DCT) is a strategic management theory that emerged from the theoretical extensions of the Resource-Based View (RBV). It was first introduced by Professor David Teece and Pisano in 1994 and further developed in subsequent research studies (Teece et al., 1997; Jajja et al., 2018). This study elucidates how organisations can harmonise ostensibly incongruous mandates amidst a swiftly evolving environment (Sunder et al., 2019). Dynamic Capabilities Theory focuses on an entity's capacity to effectively incorporate, construct, and adapt internal and external resources in reaction to ever-changing market circumstances. This notion has been extensively explored by Teece et al. (1997) and Jajja et al. (2018).
Roumpi (2021) posits that the Dynamic Capability Theory suggests that organisations must possess inherent dynamism. This academic study focuses on the ability to adjust to changes in the business environment successfully. This is significant in nations with adverse labour conditions and political instability (Roumpi, 2021). According to Roumpi (2021), organisations can achieve a competitive edge by utilising the principles of Dynamic Capabilities Theory by integrating, generating, and rearranging their resources. According to

Jacome et al. (2021), the crucial factors for organisational success are innovation and the capacity to adjust promptly to environmental changes. The statement underscores the significance of dynamic capabilities that empower organisations to react and adjust to evolving market circumstances.

According to Rheude (2020), Dynamic Capabilities Theory has been acknowledged as a means of attaining a competitive edge and enhancing overall performance. The concept in question comprises a range of aspects, such as fluid resources, fluid procedures, fluid internal and external influences, and modular arrangements within organisational frameworks (Sunder et al., 2019). Nevertheless, procuring extensive access to the resources necessary for dynamic capabilities may entail significant corporate expenses. According to Mamedio et al. (2019), integrating processes and information systems through strategic alliances and inter-organisational integration can facilitate the efficient sharing of resources.

The utilization of Dynamic Capabilities Theory (DCT) has been implemented within the realm of supply chain management to comprehend the benefits of competition in a swiftly evolving milieu, as well as the organisational elements that foster expansion, as posited by Jacome et al. (2021). Due to the dynamic and frequent alterations in the current economic environment, Dynamic Capabilities Theory has been deemed appropriate for researching supply chain management, as Bleady and Flafrez (2018) and Joseph (2020) noted. Galvin et al. (2019) propose an alternative approach to mitigate the constraints of the resource-based theory. According to Teece et al. (1997), integrating and developing resource and capability portfolios through Dynamic Capabilities Theory enables firms to respond to dynamic environmental changes effectively.

Nevertheless, (DCT) also presents certain constraints. The theory in the debate has been subject to critique due to its unclear delineation, the challenge of evaluating its results, challenges in comprehension, and its lack of a clear framework for gauging competencies and their impact on organisational performance (Jacome et al., 2021; Winkelhaus & Grosse, 2020). The enhanced understanding and substantiation of the concepts of Dynamic Capabilities Theory and its practical application in business settings require additional academic collaboration (Winkelhaus & Grosse 2020).

DCT has been employed within SCI to examine the effects of various forms of visibility on the supply chain's resilience (Piprani et al., 2020). This claim posits that for organisations to

be responsive, they must reconfigure their supply chain practices and strive towards achieving closer integrations with both their suppliers and customers, as suggested by Jajja et al. (2018). Implementing Dynamic Capabilities Theory can potentially augment organisations' adaptability, value creation, and overall agility, leading to a more competitive and successful supply chain management framework.

2.11.3 Resource Orchestration Theory

The theory of resource orchestration holds significance in comprehending the optimal approach for managers to coordinate and deploy resources to attain competitive advantages. According to Asantea et al. (2022), the theory of resource orchestration suggests that managers must adeptly coordinate their resources to leverage their potential benefits fully. The concept mentioned above is an extension of the resource-based view framework, which posits that discrepancies in ownership of resources that are valuable, rare, difficult to imitate, and non-substitutable might explain the differences in the performance of entities.

Despite its significance, the resource-based view theory must provide adequate direction on the optimal deployment of resources to generate synergistic outcomes. According to Alam and Shankar (2020) and Cui and Zhang (2021), it is argued that the theory of resource-based view requires revision to accurately predict the most effective strategies for combining resources to achieve competitive advantage. Ding and Zhou (2022) have proposed a theoretical framework known as resource orchestration theory to address the identified inadequacy. This theory posits that integrating resources, capabilities, and managerial expertise is crucial to superior firm performance. The statement underscores the notion that the consequences of allocating resources are contingent upon the collective influence of the related resources in tandem with the central resource rather than the discrete effect of each resource.

Resource orchestration theory is a valuable framework for comprehending the allocation of resources and skills in the context of SCI and IT competency. As per the tenets of resource orchestration theory, the salience of SCI or IT proficiency is subordinate to the coherence and compatibility of these two interdependent variables. According to Wang and Yang (2022), combining information technology and supply chain activities can enhance a firm's operational efficiency. By ensuring the alignment of these factors, it is possible to generate

transactional efficiencies that can result in operational and strategic advantages. The discourse on resource orchestration can be improved by researchers who take into account that an organisation's capacity to enhance performance through complementary strategic assets is contingent upon the effective utilisation of crucial information technology competencies in conjunction with those assets (Asantea et al., 2022; Wang & Yang, 2022). Resource orchestration theory offers valuable insights into managers' effective coordination and deployment of resources, considering the interplay among different resources, capabilities, and managerial expertise. Investigating the influence of SCI and information technology competencies on the resilience and performance of state-owned logistic enterprises in the Port of Walvis Bay, Namibia, holds significant relevance.

2.11.4 Contingency Theory

The Contingency Theory, first proposed by Lawrence and Lorsch (1967) and Thompson (1967), posits that no universal best strategy for organising an organisation exists. The theory suggests that the effectiveness of various theories or approaches is contingent upon particular circumstances or contextual factors. That is, the most effective approach for an entity is contingent upon the different integration of internal and external parameters it encounters. Contingency theory claims that organisations must ensure that their structures and processes are aligned with their environment to optimise performance. The adaptability of an organisation's design and operations to the unique demands and challenges of its external environment is imperative. The environment is a crucial factor that significantly influences organisational structures and processes, encompassing suppliers and customers. The theory of structural contingency, as corroborated by Gupta and Singh (2023), Chandler (1962), Lawrence and Lorsch (1967), and Galbraith (1973), posits that the effectiveness of an organisation is contingent upon the degree to which its intended strategy is congruent with its structural design. The term "fit" is used in strategic management literature to describe the relationship between strategy and performance. The application of structural contingency theory to SCI posits that the attainment of optimal performance is contingent upon the alignment of particular facets of SCI with the overarching strategy and structure of the organisation.

Contingency and structural contingency theories propose that organisational success is contingent upon the capacity to identify and adjust to the necessities of the external milieu. By thoroughly comprehending an organisation's unique circumstances and ensuring the appropriate alignment of its structures, processes, and strategies, an organisation can optimise its performance and effectively utilise its internal capabilities in response to external conditions. Contingency theory asserts that a universal organisational strategy is non-existent, and the most effective strategy is contingent upon the particular context. The structural contingency theory emphasises aligning an organisation's strategy with its physical structure. Organisations can improve their performance and achieve greater alignment between their internal capabilities and external conditions by acknowledging and adjusting to the demands of the external environment.

2.11.5 Information Processing Theory

Galbraith's (1974) Information Processing Theory (IPT) states that organisations are considered open systems that effectively manage external uncertainties and disruptions within their supply chain. According to the discipline of Information Processing Theory (IPT), organisations are recommended to effectively handle disruptions by incorporating information processing requirements into their capacity to manage such disruptions. Amidst the COVID-19 pandemic, the heightened likelihood of supply chain disruptions has led to a surge in the need for efficient information processing. The utilisation of Information Processing Theory may provide insight into the effects of said disruptions on establishing durable resilience, as suggested by Modgil et al. (2021) and Dubey et al. (2021). The relationship between the demand for information processing and uncertainty and ambiguity within an organisation's operational context is significant. Bartnik and Park (2018) and Li et al. (2020) have noted that the effectiveness of information management is contingent upon factors such as volume and ambiguity. Per the principles of Information Processing Theory, developing resilient organisations is contingent upon aligning information processing demands and capabilities.

Digital technology is vital in enhancing the capacity to process information effectively. Prior studies have established that using digital technology to collect and evaluate data is crucial for enhancing information processing capabilities (Li et al., 2020). The integration of the

supply chain is an essential approach in this context. The integration of external entities, specifically, mitigates the requirement for extensive information processing by furnishing comprehensive data from partners in the supply chain (Bartnik & Park, 2018; Li et al., 2020). Furthermore, incorporating digital technologies across the supply chain amplifies information processing capabilities in upstream and downstream sectors (Lee, 2021). De Vries et al. (2021) and Dubey et al. (2021) have suggested that internal integration can enhance information processing abilities by facilitating efficient cross-functional information exchange.

Integrating Information Processing Theory (IPT) with supply chain management can enhance the efficiency and proficiency of organisations' information processing activities. Consequently, this can result in enhanced decision-making and increased efficacy of supply chain operations. Even with the increasing significance of SCI in bolstering resilience, there is a requirement for additional empirical investigation to ascertain the precise influence of SCI on resilience within Namibian state-owned enterprises. The identified deficiency in comprehension of this field underscores a crucial lacuna in the knowledge that necessitates redress to determine the influence of supply chain integration on the resilience of Namibia state-owned enterprises.

2.12 Conceptual Framework

The study involved the development of a conceptual model, as depicted in Figure 2.2. The model proposes four dimensions of supply chain integration as predictive factors. The types of integration included are internal integration, supplier integration, customer integration, and information integration. Supply chain integration serves as the mediating component, with resilience being the resulting variable. The study utilised five (5) hypotheses (H1 to H5) to establish the connections between interactions.

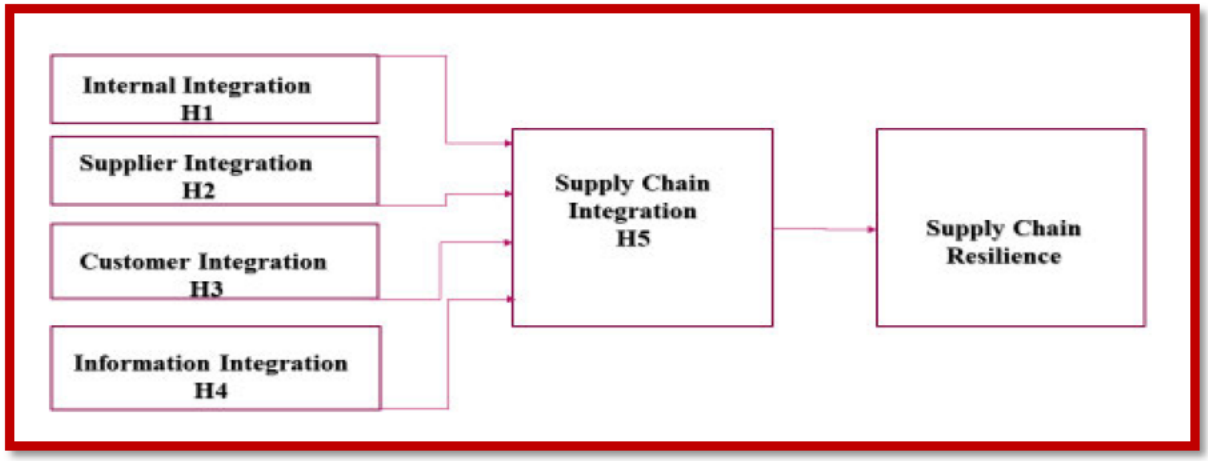


Figure 2.2 Conceptual Framework for SCI Impact on Supply Chain Resilience

Source: *Author's Compilation*

2.13 Hypothesis Development

The Dynamic Capabilities Theory (DCT) emphasises the significance of integrating business processes to effectively align and reconfigure resources in response to rapidly changing business dynamics (Helfat et al., 2020; Teece et al., 1997; Piprani, 2020). Several authors (Huo, 2012; Qi, Huo, & Yeung, 2017) have highlighted the significance of Supply Chain Integration (SCI) in driving company performance improvement. Internal integration (II) is the most pivotal kind of integration for enhancing business performance. Companies that have enhanced capacities are able to organize and cooperate among their many divisions more effectively. This enables manufacturers to distribute and enhance external knowledge obtained from suppliers and consumers. With integrative mechanisms within the organisation, state-owned logistics enterprises can improve their process efficiency and flexibility (Agyabeng-Mensah et al., 2019), logistics industries' flexibility (Chaudhuri et al., 2018), quality (Piprani et al., 2020), agility (Jajja et al., 2018) and delivery performance. Companies are better able to deal with interruptions, get back on their feet fast, and go about their business as usual when their supply chain networks are robust. The results that businesses achieve may be affected by this (Pettit et al., 2013; Shekarian & Parad, 2021). Damage increases as a firm's reaction time to turbulence increases, according to the literature (Gunasekaran et al., 2015). The rationale for this is that businesses may see a decline in performance as a result of these disturbances (Zollo & Winter, 2002; Blackhurst et al., 2005;

Zollo et al., 2016). Research on the resilience phenomena, as it relates to third-party logistics providers' service performance, has also been conducted (Cui et al., 2022; Liu & Lee, 2018 A). A favourable and statistically significant effect on service performance was discovered. To sum up, businesses that had higher SCR were better able to identify dangers and hazards. The researcher derived similar hypotheses, as detailed in the following sections, from the arguments presented above.

2.13.1 Internal Integration Dimension of SCI

Internal integration strengthens the coordination mechanism between functional areas, leading to better cross-departmental communication, business performance, and achievement of organizational goals (Noor & Pribadi., 2020). Furthermore, when companies wish to deal with supply chain disruptions proactively, it requires more II. A functional, internally integrated organization has a seamless, structured information flow across departments. This reduces the likelihood of disturbances. Long-term partnerships, open communication, trust, commitment, and shared risks and benefits characterize organizations willingly sharing information and expertise in an integrated supplier environment (Luo et al., 2023). Effective SI may aid in the reduction of product quality discrepancies (Quesado & Martnez, 2008). Risks and rewards would, in turn, enhance delivery time and product reliability. In turn, risks and rewards would improve delivery time and product reliability.

Furthermore, improved information exchange with suppliers can lessen the cost of holding more capital on inventories (Yu et al., 2013), allowing buyers to make operational decisions such as replenishment and delivery schedules (Ku et al., 2016). As a result, the flexibility and deliverability of the SCP are improved. Firms must align and synchronise their business processes and activities with their supply chain partners to improve the flow and continuity of supply chain operations (Luo et al., 2023). Under extreme turbulence, organizations can only respond to unexpected changes successfully through collaborative agreements among partnering enterprises (Flyn et al., 2010; Huo et al., 2019). Furthermore, collaborative partnerships with suppliers and consumers via an integrative capability can improve system transparency. This also helps the organization gain awareness throughout the supply chain network. As a result, businesses are better prepared to deal with any unexpected changes

ahead of time, allowing them to strengthen supply chain resilience. The researcher developed the following hypotheses based on these arguments:

H_{O1}: IIn has no positive impact on the SCI

H_{A1}: IIn has a positive impact on the SCI

2.13.2 Supplier Integration Dimension of SCI

Companies in an integrated supplier environment are aware of the benefits and hazards and are prepared to share information (Luo et al., 2023). There may be less variation in product quality if SI is effective (Kumar et al., 2020). Delivery time and product reliability would be enhanced as a result. In addition, it is easier for buyers to make operational decisions, including whether to restock and what materials to get, when there is improved communication between suppliers and themselves (Agyabeng-Mensah et al., 2019). (Huo et al., 2019). The SCP's delivery and adaptability have both improved. These reasons suggest that the edge is defined by commitment, sharing, trust, open communication, and long-term partnerships.

Ho_2: SI has no positive impact on the SCI

H_{A2}: SI has a positive impact on the SCI

2.13.3 Customer Integration Dimension of SCI

Customers can provide fresh, innovative and practical ideas for new product development as they specify their needs and requirements by clarifying the characteristics those products should have (Jajja et al., 2018; Huo et al., 2019). Competitive intelligence enables companies to infiltrate clients' organizations and gain a comprehensive understanding of their products, culture, and market. This knowledge empowers companies to address market demands effectively and with precision. This will aid in minimizing the necessity for rework and waste, which frequently arises from a lack of comprehension regarding consumer requirements. Customers' provision of precise demand information can significantly strengthen enterprises' ability to respond and adapt to market demands by improving the

accuracy of their forecasting (Flym et al., 2010; Huo et al., 2019). The hypotheses were created based on the arguments:

H_{O3}: CI has no positive impact on SCI

H_{A3}: CI has a positive impact on SCI

2.13.4 Information Integration Dimension of SCI

In order to ensure smooth and uninterrupted supply chain operations, enterprises must harmonize and coordinate their business processes and activities with their supply chain partners (Mandal et al., 2016). In situations of severe turbulence, organizations can only effectively address unexpected changes through collaborative agreements between the collaborating enterprises (Jutter & Maklan, 2011; Arsanvan et al., 2020). Moreover, establishing collaborative partnerships with suppliers and customers by leveraging an integrative capability helps enhance transparency inside the system. This also helps companies to establish visibility throughout the supply chain network. As a result, companies are more equipped to anticipate and handle unexpected changes ahead of time, allowing them to strengthen the ability to withstand disruptions in the supply chain. Based on this, hypothesis H4 was formulated. This study suggests a hypothesis that claims a statistically significant association between supply chain integration and the resilience of state-owned logistics enterprises.

H_{O4}: II has no positive impact on the SCI

H_{A4}: II has a positive impact on the SCI

2.13.5 Supply Chain Integration and Resilience

In supply chain management, the notion of resilience has the utmost significance. A resilient supply chain network can effectively absorb unforeseen interruptions and speed the restoration of regular operating circumstances, positively impacting a company's overall performance (Rajesh, 2021). Piprani et al. (2020) emphasise the need to react promptly to unstable occurrences, as any delay might worsen the harm suffered by a corporation. The

underlying cause for this phenomenon is that these interruptions might weaken a company's performance, as studied by Katsaliaki et al. (2021). Liu (2018) explored the correlation between resilience and service performance in third-party logistics (3PL) organisations. The findings of the study demonstrated a significantly favourable impact on resilience. Organisations with greater levels of supply chain resilience are better at recognising and reducing possible risks and threats. Thus, the study suggests a hypothesis that claims a statistically significant association between SCI and the resilience of state-owned logistics enterprises. Thus, the following hypotheses were formulated:

H_{05}: SCI has no positive impact on the supply chain resilience

H_{A5}: SCI positively impacts supply chain resilience

2.14 Mediation Analysis

The existing literature on (SCR) and (DCT) underscores the significance of efficiently combining and reconfiguring a company's resource base, enabling it to adjust and thrive in the ever-changing landscape of the corporate world. This, in turn, enables the company to attain a competitive edge in the market (Teece, 2014). The integration of supply chain strategies, commonly referred to as Strategic Supply Chain Integration (SSCI), is an approach that allows companies to achieve synergistic outcomes across their supply chain networks. Establishing collaborative relationships with supply chain partners is a viable means of achieving this objective (Ali et al., 2017). According to Narasimhan and Kim (2002), integrating activities throughout the supply chain network can improve capabilities in multiple areas, resulting in sustained performance for firms.

Furthermore, this integration enhances the long-term sustainability of the organisation. Nonetheless, depending exclusively on SCI in the contemporary business landscape may only sometimes yield enduring SCP. The significance of (SCR) is paramount in ensuring the prosperity and endurance of an enterprise, as highlighted by Ambulkar et al. (2015) and Hohenstein (2017). According to Chowdhury and Quaddus (2016), companies with resilient mindsets are more adept at anticipating and managing disruptions.

SCI is crucial for enhancing resilience against supply-chain disruptions and facilitating risk management in the corporate environment. Consequently, this results in enhanced financial gains, service efficiency, and a competitive edge, as demonstrated by research undertaken by Piprani et al. (2020) and Soni, Jain, and Kumar (2014). The study proposed hypotheses H1 to H5 to investigate the importance of resilience as a result of different types of spinal cord injury (SCI) and as a prelude to internal integration (II), supplier integration (SI), customer integration (CI), and information integration (II). According to this study, SCR functions as an intermediary variable in the association between different categories of SCI and the outcome above.

2.15 Resilience through Supply Chain Integration: Mechanisms, Strategies, Best Practices

This study aims to investigate the impact of SCI on the resilience of state-owned logistics enterprises in Namibia, explicitly focusing on the Port of Walvis Bay. The study explores various mechanisms, strategies, and best practices that can be employed to enhance resilience through effective SCI. These include fostering collaboration and coordination among stakeholders, promoting information sharing and visibility, building redundancy and flexibility into the supply chain, conducting risk assessments and developing contingency plans, managing supplier relationships effectively, embracing continuous improvement and innovation, and investing in training and skill development. By implementing these practices, state-owned logistics enterprises can improve their ability to respond to disruptions, mitigate risks, and ensure smooth operations within the supply chain, thereby enhancing their overall resilience.

2.16 Chapter Summary

This chapter presents a comprehensive literature review on SCI and its relationship with resilience. It introduces the concepts of SCI and resilience, emphasising their importance in today's complex business environment. The review explores different dimensions of integration, including internal integration, customer integration, supplier integration, and information integration, while discussing their associated benefits and challenges. Regarding

resilience, the chapter defines its dimensions and emphasises its significance in risk mitigation and continuity. It provides frameworks and models for assessing and measuring supply chain resilience. Through empirical studies and theoretical perspectives, the review reveals that integration enhances resilience by facilitating information sharing, visibility, agility, redundancy, collaboration, and flexibility among supply chain partners. Factors influencing the integration-resilience relationship, such as organisational culture and environmental uncertainty, are explored. Barriers to achieving integration and resilience are identified, highlighting the need for effective communication and stakeholder engagement. The chapter summarises critical findings, research gaps, and future directions, encouraging further exploration of the dynamic nature of the integration-resilience relationship and the role of emerging technologies and cultural factors. Overall, this literature review is valuable to practitioners and policymakers aiming to enhance supply chain resilience through effective integration strategies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The researcher carefully created a study to produce accurate and trustworthy results that address the research aims, objectives, and questions to comprehend the research topic. This research technique chapter describes theoretically and methodologically how the study solved a problem. Data collection, analysis, and source are among its methods. Thus, this research methodology chapter legitimises the study and yields scientific results. The precise plan keeps the researcher on track, making the procedure easy, effective, and manageable. The chapter allows readers to understand the approach and methods used to reach conclusions. The chapter provides a sound research methodology to help other researchers who want to replicate the study have enough information. The chapter provided the researcher with a specific plan throughout this study, helped select the correct methods for the research problem, and helped document what the study intended to achieve from the outset. This chapter covers the research philosophy, design, method, sampling strategy, and study site. Similarly, it explains the population, sampling techniques, sample, sample size, inclusion and exclusion criteria. The chapter discusses the data collection methods used for this study, data quality control measures, how the researcher analysed data, and the ethics that were considered and adhered to during this study. It ends with a summary. This study implemented the “research onion “(Saunders et al. 2019, p.179), depicted in Figure 3.1

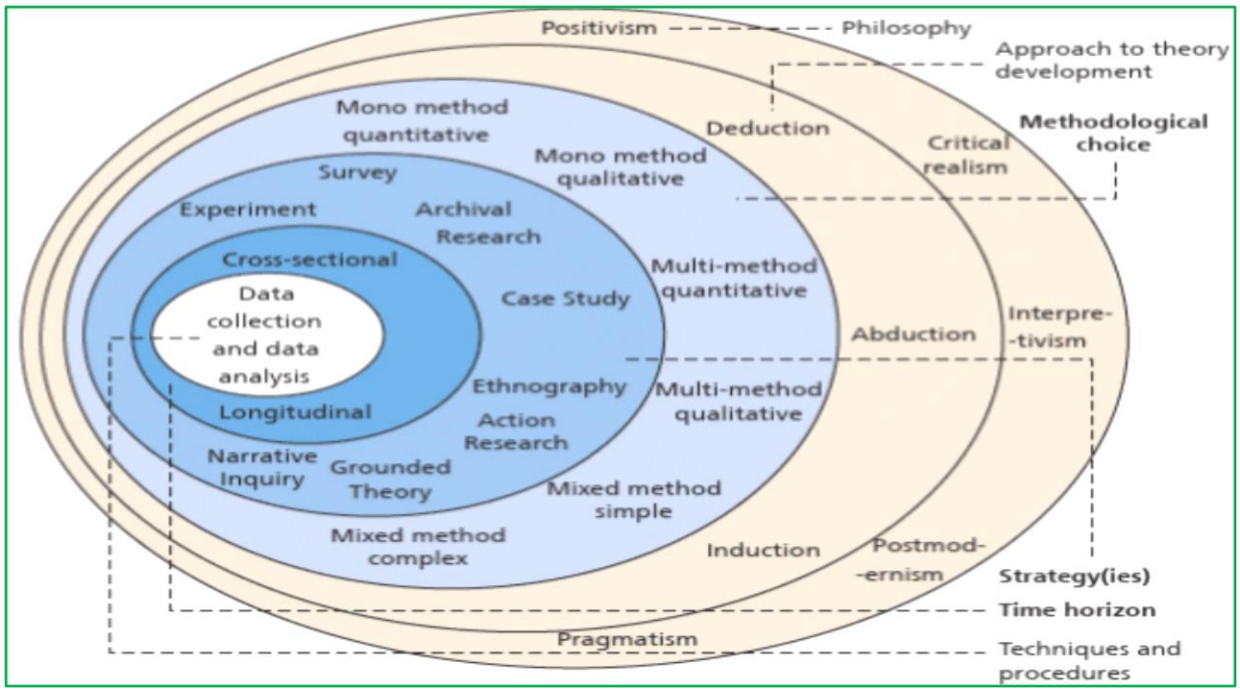


Figure 3.1 Research Onion Framework

*Sourc*e: Saunders et al. (2019, p179)

The research onion framework helped ensure coherence and rigour by meticulously approaching the various components of the research process. The framework provides a methodological structure that is consistent with the research objectives. Thus, this study employed a positivist philosophy and a deductive strategy for theory development. In addition, the research employed a mono-quantitative method for collecting data through a survey employing cross-sectional techniques.

3.2 Research Philosophical View

Research philosophy is the system of beliefs and assumptions about developing new knowledge that addresses a specific problem in a particular phenomenon (Saunders et al., 2019). The researcher had to develop a coherent set of assumptions that form a reliable research philosophy supporting the chosen technique, research plan, and data collection processes. It would enable the researcher to develop a well-organized study (Johnson &

Clark, 2006; Saunders et al., 2019). The study employed a positivist research paradigm in order to empirically examine predetermined hypotheses and establish the connections between the independent and dependent variables (Taylor & Milton, 2013). Positivist Social Science arose from a 19th-century school of thought by the Frenchman who founded and systematised the field of Sociology, Auguste Comte (1798-1857), and was later modified as Postpositivism by Social Science researchers and philosophers such as Emile Durkheim (1858-1917) and John Stewart Mill (1806-1873), amongst others. The factionist theory that describes positivism is based on a philosophical approach called logical positivism, which argues that study should be limited to what can be measured objectively, observable, and quantifiable phenomena. These authors, such as Durkheim and Mill, are among the factionist theories that describe positivism. Positivist researchers believe in empiricism and the importance of observation and measurement in scientific endeavours (Saunders et al., 2019). The researcher used a quantitative research approach that was appropriate for this study.

3.2.1 Positivism

Positivist research philosophy believes in empiricism, that observation and measurement are core in scientific endeavours (Saunders et al., 2019). Positivists believe that the world operates by laws of cause and effect, which can be identified by scientific methods (Sekaran & Bougie, 2016). Rab and Struffolino (2022) argue that using the positivist method helps the researcher generalise the study's results, providing a clear understanding of the impact of SCI on the resilience of state-owned logistics enterprises in Namibia. Zaumanis (2022) states that a paradigm is a fundamental set of assumptions or a worldview that guides research activity or inquiry. Paradigms are essential for offering concepts and principles that assist academics working on a particular subject in deciding what should be investigated, how it should be examined, and how the research should evaluate findings. A paradigm encompasses a researcher's worldview, which consists of the researcher's abstract beliefs and guiding principles that shape how they perceive and interact with the outside world (Zaumanis, 2022). The ideas of the French philosopher Auguste Comte led to the development of the philosophical movement known as positivism in the early nineteenth century (Haile, 2019). According to positivism, reality exists apart from people and acts without the aid of senses and by unalterable laws.

Positivists hold that reality exists, and hence, they want to understand society in the same way as they do the natural world. Interpretivist scholars address this intricacy by gathering essential data for the subjects of their studies (Saunders et al., 2019). Ontology concerns preconceived notions about reality, influencing how the researcher perceives and examines the study objectives (Saunders et al., 2019). Leavey (2017, p.12) describes ontology as the assumptions about the nature of reality, meaning ontological assumptions shape how the researcher sees research objectives. Social positivists also hold that reality is context-free, and researchers from different ages and places would come to the same conclusion regarding a particular phenomenon (Hempel, 2019).

Objectivism is the epistemological position adopted by adherents of positivism. It involves identifying observable and quantifiable facts and patterns and limiting observations and measurements to those within the researcher's capacity (Saunders et al. (2019). Researchers assume the role of impartial observers to investigate phenomena that occur independently, with the study exerting no impact or disruption on the observed activity. Thomas (2021) posits that positivists believe the world exists independently and can be comprehended as relatively stable. Positivist theorists maintain that social phenomena are subject to laws that can be uncovered and expressed through scientific techniques and empirical statements (Sekaran & Bougie, 2016).

Many academics have questioned the positivist approach, as it is less effective when studying human interaction and sociology than when studying natural phenomena (Lindsay, 2020; Saunder et al., 2019; Sekaran & Bougie, 2016). Essia (2022) added that post-positivism attempts to address the flaws of positivist philosophy by adopting a critical realist stance. Research is the cornerstone of the positivist approach, where hypotheses are formed, and theories are put forth to explain how the independent variable affects the dependent variable. Hypotheses are first proposed and then confirmed or rejected depending on the results (Zaumanis, 2021).

The research objectives are quantifying, controlling, forecasting, making laws, and assigning blame (Haile, 2019). The research should establish a theory demonstrating the causal relationship between variables, and a hypothesis must be strong enough to withstand attempts by empirical evidence to refute it (Haile, 2019). Internal validity is established when an experiment shows causal linkages between phenomena without the intervention of outside

variables (Essia, 2022). The effect on generalisability increases with the researcher's efforts to control uncontrollable factors .

According to Raab and Struffolino (2022), the positivist perspective posits that rigorous research should possess external, internal, and objective validity. The concept of internal validity pertains to the ability of a researcher to demonstrate that the independent variable solely influenced the dependent variable. External validity, on the other hand, refers to the extent to which the results of a study can be generalised to a larger population. Objective validity is achieved when multiple researchers conducting the study at different times, locations, and settings arrive at the same conclusions. Interpretive and critical thinkers have criticised the positivist worldview, as evidenced by Haile's (2019) work. One of the most cited criticisms is that scientific methods are insufficient for analysing human beings and social phenomena. Qiu (2022) notes that anti-positivist scholars have yet to effectively develop a viable alternative framework that addresses the fundamental issues. *Positivism* is a philosophical approach that endeavours to attain the level of accuracy, precision, and predictability characteristic of the natural sciences.

The evaluation is based on four specific criteria: internal validity, external validity, dependability, and objectivity (Deetjen, 2020). Internal validity refers to the degree to which the outcomes of a study may be attributed to the independent variable being studied rather than any other influences that may have influenced the observed results. External validity pertains to the degree to which the outcomes of a study may be ascribed to the independent variable that is accountable for their manifestation rather than being influenced by unrelated circumstances (Deetjen, 2020). Positivist research follows a deductive method that includes creating hypotheses and using statistical analysis to examine pre-established theories. (Sekaran & Bougie, 2016; Wilson, 2014). According to Dudovskiy's (2016) synthesis, positivism espouses foundational principles underpinning scientific inquiry. Firstly, it upholds the notion of a uniform logic that transcends disciplinary boundaries, advocating for the consistent application of scientific methods and principles across diverse fields of study. Furthermore, positivism places a premium on the research objectives of furnishing explanations for observed phenomena and making prognostications about future occurrences, positioning the pursuit of knowledge as an endeavour driven by the quest for understanding and prediction. Secondly, the positivist framework prioritises empirical observation as the

bedrock of scientific knowledge, with inductive reasoning as the tool for generating and articulating hypotheses. Importantly, positivism underscores the necessity for scientific methodologies to remain impartial and subject to rigorous evaluation based on logical criteria, thereby ensuring the objectivity and reliability of the knowledge produced. According to Dudovskiy's (2016) argument, positivist research is characterised by a descriptive approach, wherein quantitative data is gathered and analysed to fulfil the study's objectives. The positivism philosophy was deemed suitable for this research endeavour due to its use of scientific methods to acquire impartial outcomes that can be applied to the study's target population.

3.2.2 Research Assumptions that Distinguish Research Philosophies in this Study

The epistemology of positivism relates to ideas about what makes valuable, trustworthy, and authentic knowledge and how this research might communicate knowledge to others. On the other hand, the ontology of positivism is the study that addresses the nature or reality of any study and precisely the explanation of what constitutes a fact about the world, what reality is and how one knows what is real (Collis & Hussey, 2014). This study assumes that the validity of the reasons for resilience and how it has impacted all the parties involved is constantly renegotiated, debated and interpreted, considering its usefulness in new unpredictable situations.

According to Saunders et al. (2019), the axiology of positivism is another way of understanding research philosophies, ontology and epistemology, and the role of value and ethics the study undertook. One of the critical axiological choices this study focuses on is “real” and how one knows what is real (Sekeran & Bougie, 2020). Axiological consists of positivist views, and this study assumes that moral values are tentative and constructed from experience and can change according to time and space. The values in question are not predetermined (Saunders et al., 2019) but are created by human beings. Their respective environments determine the value of responses in this study.

Table 3.1 Philosophical Assumptions about Business and Management Research Positions

Ontology	**Epistemology**	**Axiology**	**Typical methods**
Nature of reality or being	What constitutes acceptable knowledge	Role of values	
POSITIVISM			
Objective, external, independent One actual reality (universalism) Granular (things) Ordered	Scientific method observable and measurable facts, Law–like generalisations Numbers, Causal explanation and prediction as a contribution	Value-free research Research is detached, neutral and independent of what is researched. Researcher maintains objectivity	Typically, a deductive, highly structured method of analysis is used with large sample measurements. It usually involves quantitative analysis, although a variety of data can be analysed.

Source: Adapted from Saunders et al., 2019. p.144

3.2.3 Philosophical Assumptions Underpinning This Study

After a comprehensive review of relevant philosophical perspectives guided by Creswell and Clark (2018), this study regarded positivism as the most appropriate research philosophy to serve as the foundation for the study. This choice is based on utilising operationalisation techniques to develop research instruments and variables, as well as data analysis and interpretation of statistical findings. The study employs positivist philosophy to verify multiple *apriori* hypotheses and establish correlations between the independent and dependent variables (Tylor & Milton, 2013). The study employs a quantitative methodology to examine the relationships, facilitating the extrapolation of the findings to other supply chains operating in diverse settings. The philosophical stance of this study is positivist and quantitative, as the researcher subscribes to the belief that the world can be predicted through practical means (Hair et al., 2016). Furthermore, it is crucial to consider the generalisability of the study findings.

3.3 Descriptive Research Design

Jones (2019) describes research design as the framework of how the study should answer the research questions for data collection and analysis that aims to balance the methodological efficiency and relevance of the study's purpose. Saunders *et al*. (2019) depict a research design as a framework, investigative method, and plan created to address the research topic and account for variables. It is a comprehensive plan for addressing a research question. It incorporates several elements, methods, and procedures as a planned strategy for scientific research to gather data and assess its importance. Creswell (2017) asserts that the length and degree of adaptability that must be considered in research planning may be overlooked. Mughumalewa (2021) claims that research design not only anticipates and outlines the allegedly limitless number of decisions connected to data collection, processing, and analysis but also offers a logical basis for these choices. Jones (2019) states that a study should rationally arrange its ideas and produce a flowchart known as a research design. A research design sets conditions for data collection and analysis in a way that strives to balance relevance to the study objective with efficiency in procedure. According to Taherdoost (2021), a research design is a conceptual framework or structure within which the research is carried out. It serves as a simple road map for continuing.

Research design should ensure that the data collected enables responses to the research question to be as logical and unambiguous as possible. The social sciences typically require specifying the types of evidence needed to test a hypothesis, evaluate a programme, or precisely characterise and evaluate the relevance of an observed phenomenon before acquiring information pertinent to the study problem (Taherdoost, 2021). Each study needs a research design since it acts as a road map for all research operations. It serves as a series of benchmarks to ensure the investigation continues. The importance of the research design lies in its ability to make the study plan more efficient, organised, and systematic. It increases the effectiveness of the study implementation. Before the initiation of the research, the intended study will be carefully reviewed. Therefore, a study design is necessary because it enables the most fruitful analysis (Zaumanis, 2021).

In addition to the study's objectives, a research design also comprises the study's scope, coverage, timeline, restrictions, data collection methods, data analysis tools, data processing, and data presentation. Research design is a set of choices concerning how, when, where, and how much to undertake a study or investigation (Mullaney, 2022).

This study used a descriptive research design. Descriptive research provides valuable insights into phenomena by describing characteristics or behaviours, it has inherent limitations in establishing causal relationships or making predictions (Wang et al., 2021). The critical goal of descriptive research is to provide a detailed description of the current state of affairs. The term “Ex post facto research” is frequently utilised in social science and business descriptive research studies. The critical attribute of this method is the researcher's lack of control over the variables, resulting in the ability only to provide factual observations of events or current situations. Ex post facto research studies are frequently employed for descriptive studies in which the researcher aims to quantify the outcomes. It is essential to acknowledge that while the study primarily employed a descriptive research design to characterize and understand supply chain integration and resilience phenomena in state-owned logistics enterprises, inferential analyses were also conducted to infer relationships or associations between variables. This was achieved through statistical techniques such as correlation analysis, regression analysis, or structural equation modelling, depending on the nature of the research questions and data. For example, in exploring the relationship between supply chain integration (SCI) and resilience, inferential analyses were conducted to determine the extent to which variations in SCI predict or influence resilience outcomes. This involved establishing statistical relationships between SCI variables (information integration, coordination, and strategic alignment) and resilience indicators (response to disruptions, adaptive capacity, and recovery capabilities). By employing inferential statistical techniques, the study moved beyond descriptive summaries to infer underlying relationships and draw meaningful conclusions about the factors influencing supply chain resilience in state-owned logistics enterprises.

Descriptive research employs various survey methods, including comparative and correlational techniques, surveys, and other research Kothari (2004, p.2-3). This study used this design to gather, analyse, and present the data, help others understand the importance of

this type of study and aid the study in clearly defining the problem. Saunders et al. (2019) state that the researcher should have a clearly defined problem statement on which the researcher wishes to collect data before the collection (Taherdoost, 2021). This strategy uses quantitative methods to determine a topic with little or no relevant data. It tries to define a research topic adequately. The descriptive research method may use a range of research approaches to investigate the variables of interest. Descriptive research offers additional details about the population, situation, or phenomenon being examined—acquiring sufficient information about the research problem, the what, how, when, and where, which is one of the research components. It is constructive when identifying traits, frequencies, central tendencies, dispersion measures, correlations, and classifications. This calls for a complete understanding of a study problem before considering why it exists (Roni et al., 2017). As a result, the design was used to determine the influence of SCI on resilience in Namibian state-owned logistics enterprises. Despite having access to various information sources, social scientists use structured processes to ascertain social facts; these structured processes are known as research techniques (Grønmo, 2019). The argument over technique choice has often come up because it is crucial in all academic disciplines, not just social science; it is a higher-order skill than accurate description, according to Saunders et al. (2019). This is expected, given the significance of technique selection. The different types of descriptive research are categorised based on the methodology utilised to carry them out.

Furthermore, the study employed inferential analyses to test hypotheses or research propositions derived from theoretical frameworks or prior research. For instance, hypotheses related to the impact of SCI dimensions on resilience outcomes were tested using inferential statistical tests to determine the significance of relationships and the strength of associations. While the study primarily adopted a descriptive research design, inferential analyses were integrated to achieve the inferential research objectives. Through statistical techniques and hypothesis testing, the study could infer relationships, test theoretical propositions, and draw conclusions beyond mere description. By clarifying the integration of inferential analyses within the descriptive research framework, the study aims to address the examiner's feedback and enhance the rigour and validity of its findings.

3.4 Quantitative Method

According to Saunders et al. (2019) and Alvim et al. (2020), quantitative research is characterised as the process of examining and quantifying numerical data using statistical software to address inquiries about the identification of individuals, the determination of quantities, the specification of attributes, the localisation of phenomena, the establishment of temporal sequences, the enumeration of quantities, and the explication of mechanisms. According to Leavy's (2017) definition, quantitative research involves collecting numerical data and using mathematical techniques, specifically statistics, to attain precise, objective, and systematic measurements. In conducting a study, the researcher must comprehensively explain a specific phenomenon, such as a social one. For instance, the researcher may seek to elucidate the number of state-owned logistics enterprises that emerged from Namibia and the extent to which their employees possess practical communication skills.

Quantitative research is a method that involves the collection of numerical data and utilises statistical, mathematical, or computational techniques to study phenomena. The methodology employed is based on deductive designs to refute or support particular theories and hypotheses, as Leavy (2017) stated. Samoilenko and Osei-Bryson (2021) identified surveys, ex-post facto case studies, and experimental research as the most commonly employed quantitative research methodologies. One advantage of employing this research methodology was incorporating statistical data tools. As Jones (2019) noted, the collection and analysis of numerical data were emphasised significantly. Using quantitative research methods can facilitate the depiction of the effects of SCI on the resilience of state-owned logistics enterprises in Namibia and enable a comprehensive analysis of the resulting outcomes. According to Samoilenko and Osei-Bryson (2021), using Statistical Software for Social Science (SPSS) version 25 enables the computation and execution of numerical data, percentages, and quantifiable figures on a computer, resulting in cost and time savings.

The crucial aspects of the phrases (Dawson, 2019; Williams et al., 2021) about empirical results and analysis procedures, as well as those (Samoilenko & Osei-Bryson, 2021), highlight the significance of scientific data collection and analysis procedures in facilitating generalisation. However, it is imperative to ensure the validity of the sampling techniques employed to substantiate the generalisability of the empirical findings. The validation process

would play a crucial role in enabling the replication of study methods, thus offering an additional advantage. The study is carried out to achieve broad and public objectives and adhere to established guidelines. As such, the study can be replicated with comparable results in any location or time (Williams et al. 2021). This particular research methodology facilitates the integration of control and study groups.

According to Saridakis and Cowling (2020), quantitative research is a technique employed to identify the existence and extent of a correlation among two or more variables within a given population. Correlation coefficients are employed to quantify the magnitude of correlations, with coefficients ranging from +1.000 to -1.000 (Sekaran & Bougie 2016). Coefficients closer to +1.00 or -1.00 indicate stronger correlations (Saunders et al., 2019). Quantitative research encompasses various methodological approaches, including survey, correlational, experimental, and comparative causal research. Positive correlations mean that the other variable's importance increases as one variable's values increase. Positive correlations imply that the value of the other variable falls as the weight of one variable rises. Kara (2022) and Saridakis and Cowling (2020) used correlation research approaches to investigate the association between two or more variables in the same population.

Quantitative research provides benefits such as being cost-effective and time-saving when researching extensive samples, according to Saunders et al. (2016). Zikmund et al. (2013) note that the reliability and validity tests met through quantitative research enable the generalisation of research results to the study population. The survey methodology involves the utilisation of a meticulously crafted questionnaire and a rigorous sampling technique to assess the attributes of a specific population through statistical means. Chaurasia (2020) noted that the survey strategy is a social scientific approach that involves investigating individuals, their fundamental characteristics, as well as their viewpoints, opinions, motivations, and behaviours. According to McCoy's (2021) discourse, survey research is guided by three fundamental principles: quantified description, using surveys, and a systematic approach. Survey research methods are employed to obtain quantitative descriptions of specific aspects of a population by examining relationships. Data is collected from individuals through the use of surveys. A survey sample, a subset of the population, is then used to make inferences about the entire population.

3.4.1 Characteristics of Quantitative Research

In academic research, researchers hold a common perception of their inherent independence from the individuals under study, commonly referred to as respondents. In this study, the primary objective is to thoroughly analyse the correlations among various variables, employing probability sampling techniques to ensure the generalizability of the results. The data collection methods employed in this research are meticulously delineated, characterised by a high degree of organisation, and aimed at yielding standardised and quantitative results. Subsequently, the analysis is conducted using statistical methods and graphical representations, facilitating the extraction of meaningful insights from numerical data. This methodological approach has proven instrumental in enabling the researcher to comprehend the intricate dynamics of how SCI influences resilience. Specifically, it aids in assessing the impact of SCI on crucial components such as agility advantage and firm performance within the context of the Namibian port.

3.5 Study Site

The study was conducted in one of Namibia's 14 regions, the Erongo region, named after the mountain Erongo, a well-known landmark in Namibia. The Hardap region borders it on the south, the Otjozondjupa region on the east, and the Kunene area on the north. The main subjects of this study were the supply chain and those active in the Port of Walvis Bay. Samples included inventory controllers, suppliers, clearing agents, freight and forwarding agents, and staff involved in government liaison. Survey research was conducted in the Erongo region from March to November 2022, using questionnaires as the primary data collection instrument. The research was crucial in ascertaining the resilience and adaptability of logistics enterprises owned by the state in their response to the integration of supply chains.

Figure 3.2 Map of Erongo Region

Source: Namibian Maps, Erongo Region (2021)

3.6 Population of the Study

A research population is a clearly defined group of research participants that are being sampled (Bryman, 2016). The population for a research endeavour refers to the entire set of individuals, events, or phenomena that a scientist investigates (Sekaran & Bougie, 2016). As stated by Saunders et al. (2016), the research study population consists of individuals who possess similar traits and can supply the necessary data for drawing conclusions and making suggestions based on the study. Shikalepo (2021) describes the study population as the subsets of the target population that can be included in the study. The population in the context of this study consisted of 370 respondents, representing six supply chain contributors among various supply chain contributors associated with the Port of Walvis Bay.

3.7 Target Population

The target population of the research is described as the complete set of units for which survey results will be used to conclude. The target population identifies the units to which the survey results are intended to be generalised (Berends, 2019). Therefore, the study's target population was the Port of Walvis Bay stakeholders. Humble (2020) defines the target population as all visual elements or groups of individuals with the same characteristics the

researcher wants to survey. As a result, the target population for this study is defined as possible respondents who meet the research criteria. The researcher contributed to explaining the relationship between SCI and resilience within state-owned logistics enterprises in Namibia. The researcher assumed a pivotal role, engaging with diverse supply chain stakeholders closely affiliated with the Port of Walvis Bay. These stakeholders included inventory controllers, representatives of transportation companies, suppliers, clearance agencies, freight and forwarding entities, and government liaison officers. This informs why data collection was limited to Namibia's three state-owned logistics enterprises. According to the National Accounts (Namibia Statistics Agency, 2019), logistics and transport industries made relatively higher contribution to the logistics value addition relative to GDP compared to other logistics sectors. (Namibia Statistics Agency. (2021).

3.8 Sampling

Haile (2019) defined sampling as a critical element affecting a study objective. While. Creswell and Creswell (2017) described it as a population subset used to draw statistical inferences and estimate population characteristics, which is known as sampling. It was vital to consider using samples in research irrespective of the research question/objectives. In the context of this study, the sample would be a group of respondents drawn from the population of interest. Sometimes, it might be possible to collect and analyse data for the entire population of the study, referred to as a census (Creswell & Creswell, 2017).

In most cases, this is not likely because of time, money and access (Saunders et al., 2009). Some research objectives/ questions may require the researcher to make inferences, such as generalising the study findings. Sampling is the selection of any slice of a population or universe that is typical of that population or universe.

According to Lindsay (2020), a representative sample of the population should be chosen for the research to be reliable and effective. A trustworthy generalisation of the discovery is the importance of selecting an optimum sample size, which is illustrated by the necessity of choosing an ideal sample size to lower the cost of sampling error. Lebrun and Lebrun (2021) similarly note that a sufficient sample size is necessary for all research because a small sample size must accurately reflect the community. A Type I error, or the risk of wrongly rejecting a particular discovery when it should be accepted, can be caused by a sample size

that is too small (Deetjen, 2020). This means the study rejects the null hypothesis when the researcher should not. Therefore, the term “statistical significance” discussed earlier refers to the probability of making a Type I error (Saunders et al., 2019, p.609). A type II error involves the opposite occurring, which is accepting a particular finding when it should be rejected. This is another reason an extremely high sample size is unsuitable (Jones, 2019). Sampling is a critical factor that determines the accuracy of the research. It is crucial to the external validity of the study results. It saves money and time, especially when the population is substantial (Creswell & Creswell, 2017).

3.9 The Eligibility Criteria

Following the research conducted by Mbokane (2017), this study meticulously delineates its eligibility criteria for inclusion and exclusion of respondents within the context of supply chain stakeholders associated with the Port of Walvis Bay. The study sought to encompass various individuals, including inventory controllers, representatives from transportation companies, suppliers, clearing agencies, freight and forwarding agencies, and government liaison officials. Integral to the inclusion criteria were participants' willingness to engage in the research voluntarily and their availability during the study period. Conversely, individuals who declined participation or were unavailable during the designated study timeframe were explicitly excluded from the study. These carefully delineated criteria ensured the precision and relevance of the study's participant cohort, contributing to the research's robustness and validity in investigating the dynamics of supply chain stakeholders in the specified context.

3.10 Sampling Strategies

According to Ravitch and Riggan (2017), sampling is the process of choosing a subset or portion of the things, events, or people that compose the subject of the comprehensive study. Creswell (2014) observes that researchers usually utilise a sample rather than the entire study population because it is impossible to include everyone. By gathering a sample, the researcher can generalise the study findings. Sampling can be categorised into two primary approaches: probability sampling and non-probability sampling procedures. Shikale (2021,

p. 185) states that probability sampling ensures that each member of the population has an equal chance of being chosen and participating as a responder in the study.

Conversely, non-probability sampling does not provide an equal chance for every individual in the target population to be selected to participate as a responder in the study. Probability sampling is a survey research method that uses statistical analysis to conclude a population based on a study sample. It answers research questions and fulfils research objectives (Chirimo, 2009).

Considering the characteristics of the study, probability sampling methods were considered suitable for selecting respondents in order to obtain valuable insights into the effects of SCI on the resilience of logistics firms in Namibia.

The study utilised cluster sampling and simple random techniques known for their minimal bias and high generalisability. Nonetheless, the sampling process may pose challenges in terms of cost and feasibility, especially when an up-to-date population record is not readily accessible (Sekaran & Bougie, 2016). The researcher employed probability sampling techniques, namely simple and cluster sampling. In a simple random sampling technique, all the elements in a population have a known equal chance of being selected in a study (Bhattacherjee, 2012; Wilson, 2014). Sekaran and Bougie (2016) illustrated that in a population of 1000, 100 samples are required. If each of the names of the population is dropped in a hat and 100 names are blindly drawn. The first name selected has 1/1000 of being drawn, the second has 1/999, the third has 1/998 and so on. In essence, the probability of any names being drawn is one in the number of the entire population.

The strength of this sampling technique lies in the fact that it is the most appropriate for generalising and has the slightest chance of being biased in sample selection (Tashakkori & Clark, 2010). This justifies the reason for adopting this technique in selecting the respondents who participated in the survey for this study. The researchers determined a sample size of n=370 respondents, supported by the established convention that sample sizes ranging from 30 to 500 and a 5% confidence level are frequently sufficient for quantitative studies.

The reason for adopting a simple random sampling technique is because of its lack of bias in selecting each individual who makes up the sampling frame to partake in the quantitative data collection for this study (Sekaran & Bougie, 2016; Wilson, 2014).

3.11 Sample and Sample Size for this Study

According to Creswell and Creswell (2017), a sample is a subset of the population a researcher studies to generate generalisable findings. Similarly, Leavy (2017) defines a sample as a group of multiple individual instances from which the researcher eventually gathers data. The sample size is defined by Creswell and Creswell (2017) as the number of individuals or observations included in a research study. The minimal expected difference or effect size, the anticipated measurement variability, the intended statistical power, the desired significance criteria, and whether a one- or two-tailed statistical analysis is planned are some research design characteristics that commonly influence sample size (Taherdoost, 2021). Probability sampling will be used, according to Leavy (2017). The non-probability of sample selection will vary according to how many satisfy the selection criteria. As a result, the respondents were selected to be in the best position to inform the researcher with their perspectives, ideas, and expertise on SCI and resilience. Using the Taro Yamane method's sample size calculation formula, at a 5 percent margin of error and 95% confidence level, this study should have adopted the use of 370 respondents in data collection, but the study used even a higher sample size. Taro Yamane's sample size formula calculates the sample size as follows. The sample size was determined using the Taro Yamane method, which is given as follows: n = N/ (1 + N (e) 2)

Where:

N signifies the sample size,

N signifies the population of interest,

E signifies the margin of error using a 95% confidence level.

Therefore, n = 5,000 = 5,000 = 370.37 ~ 1 + 5.000 (0.052) 13.5

Based on the population size as depicted above, the population sample of this study comprised 370 respondents drawn from various supply chain contributors associated with the Port of Walvis Bay, such as inventory controllers, transportation companies, suppliers, clearance agencies, freight and freight and forwarding agencies, and government liaison officers. The emphasis is on understanding or linking facts to theory rather than predicting population size. The sample size is adequate for the study because most statisticians agree that 100 is required to produce meaningful findings. The researcher included inventory

controllers in the sample size because they manage orders and keep track of stocks to support production or sales. Freight agencies serve as go-betweens for shippers and transportation firms; transportation companies move products; suppliers are in charge of supplying goods; clearing agencies bring items into the country; and government liaison officers manage public relations and streamlining processes. The chosen respondents have the necessary competence in their respective employment sectors to support the study's goal, which is to examine how SCI influences resilience in Namibian state-owned logistics enterprises.

3.12 Data Collection Instruments

3.12.1 Survey Instruments

The survey instrument is developed by utilising structured questionnaires that align with the constructs of the conceptual framework, hence promoting research objectivity. The list includes dimensions of supply chain integration, internal integration, supply integration, customer integration, information integration, and supply chain resilience. The survey instrument is developed to gather information from relevant professionals and experts in the business, as supply chains acknowledge the diverse structure inside the organisation and the relationships between different organisations (Creswell & Creswell, 2017). The study employed objective scales to account for the survey's multi-sectoral nature.

The Likert scale, a fundamental psychometric scale commonly employed in research involving questionnaires, was utilised to administer the survey questionnaire (Saridakis & Cowling, 2020). The Likert scale, introduced in 1932, is named after the inventor, Rensis Likert. Using a Likert scale permits respondents to express their level of concurrence rather than necessitating a binary response, thus relieving individuals from the obligation to take a definitive position on a particular matter. The survey responses are designed to consider the respondents' ambivalent or impartial emotions, facilitating their ability to respond to the inquiries. According to Deetjen (2020), using Likert scales for data collection is cost-effective, expeditious, and proven effective. The surveys are versatile in delivery methods, including in-person, online, or mail forms. Additionally, they encompass a comprehensive and multifaceted spectrum across all surveys.

The survey instrument employed in this study was structured into three distinct sections, labelled as 'A', 'B', and 'C'. Section A of the study focused on demographic data, including gender distribution, category of age, tenure in the current position, highest attained educational level, the field of study, and employment characterisation. Section B sought a succinct and focused description of the study's primary objective: to develop a framework to measure the efficacy of SCI in the logistics sector, specifically at the Port of Walvis Bay. The study used a 5-point Likert scale for rating, where the options ranged from strongly disagreed (1) to strongly agreed (5). The study guaranteed respondents that the researcher would provide them with research outcomes upon request. To maintain ethical standards, the study will uphold the confidentiality of respondents by refraining from disclosing their identities. This has been observed to engender a sense of confidence and enthusiasm towards engagement in the study.

3.12.2 Questionnaire

The data-gathering method was a questionnaire, and this study used a quantitative research technique (Johnson, 2020). Survey questionnaires are intriguing because they are inexpensive and straightforward to administer, having no constraints, and respondents get the surveys and complete them freely without the presence of a researcher (Kara, 2022). The respondents received anonymity from the researcher; respondents offered measurable, straightforward input to analyse. The questionnaire was constructed so that respondents may self-administer it. A survey questionnaire should include all instructions, and the questions should be appropriately crafted and developed with further facts and illustrations as needed. The questions were straightforward, without ambiguity, with loaded phrases or prejudices, and easy to understand.

The researcher remained available on Google conversations so respondents could easily ask for clarification on any questions or the survey itself. According to Hibbert (2021), each quantitative data collection has a unique numerical value. This data consists of any measurable information researchers may use for mathematical computations and statistical analysis to draw practical conclusions from these mathematical derivations. Quantitative data gathering to classify distinct occurrences relies on organised data-collecting technologies,

random sampling, and non-probability sampling. This study used quantitative research methods to offer straightforward summarising, comparing, and generalising outcomes.

3.13 Data Analysis

The data were analysed using IBM SPSS Statistics Version 25. An ordinary least squares regression was used to examine how SCI impacts the resilience of Namibia's state-owned logistics enterprises. Descriptive statistics, a subset of quantitative data analysis, describe or display data in a comprehensible numerical format (Lindsay, 2020). In other words, this method assists in showing and synthesising study findings. Furthermore, academics prefer this statistical method since it makes it easier to create quantification-related reasoning. In quantitative research, the statistical measurement stage converts observations into numbers (Hempel, 2019). Statistical measurement assigns numbers to items or events by rules (Essia, 2022). One of four scales meticulously classified by Essia (2022) is the nominal scale, which assists in organising observations into discrete groupings. Ordinal scales categorise research variables based on where these fit within a group. Interval scales are the third set of measurement instruments. The degree of quality of a variable, person, or thing is quantified and denoted by this balanced interval scale. The ratio scale is the fourth type of scale. The ratio scales use balanced intervals to record measurements beginning from a clearly defined zero point. In addition, the researchers organise the quantification of their data using frequency distributions or graphs.

The collected data was analysed using the Statistical Package for the Social Sciences (SPSS) for Windows and Microsoft Excel. The researcher used descriptive statistics to analyse the results throughout the procedure. SPSS was ideal for this research because descriptive research methodology allows the researcher to reveal a population, an event, or a phenomenon. (Zaumanis, 2021) This technique includes descriptive statistics such as percentages, frequencies, means, medians, modes, and standard deviations. Descriptive statistics uses percentages, frequencies, bar charts, graphs, and pie charts to summarise and describe statistical data. Univariate, bivariate, and multivariate data analysis are the methods used.

3.13.1 Methods of Data Analysis

This section examines different techniques for analysing quantitative data collected through survey questions. Burton (2021) described coding as assigning a numerical value or other symbols to each category or response. A coding approach is established for each inquiry based on the conjectural generic categories. If the data is to be delivered to machine punch cards, the codebook will also specify which column the data must be written in (Sekaran & Bougie, 2016, p. 273). When it comes time to code the data once it has been cleaned, two factors influence the coding style, the first of which is the measurement scale, the method through which a variable on the research instrument is measured, for instance, whether the response to a query is descriptive, categorical, or quantitative. The next step is to present the results for a specific variable to the audience. Whether data is acquired subjectively or quantitatively, tabulation is the method employed by an investigator to categorise or arrange data into a tabular format for straightforward interpretation and accurate findings on applicable data (Deetjen, 2020). A table is a collection of data divided into columns and rows. A statistical table allows the researcher to present large amounts of organised data comprehensibly. It simplifies comparison and frequently reveals data patterns that otherwise would not have been evident. The categorisation and tabulation operations are intertwined. In reality, both complement each other. Before tabulation, data are categorised and displayed in columns and rows (Hancock et al., 2021).

3.13.2 Univariate Analysis

The univariate analysis is considered the most straightforward among the three types of analysis as it focuses solely on one variable (Kothari, 2004, p.138). The univariate analysis finds numerous applications in various fields. According to Gronmo (2019), the prevalent univariate analysis method involves examining measures of the dispersion variable's range, maximum and minimum values, standard deviation, and measures of central tendency such as mean, median, and mode.

3.13.2.1. Frequency Distribution. A frequency distribution is an arrangement of measurements organised in descending order. A researcher may use a frequency distribution

stage to calculate the mean of a line. A line's highest and lowest positions are represented by its peak and base, respectively. If the line included zero average transitional transitions, the frequency division or distribution would be substantially more compact (Taherdoost, 2021). Due to this, statistical analysis calculations (using charts and tables) are made simpler by frequency distribution-based data organisation. Univariate analysis is often shown using frequency distribution graphs, sometimes called histograms. Box plots and violin plots are alternative visualisations that can be employed to compare the data distribution and identify any potential outliers.

3.13.2.2 Descriptive Statistics Descriptive Statistics, as explained by Saunders et al. (2019, p.598), allow the researcher to characterise and compare a variable data value quantitatively. The nature of the data constrains the study's research questions and objectives. The measure of dispersion refers to a statistical measure that identifies an exact value as representative of the entire distribution, utilising metrics such as standard deviation, central tendency, and mean, mode, median, and maximum. The three measures of variation, kurtosis, skewness, and standard deviation, represent the data spread in a given dataset. The range is determined by subtracting the minimum value from the maximum value, which visually illustrates the extent of the data's dispersion (Roni et al., 2019). The objective is to provide a comprehensive elucidation of all the information. The single value exhibits the highest precision in depicting the aggregated data. The three most frequently utilised descriptive statistics are the mean, median, and mode. The data description section, called number crunching, has been identified by Mullaney (2022). The variance measure quantifies the extent to which a given dataset varies.

3.13.3 Bivariate Analysis Bivariate analysis is a statistical method used to investigate the association between two variables, Sekaran and Bougie (2016). The presence of both dependent and independent variables is a potentiality. According to Gronmo (2019), the Y-values can serve as a means of conducting a bivariate analysis of each X-value. Scatter plots are a commonly employed graphical method for bivariate analysis, wherein one variable is plotted on the x-axis and the other on the y-axis. In addition to scatter plots, standard techniques for analysing the association between variables comprise regression plots and Pearson’s Moment Correlation Coefficients (Puth et al., 2019).

3.13.3.1 Inferential Statistics. Sekaran and Bougie (2016) define inferential statistics as a branch of statistics that allows a researcher to conclude a population based on a specific sample. Research studies with a large population size benefit more from the use of inferential statistics. Researchers can make judgments about the population by analysing the sample taken from it. The references cited are Saunders et al. (2019), Sekaran and Bougie (2016), Wilson (2014), and Kothari (2004). Inferential statistics is valuable for hypothesis testing. Parametric and non-parametric tests can be employed to evaluate research hypotheses. According to Wilson (2014), the distinction between parametric and non-parametric tests lies in the fact that the former type of test relies on assumptions drawn from the parameters of the population under investigation.

On the contrary, the latter approach refrains from making such assumptions. As Saunders et al. (2019) outlined, parametric statistics is more fitting for analysing numerical data under specific conditions. To apply parametric statistics, the data must meet specific criteria within the study: Firstly, the data must come from a clearly defined population. Secondly, the variability within the population from which the data is selected should be uniform. Lastly, the selection of data cases must be independent, indicating that choosing one case should not impact the likelihood of selecting another. Saunders et al. (2009) suggest that when these assumptions are not met, it is reasonable to contemplate the use of non-parametric statistics. Parametric inferential statistics were used to answer the study's research questions, test the hypotheses, and achieve the study's goals, as stated below.

3.13.3.2 Pearson's Product-Moment Correlation Coefficients. The correlation coefficient is a statistical metric used to quantify the extent of a linear relationship between two variables, whether they are ranked or numerical. Represented by the symbol "r," this coefficient can take any numerical value within the range of positive one to negative one. A correlation coefficient of +1 signifies a complete positive linear relationship, indicating a precise correlation where an increase in one variable corresponds precisely to an increase in the other (Saunders et al., 2019, p. 615). Conversely, a value of -1 indicates a complete negative correlation, signifying a precise relationship where an increase in one variable corresponds precisely to a decrease in the other. Correlation coefficients ranging between +1 and -1 denote weaker positive and negative correlations, respectively (Saunders et al., 2019;

Sekaran & Bougie, 2016; Leedy & Ormond, 2014). A coefficient of 0 signifies complete independence between variables. In the context of business research, achieving perfect correlations is uncommon (Saunders et al., 2019).

In a sample, to assess the statistical significance of the correlation coefficient, whether small or large, it is necessary to ascertain the probability of its occurrence by chance alone. The probability has been calculated automatically by most analytical software. As previously stated, the association is deemed statistically significant when the probability is below a certain threshold (typically 0.05). The custom of accepting a hypothesis that posits a correlation between two variables is tantamount to rejecting the null hypothesis, which typically states that no such correlation exists. In statistical analysis, a probability value exceeding 0.05 usually indicates that the relationship under consideration is not statistically significant.

3.13.3.3 Test of Normality. Parametric tests operate under the assumption, as highlighted by Saunders et al. (2019) that the numerical data points in a sample are derived from populations exhibiting a normal distribution. To fulfil the criteria for statistical analysis, the data values associated with each quantitative variable need to exhibit a normal distribution. This is characterised by a symmetrical pattern and a bell-shaped frequency distribution centred on the variable's mean. The assessment of normality for a given variable's data values can be conveniently achieved through statistical techniques and graphical representations. Visual assessment techniques can ascertain how the dispersion conforms to anticipated norms. The mean, median, and mode will likely be equivalent when analysing data that conforms to a normal distribution. According to Saunders et al. (2019), the numerical variable exhibits a symmetrical distribution with the mean as its central tendency, indicating a normal distribution. The mean, median, and mode values will probably coincide for data that follows a normal distribution (Saunders et al., 2019).

3.13.3.4 Shapiro Wilk Test. The Shapiro-Wilk tests are commonly employed in software such as IBM SPSS Statistics, making them relatively straightforward (Saunders et al., 2019; Park, 2021). The statistical measures for each test are represented by the symbols D and W (Saunders et al., 2019, p.605), accompanied by the degree of freedom (df) and the corresponding probability (p-value). A probability value of 0.05 indicates a statistical

significance level of 5%, implying that the observed data distribution or a more extreme distribution could occur by chance from a similar normal distribution without any actual difference for the respective statistical measure (Saunders et al., 2019; Hair 2016). It is important to exercise prudence when interpreting probabilities obtained from software packages. Comparing a sample variable to a comparable normal distribution can result in significant differences, mainly when large samples are utilised, even if there are only slight actual differences. Using a graph can be beneficial in reaching a knowledgeable inference (Saunders et al., 2019).

3.13.4 Multivariate Analysis

Multivariate analysis is a statistical technique that compares more than two variables. The researcher used trivariate analysis to construct a three-dimensional model to examine the correlation between two variables. Due to the inherent limitations of human perception being confined to the third dimension, researchers frequently resort to alternative methods and tools to comprehend the interconnections within the data (Humble, 2020). The Seaborn library in SPSS can produce pair plots for visualisation purposes. Depending on the variable type, the plots generate a comprehensive graphic that compares specific variables through scatter plots and histograms. The type of graphic is commonly called a scatter plot matrix, as Williams et al. (2021) noted.

3.13.4.1 Confirmatory Factor Analysis (CFA) . CFA is a statistical method used to determine the underlying factor structure of a set of measurable constructs (Suhr, 2006). The primary objective of conducting Confirmatory Factor Analysis (CFA) is to evaluate the structural model, as mentioned by Herman (2016). The (CFA) underwent examinations to determine its convergent and discriminant validity. The establishment of convergent and discriminant validity was conducted by analysing the multigrain-multimethod matrix, following the guidelines provided by Marsh and Hocevar in 1988. Structural equation modelling (SEM) was employed to evaluate hypotheses and enhance the suggested model prior to achieving definitive results.

3.13.4.2 Structural Equation Modelling (SEM). A multivariate statistical approach called structural equation modelling (SEM) determines the route analysis between constructs (variables). SEM "provides an incredibly general and practical framework for statistical analysis that includes several conventional multivariate procedures, including factor analysis, regression analysis, discriminant analysis, and canonical correlation, as special cases," according to Hox and Bechger (2007, p.354). The study employed SEM to analyse the mediating impact of SCI and supply chain resilience mediating between state-owned logistics enterprises. Internal integration, supplier integration, customer integration, information sharing and supply chain resilience are the five dimensions considered in the model.

3.13.4.3 Multiple Regression Analysis. Saunders et al. (2016) note that regression involves calculating the regression equation coefficient using a single independent variable. Conversely, it also encompasses the process of deriving a regression equation using two or more independent variables (Saunders et al., 2016). The purpose of multiple regression is to predict and establish causal relationships between independent and dependent variables (Allison, 1999; Leedy & Ormond, 2014; Sekaran & Bougie, 2016). In line with this perspective, Saunders et al. (2016) highlight that regression analysis enables the prediction of dependent variable values when given the values of one or more independent variables through the calculation of the regression equation. Multiple regression can be calculated using the formula below (Wilson, 2014):

$$YY = aa + bb1\ xx1 + bb2\ xx2 + bb3\ xx3 + bb4\ xx4 + \cdots + bbnn\ xxnn$$

Where: x = independent variable

y = dependent variable

a = point where the line intersects the y axis

b= gradient of the line

This study utilised multiple regression analysis to examine hypotheses and accomplish research objectives one through four. Multiple regression analysis was utilized to determine whether there is a significant correlation between SCI and SCRS. The utilisation of multiple regression in this investigation enabled the researcher to ascertain the interdependence of the variables in this study.

3.13.4.4 Canonical Correlations. This study sought to examine the correlation between various dependent variables and independent variables. Specifically, it addresses the connection between logistics stakeholders, transportation companies, and clearance agencies and their impact on several performance factors, such as delivery quality, productivity, and rejection rates. Various univariate, bivariate, and multivariate methodologies can be employed to analyse the sample data. The employed methodologies facilitate the extrapolation of the research outcomes from the sample to a broader population. Using suitable statistical methods for assessing research hypotheses is of utmost importance.

3.13.4.5 Discriminant Analysis. This analytical method enables the discovery of independent variables that distinguish a desired dependent variable assessed on a nominal scale. It can differentiate between those who score well on a particular measure and others who score poorly. The linear combination of independent variables demonstrates the discriminant function, highlighting the significant differentiation between the means of the two groups. In other words, interest groups can be distinguished based on independent variables measured on an interval or ratio scale.

3.14 Data Quality Control

Quality control is identifying and detecting any potentially questionable data that may have been generated. It involves combining automated and manual techniques to assess whether the data satisfies the criteria established by the end user. High-quality data can assist an organisation in developing a more efficient business strategy to facilitate decision-making (Williams et al., 2021). To verify the precision of the information, Google Forms and similar technologies have been found to enhance respondents' engagement in research studies compared to other online platforms. The study conducted an extensive review of the suitability of the selection platform for the study's purpose, taking into account the scope of the study, the characteristics of the tasks involved, and the desired level of engagement from respondents (Roni et al., 2019).

3.14.1 Validity

According to Wang et al. (2021), an instrument is utilised to assess the expected behaviour or quality and the degree to which it achieves its intended objective. The validity of a measuring instrument is determined by the accuracy and relevance of the data it generates, as revealed by the analysis. According to Jones (2019), validity refers to collecting data suitable for the intended use of the measuring instrument. In this instance, it is necessary to conduct validity tests to determine whether the scale's expressions yield suitable measurements for the research. Although it is a more intricate process, assessing the accuracy of the measuring apparatus holds greater significance than establishing its consistency. For the research to maintain validity, it is imperative that the measuring instrument accurately and precisely measure the intended variable. The utilisation of measuring equipment that has been accredited ensures that the findings of the research are precise. Reliability is a term used to describe a measuring instrument's consistency and stability over time. Dependability, in alternative phrasing, pertains to the capacity of measurement instruments to generate comparable results across multiple usage instances. Different outcomes are expected due to variations in population, sample, and duration of instrument usage.

3.14.1.2 Internal Validity. The term pertains to the degree to which the outcomes of a research study can be attributed to the research intervention itself rather than any shortcomings in the research design (Sekaran and Bougie, 2016, p 172). The researcher can establish internal validity through a study if statistical evidence demonstrates that an intervention is responsible for a particular outcome rather than being influenced by other confounding variables that may be acting simultaneously. According to Sekaran and Bougie (2016), studies with solid internal validity lend themselves more favourably to claims that a link is causal. Studies with low internal validity do not allow for the inference of causality.

3.14.1.3 External Validity. The term refers to the extent to which the research findings of a study can be applied to other pertinent contexts. An inquiry that a logistics manager of a state-owned enterprise may pose is whether the researcher can apply results from a research study conducted in one organisation within the company to guide policy and practice in other organisations within the same group. The inquiry posed by the CEO of a

state-owned enterprise is whether the results of a study conducted by students can be extrapolated to other departments within the organisation. Similarly, the researchers exercise caution while choosing a sample from a population to ensure its representativeness; researchers and their stakeholders frequently prioritise the establishment of the generalisability of their findings to other contexts. In instances of this nature, it would be imperative to reproduce the study in the setting mentioned above (s) to ascertain statistical generalisability. Sekaran and Bougie (2016) define external validity as the degree to which the researcher can apply the findings of a causal study to other contexts.

3.14.1.4 Construct Validity. Construct validity refers to the degree to which the obtained results align with the theoretical constructs underlying the study for which the measure was developed. Sekaran and Bougie's (2016) work is the subject of discussion.

3.14.1.5 Discriminative Validity. The establishment of discriminative validity is possible when there is no correlation between two concepts that are distinct from each other. The researcher can establish validity, both convergent and discriminatory, through the use of the multigrain-multimethod matrix. However, it is essential to note that this discussion falls outside the scope of the objectives outlined in this study (Sekaran & Bougie 2016).

3.14.1.6 Criterion Validity. The study can establish a measure's power to distinguish between distinct individuals through testing. Johnson (2020) asserts that when researchers assess whether certain items are suitable for measuring a particular concept, face validity suggests that, at first glance, these items seem to be a reasonable fit for measuring that concept. However, some researchers do not consider face validity a reliable part of content validity.

3.14.1.7 Content Validity. Ensuring that the measurement encompasses an adequate and appropriate representation of items that effectively assess the concept is imperative. A higher degree of content validity indicates a more thorough delineation of the dimensions and elements of a concept among the items used to measure it (Sekaran & Bougie 2016).

Within the field of research, validity refers to the extent to which a survey instrument accurately assesses the dimensions it is designed to measure, as highlighted by scholars such as Saunders et al. (2016), Sekaran and Bougie (2016), and Wilson (2014) This notion refers

to the correspondence or compatibility between the specific details of the investigation, the corroborating evidence, and the resulting findings, as pointed out by Kalof et al. (2008). According to Saunders et al. (2016), four essential scenarios must be considered to assure the accuracy and reliability of measurement instruments. First, researchers need to have a clear understanding of the necessary information and then design the questionnaire accordingly. Furthermore, the respondents must be able to comprehend and decipher the queries presented to them accurately. Furthermore, respondents are required to participate actively in and provide responses to the questions provided. Finally, researchers should possess a high level of skill in deciphering and comprehending the results obtained from the survey instrument.

3.14.2 Reliability

The reliability of measured values obtained from repeated measurements carried out under the same conditions using a measuring tool is called reliability (Haile, 2019). According to this study, the validity and reliability of the measurement instrument must be two critical features. A measuring instrument can be dependable even if it is not valid; if it is valid, it is also highly likely to be trustworthy (Kumar, 2019). The validity and reliability of the term encompass distinct aspects of measurement.

Researchers must assess the dependability and validity of the intended measurement instrument to ensure it meets the two requirements of reliability and validity. It should also refrain from interpreting research results as the study may not represent expected behaviour or quality (Mughumalewa, 2021). This study highlights the importance of the validity and reliability of quantitative research scales (Qiu, 2022). Validity is the ability of a measuring instrument to measure precisely without being influenced by another quality. Reliability is the ability of a measuring instrument to give reproducible findings under the same conditions. The validity of a scale is established by how effectively it accomplishes the function for which it was developed.

Validity and reliability are critical characteristics of any measuring instrument. Butler-Kisber (2019) defines a legitimate instrument as one that measures what it is meant to measure. The questionnaire's validity was determined by a rigorous examination of the face validity of each item (Berends, 2019). The researcher validated the questions through discussions with the supervisor and provided instant messaging contact information to the responders. According

to Sekaran and Bougie's (2016) proposition, a measure's reliability is established through consistency and stability testing. The study assessed the degree of internal consistency by examining the extent to which the items designed to measure a particular construct cohere as a unified set.

Cronbach's Alpha, developed in 1951 by Lee Cronbach, is a statistical measure of reliability that assesses the degree to which items within a set exhibit positive correlations (Tavakol & Dennick, 2011). The calculation of Cronbach's Alpha involves the determination of the mean intercorrelations among the items that assess the given concept. A higher degree of internal consistency and reliability is indicated by a Cronbach's alpha value that approaches 1. According to Sekaran & Bougie's (2016) studies, reliability scores below 0.60 are generally regarded as poor, while those that range between 0.70 and 0.80 are deemed acceptable, and those that exceed 0.80 are considered good (Sekaran & Bougie, 2016, p.290). Table 4.6 in the following chapter displays Cronbach's alpha test results for the variables of this study, along with the methodology employed to obtain them.

3.16 Ethical Considerations

This study strictly followed the ethical norms set forth by the University of KwaZulu-Natal for conducting research. The Namibia Port Authority (NAMPORT) has issued a letter to gatekeepers. The researcher successfully filled out the Ethical Clearance Application form. The researcher sent the instruments, the letter from the gatekeeper, and the fully completed Ethical Clearance Application form to the Humanity and Social Sciences Research Ethics Administration at the University of KwaZulu-Natal. The ethical clearance certificate, bearing the reference number HSSREC/00003545/2021, was issued on 25 November 2021 (See Appendix C). The subsequent measures were implemented to guarantee compliance with the ethical standards of the University of KwaZulu-Natal .

3.16.1 Institutional Clearance and Scientific Integrity of the Researcher

The researcher submits the research proposal to the ethical committee for assessment before beginning the study. The researcher has sought permission from the CEO of the Port of Walvis Bay to conduct the study. This ensures that the study conducted respects the

respondents' dignity, rights, and safety and that the research design is solid and likely to provide the desired findings (Terrell, 2021). The researcher would conduct the study professionally and adequately. The researcher would not change the subjects or the findings to satisfy prejudices. To avoid plagiarism, the researcher must cite and recognise all sources used in the research.

3.16.2 Self-Determination (Autonomy)

Autonomy is defined as an individual's ability to determine what to do and what they agree to (McCoy, 2021). Respondents would know that abandoning the study at any time will have no negative consequences and that participation is optional. The respondents would not need to do anything they do not want to do.

3.16.3 Respect

The respondent's privacy and dignity are maintained. To guarantee the confidentiality of the respondents, questions would be posed in private rather than in front of the public during data collecting. Respondents would not be identified in the findings and would be requested to use codes rather than their real names. The researcher guaranteed that no one used their actual identities throughout the data management and storage and that none of the respondents' real names were revealed during the survey. Instead, respondents were isolated from the rest of the subjects using codes and numbers that only the researcher knew. Since no names were associated with the data, the respondents' identities were kept anonymous, even during the publication and presentation of the research findings.

3.16.4 Justice

Everyone was treated fairly and equally. This was ensured throughout the study so that everyone in the sample, not only those chosen by the researcher, had an equal opportunity to participate. In addition, a researcher would share the study's findings with all respondents. All respondents received the researcher's contact information in case of any problems. When the study began, respondents were made aware that participation and refusal to participate

were wholly voluntary and free of charge. The researcher did not compel volunteers to provide information, mainly personal information.

3.16.5 Beneficence

Beneficial actions are those taken for the benefit of others (Johnson, 2020). According to this theory, the study's subjects suffered no physical, emotional, social, financial, or emotional harm. They were not subjected to sensitive inquiries or activities that may have made them feel inadequate or anxious. This study attempted to generate new and valuable knowledge. It never intended to hurt individuals or acquire data at their cost. Respondents would be able to withdraw from the study if uncomfortable and if they decided they did not want to continue. This was conveyed to them during the authorisation process before the research began. Before agreeing or declining to participate, individuals were informed of the study's objectives, merits, risks, and limitations.

3.17 Methodological Limitation

The data collection for this study was restricted to the six supply chain participants linked to the Port of Walvis Bay, Namibia. The researcher and Port Authority sought ten logistics industries, but only six authorized access to the survey were available in their companies. The issuance of a gatekeeper letter from the Namibian Port Authority obtained this access. The data collected from the six organizations were utilized to construct the conceptual framework for assessing the success of SCI in Namibia's owned logistics enterprises (SOLE). To clarify, the study was extended to encompass the logistics sectors in the Erongo region. Despite its modest size, Namibia presents an opportunity for future research to examine the efficacy of SCI across all logistics sectors in the country.

One additional constraint of this study was the utilisation of the cross-sectional methodology. A longitudinal study is necessary to determine the effects of five mediating variables (internal integration, supplier integration, customer integration, information integration, and supply chain resilience) on the endogenous variable (organisational perspective).

3.18 Chapter Summary

The chapter extensively examined the methods employed to achieve the study's objectives, grounded in the positivist philosophy, while acknowledging the strengths and limitations of other philosophies. It delved into various aspects, including research philosophy, methodological choices, research design, population and sampling, sampling approaches, techniques, sample size determination, and the selection of data collection instruments and analysis tools. The quantitative research design informed the utilization of both non-probability and random probability sampling to identify participants. Respondents were selected through a combination of random, cluster, convenience, and purposive sampling techniques, ensuring a coherent alignment with the research objectives and preventing the adoption of inappropriate methods.

The chapter also explored the philosophical underpinning guiding the study and its relation to the research process. Tools such as SPSS version 25, SEM, PPCMM, Shapiro Wil Test, Kaiser–Meyer Olkin, and Bartlett’s Test of Sphericity, employed for data analysis, were comprehensively explained. The chapter addressed the validation and reliability testing of the research instrument and delved into the methodology's limitations and ethical considerations. The subsequent chapter presents the outcomes of data analyses, encompassing univariate, bivariate, and multivariate analyses.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This Chapter analyses survey questionnaire data collected by the researcher according to the research plan in the previous Chapter. The Chapter also presents and analyses researcher data. Along with descriptive statistics, the Chapter discusses respondent demographics. The essential factors of the supply chain integration construct were examined. The study used a questionnaire to collect data for analysis, and the study utilised a survey instrument (questionnaire) to collect data for analysis. The previous Chapter on research methodology and data collecting recommended univariate, bivariate, and multivariate techniques The researcher used SPSS (Version 25) to analyse and interpret data using univariate methods like descriptive statistics, frequency distribution, and pie and bar charts, bivariate methods like inferential statistics with hypotheses testing, Pearson's Product-Moment Correlation Coefficients, a test of normality, Kaiserer–Meyer Olkin (KMO), and Bar-Heyy's of Sphericity.

4.2 Response Rate

A total of 370 survey questionnaires were distributed to the respondents by email, along with a shared Google sheet; Out of them, 360 questions were completed and returned. Out of the 360, a total of fully answered responses were returned and considered suitable for analysis. The rate of response was 97%. The high response rate achieved was sufficient to meet the research objectives.

The researcher obtained a high response rate, likely attributed to the timely notification provided to the management of the ports and all stakeholders affiliated with the Port of Walvis Bay prior to the initiation of data collection. Additionally, the management and employees displayed a keen interest in the research findings. This research was instrumental in making strategic-level decisions for managers and improving the welfare of state-owned logistics enterprises in logistics and transport industry companies.

4.3 Univariate Analysis

Univariate analysis is a statistical technique that investigates the distribution of cases based on one variable at a time, aiming to offer a descriptive summary (Sekaran & Bougie, 2016). Bivariate analysis refers to the examination of the relationships between variables. Analysing the links between variables involves investigating if the changes in one variable are correlated with the changes in another one (Suhr, 2006). The initial step in the descriptive statistics analysis typically involves generating a frequency distribution. The collected data is then analysed to ascertain central tendency and variability measures.

4.3.1 Frequency Distribution: Pie and Bar Charts

A frequency distribution is a visual depiction of data that showcases the distribution of variable values across the units being analysed. Frequency distributions are employed to describe the responses to a certain variable and assess the extent of non-response, if any, by displaying the counts and percentages both before and after accounting for non-responses. The researcher can effectively evaluate the data by utilizing these summary measures, which condense the key features of different distributions and consolidate information into specific numerical values.

4.3.2 Analysis of Demographic Data

In this section, the respondents' demographics are presented in four questionnaire categories of demographic data from the respondents, describing the sample that was most appropriate for this investigation. The demographic data collected comprised gender (see Figure 4.1), age (see Figure 4.2), years of working experience in the organisation (see Figure 4.3), job titles of the respondents (see Figure 4.4), and educational qualifications (see Figure 4.5), as précised in the subsequent section. The analysis of the demographic data, which was achieved with descriptive statistics, was presented.

Following the mailing of the questionnaire, a total of 360 usable questionnaires were collected, yielding a 97% response rate. According to the analysis of demographic

characteristics, 163 of the 360 respondents in this survey were females, while 244 were men (see Figure 4.1). This reflects that most study respondents in the logistics industry were men. Women's involvement in logistics, transportation, and crucial roles across the sector's value chain does not indicate a pro-gender equality stance. Males dominate the logistics and transport fields. The male contribution accounted for 68% of the study, while females provided 32%. Owing to the nature of the industry, most logistics companies' employees are men, and men also run most logistics companies in Namibia.

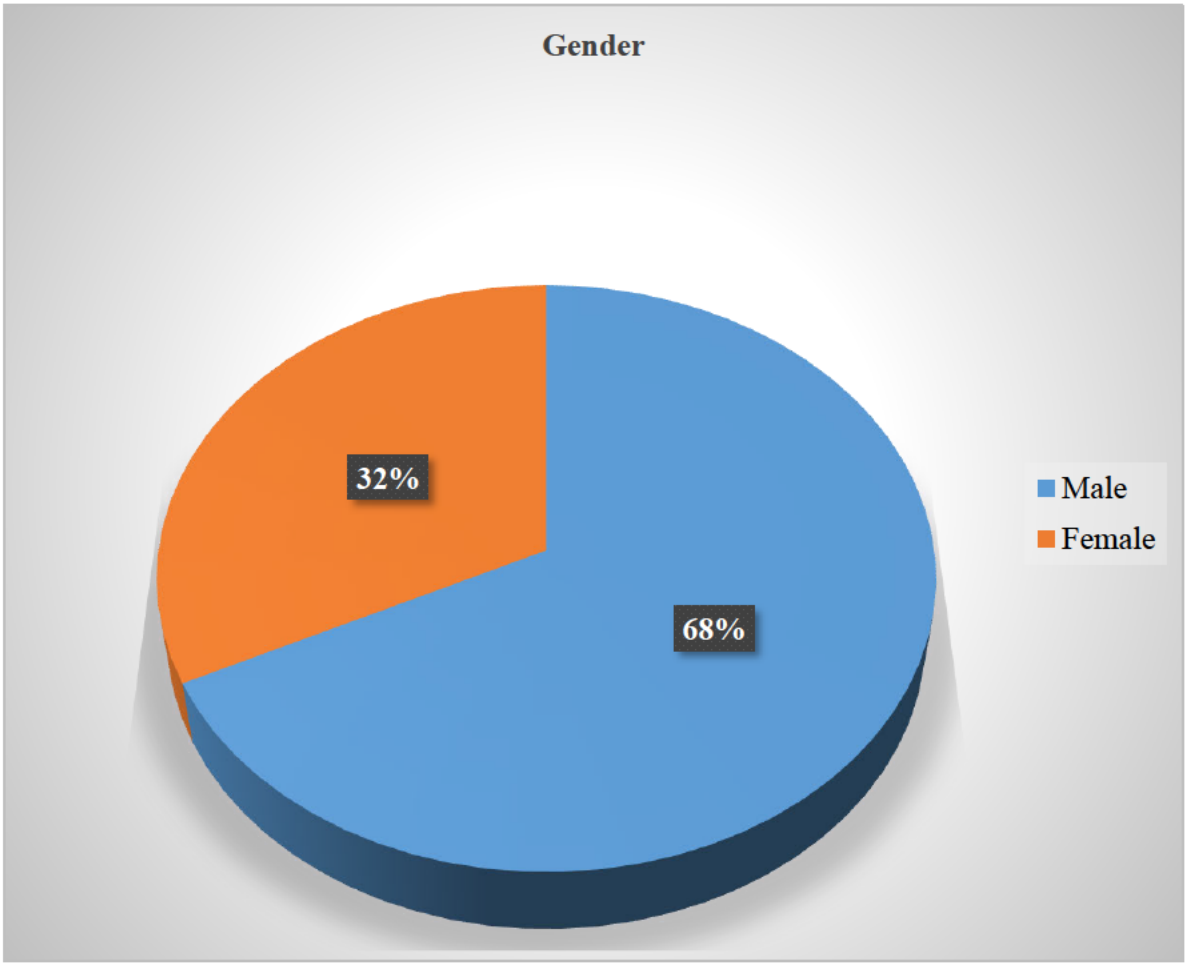


Figure 4.1 Distribution of Respondents by Gender

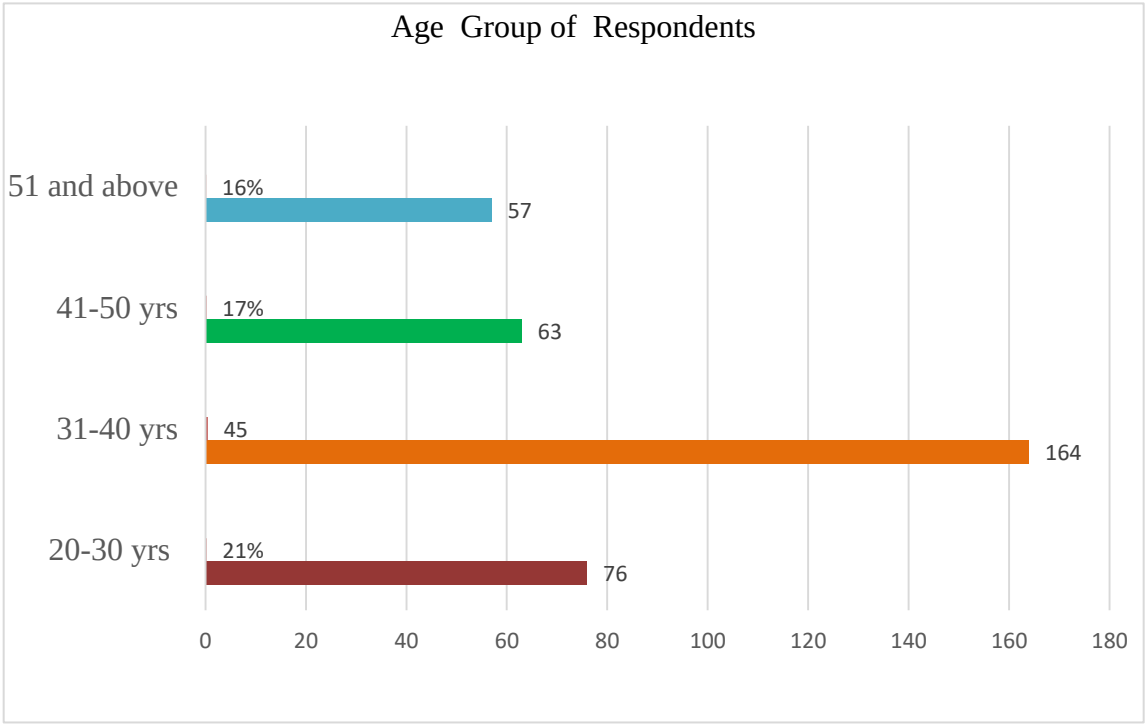


Figure 4.2 Age Group of Respondents

Figure 4.2 shows that the age group with the most respondents was 31-40 years, followed by 20-30 years, then 41-50 years, and the smallest group was older than 51 years. Regarding age, the analysis showed that all respondents were within the active working sample. Based on the existing literature and the latest journals, the researcher observed that most SCI studies and researchers paid particular attention to age when analysing data. The research divided the age group into four sections: under 20 - 30, 31 - 40, 41 - 50, and 51 and over. According to the demographic breakdown of respondents, the majority (89% of the respondents) were below 50. Fifty-seven people were over 51 years of age, while 76 people were between the ages of 20 and 30, accounting for 21 of all respondents.

Furthermore, 45.50% of the 360 research respondents were between 31 and 40 years old. Most respondents (50.6%) were between 31 and 40. The last age category, above 51, had 57 respondents, accounting for 15% of all study respondents.

Having more employees aged 51 and under in this profession suggests various advantages, the most significant of which are long-term connections. This level of SCI is vital in this business. The availability of young people in logistics and transportation, particularly in the

supply chain, is a critical asset to the country's development strategy, notably Namibia Vision 2030 since ports serve as work experience centres for future engagement. Additional benefits, such as revenue and worker taxes in the field for many years until retirement, should not be overlooked.

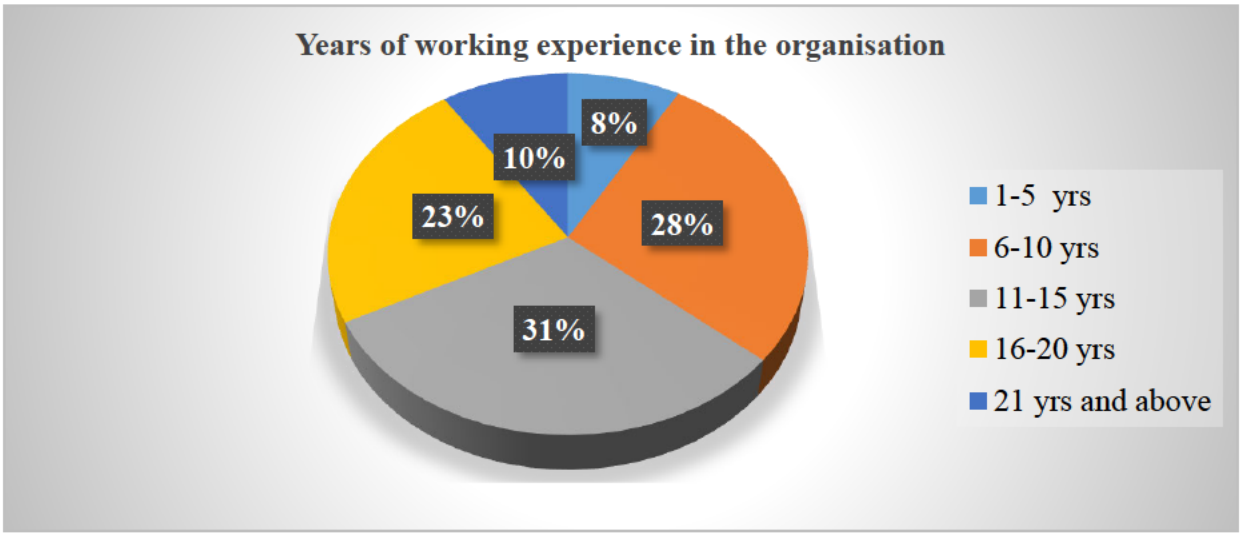


Figure 4.3 Years of Working Experience in the Organisation

This variable showed that most respondents had been with the organisation for more than ten years, with those who had been in the organisation for 11-15 years accounting for 31.0% of all respondents; for 1-5 years, 8% of respondents; for 6-10 years, 28% of respondents; for 16-20 years, 23% of respondents and for 21 years or more.

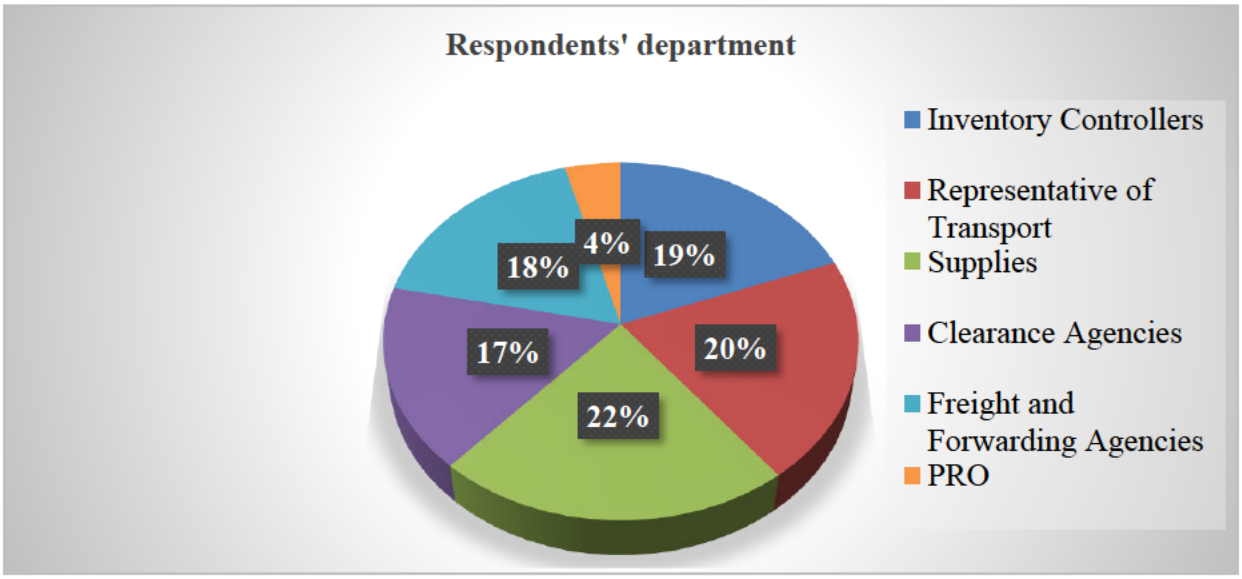


Figure 4.4 Respondents' Distribution by Department /Unit

Figure 4.4 depicts the percentage of respondents occupying different logistics industry positions. Transportation comprises 20% of the respondents in the study, whereas the other departments have the highest representation (22% of the listed departments). The remaining percentages represent Freight Forwarding Agencies (18%), Clearance (17%), Inventory Controllers (19%), and Government Liaison Officers (PRO) 4%).

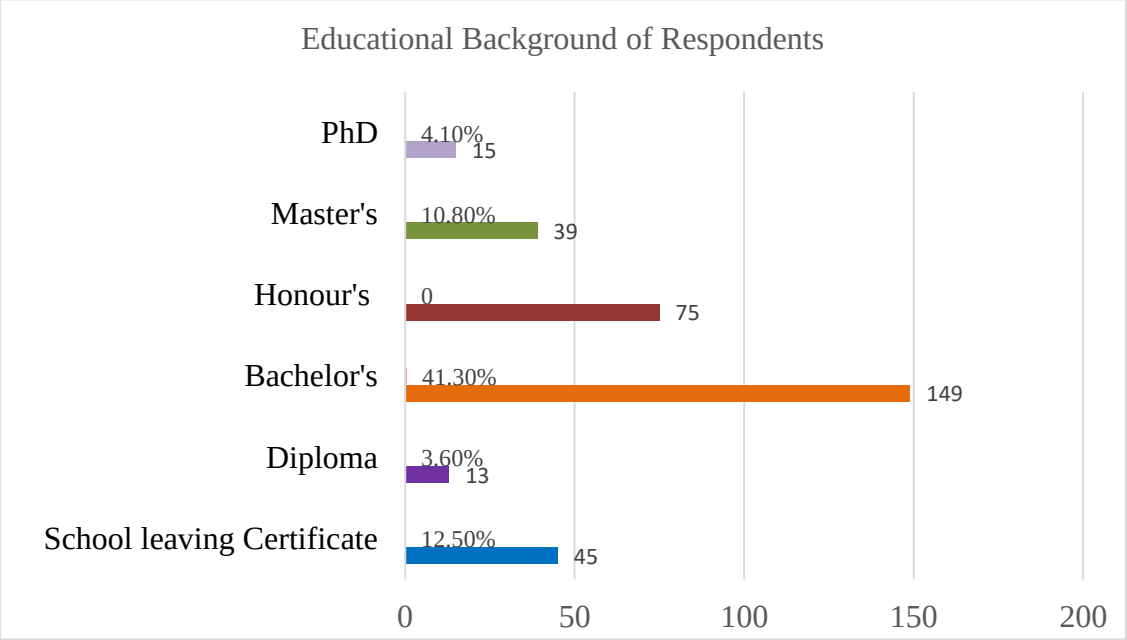


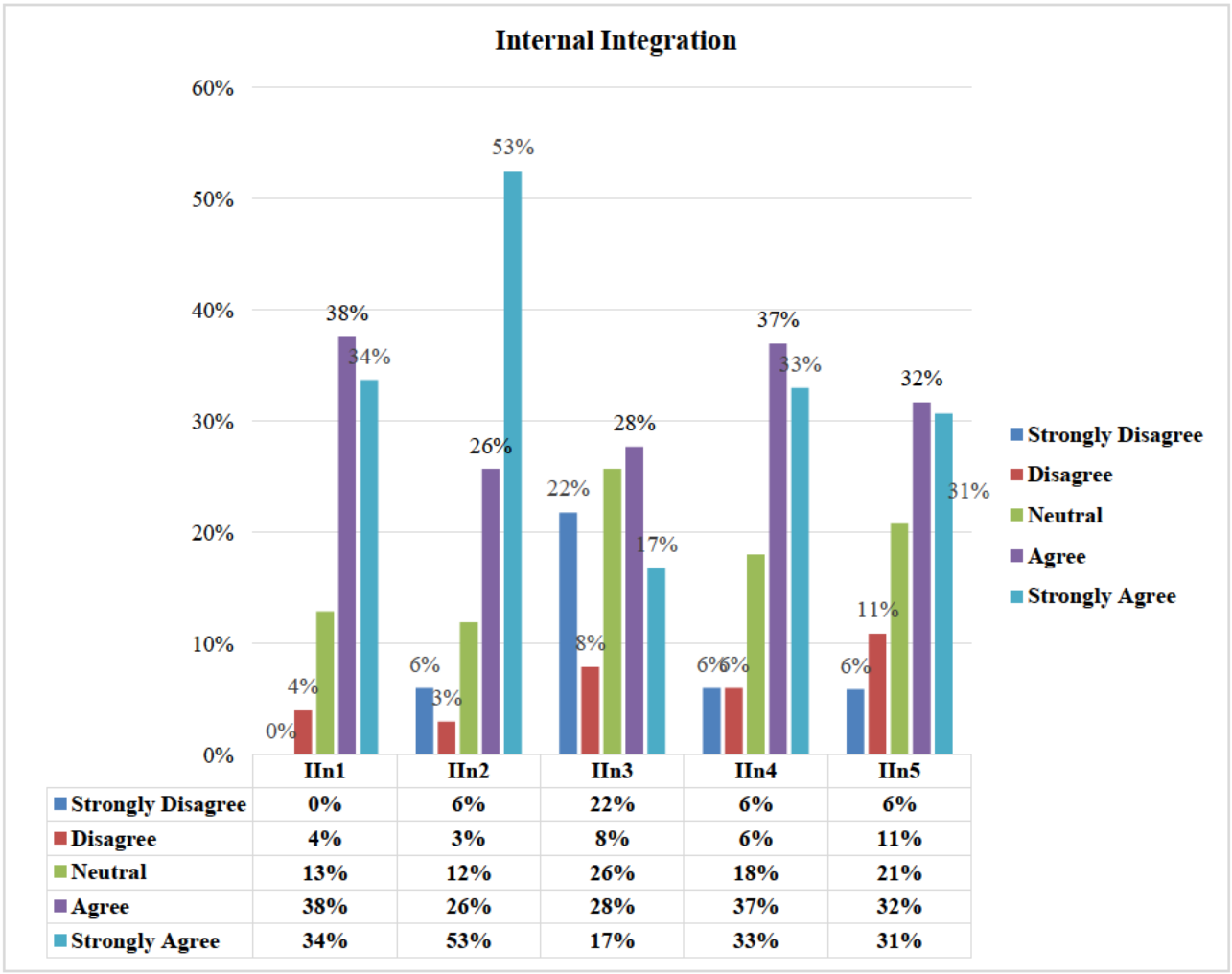
Figure 4.5 Educational Background

Regarding educational attainment, most respondents (41%, n = 149) had bachelor's degrees. Educational background was also an essential factor to consider for this study. Regarding educational attainment, most respondents (41%, n = 149) had bachelor's degrees. Following a comprehensive review of the literature, the researcher discovered that the previous authors had paid attention to age, which was then included in the questionnaire. According to Figure 4.5, most respondents had postgraduate qualifications; 149 were graduates, 39 had master's degrees, 13 had diplomas, including the school leaving certificate, and 15 had PhDs. Of the 360 respondents in the study, 45 had completed their secondary education and contributed 12.5%. Similarly, 13 people had a school diploma level, accounting for 3% of the overall sample. The bachelor's degree education level included 149 individuals, accounting for 41%

of all respondents. Furthermore, 39 respondents possessed a master's degree, representing 10.8% overall; finally, the 15 PhD holders made up accounted for 4% of all respondents.

4.3.3 Frequency Statistics for the Measures of the Research Constructs

The responses provided by the survey respondents on the items adapted to measure the constructs (internal integration, supplier integration, customer integration, and information integration) are depicted in Figures 4.6 to 4.10 below).

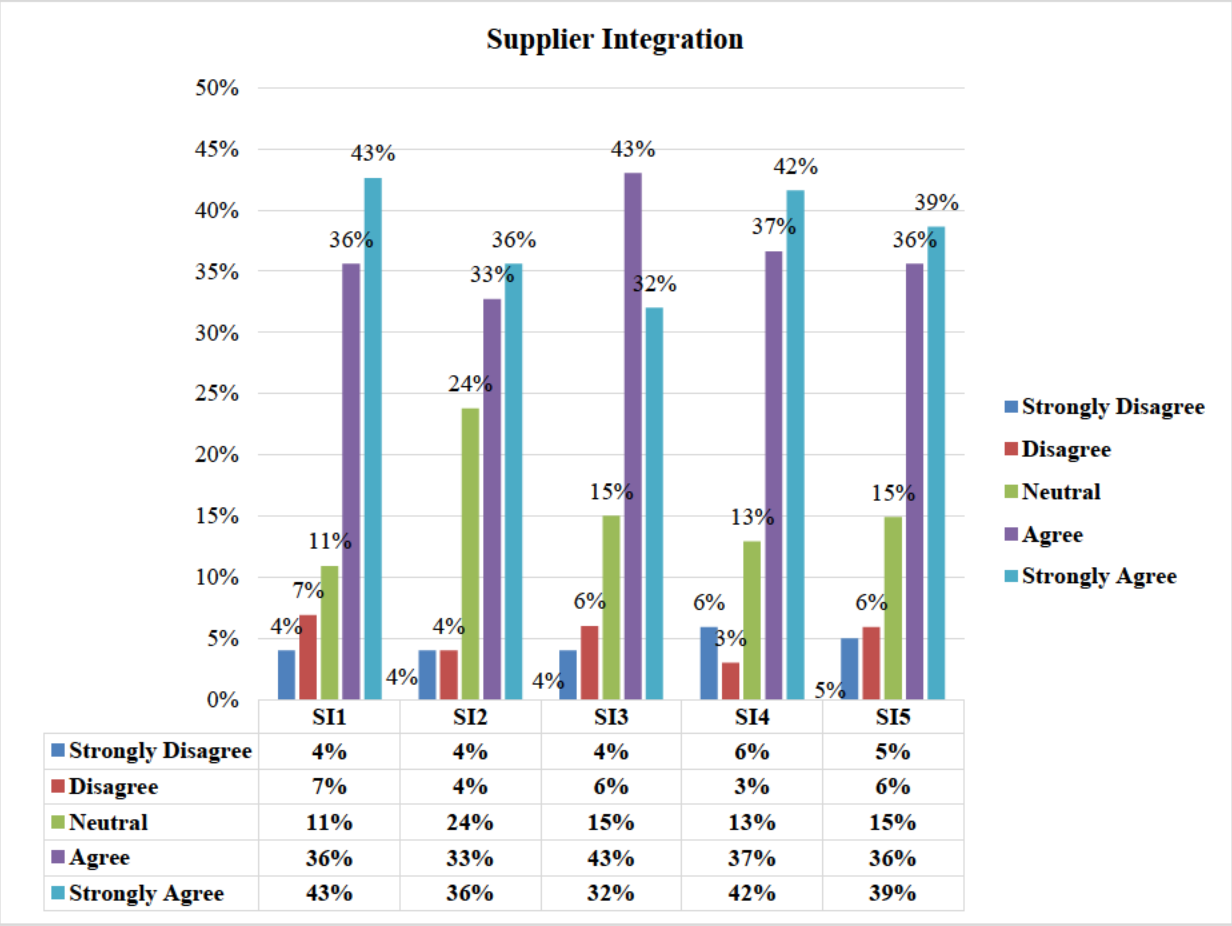


	IIn1	IIn2	IIn3	IIn4	IIn5
Strongly Disagree	0%	6%	22%	6%	6%
Disagree	4%	3%	8%	6%	11%
Neutral	13%	12%	26%	18%	21%
Agree	38%	26%	28%	37%	32%
Strongly Agree	34%	53%	17%	33%	31%

Figure 4.6 Internal Integration

In Figure 4.6, depicting Internal Integration, it can be determined that, in category IIn1, 38% of the respondents acknowledged adopting functional teams within their organisation, as

these teams play a vital role in process improvement and product creation. In category IIn2, more than half of the respondents 53% emphasised data integration among internal processes in influencing their decision-making and actions. Additionally, IIn3 revealed that 28% of the respondents believed in enterprise-wide application integration across different organisational functions. Regarding inter-departmental collaboration, 37% of the respondents confirmed occasional inter-departmental meetings within the organisation in response to question 4, category IIn4. Consequently, 31% of the respondents in II5 strongly expressed the importance of real-time integration and connectivity across all internal processes, encompassing raw material management, manufacturing, shipping, and sales. It is worth noting that this study recognised the crucial relationship between supplier integration and internal integration, making it imperative to measure this variable in the research.

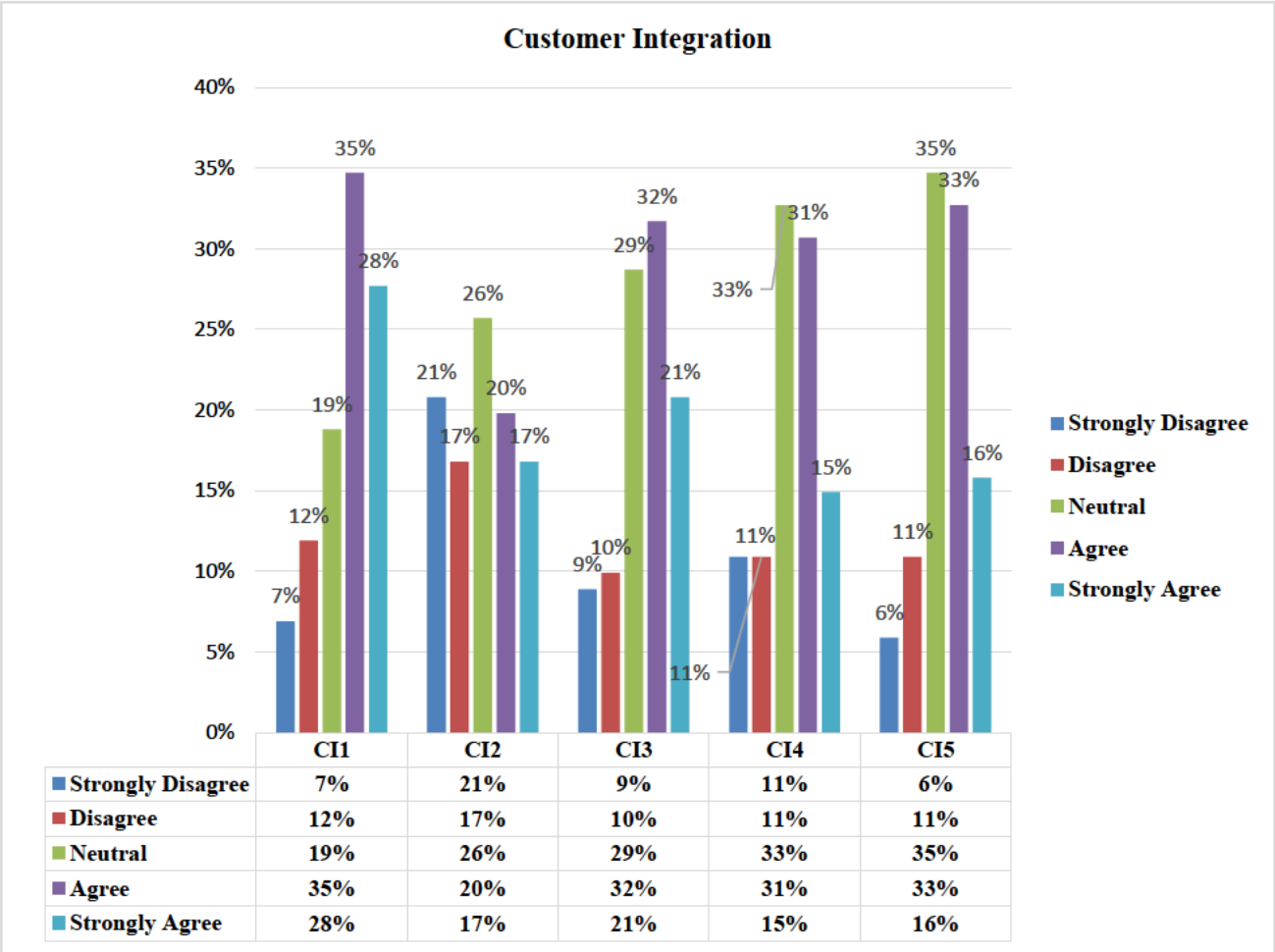


	SI1	SI2	SI3	SI4	SI5
Strongly Disagree	4%	4%	4%	6%	5%
Disagree	7%	4%	6%	3%	6%
Neutral	11%	24%	15%	13%	15%
Agree	36%	33%	43%	37%	36%
Strongly Agree	43%	36%	32%	42%	39%

Figure 4.7 Supplier Integration

As presented in Figure 4.7, the research findings shed light on the critical role of collaboration and communication with key suppliers in achieving successful supplier integration and enhancing overall performance. The respondents' responses (SI1) revealed that a substantial proportion (43 %) strongly agreed on the importance of establishing extensive cooperation with critical suppliers during procurement and production supply integration. This emphasises the significance of nurturing solid supplier relationships to ensure seamless and efficient supply chain operations. In addition, in SI2, 36% of the respondents firmly acknowledged that their key suppliers maintained strategic and robust bond ties with their organisation. These strategic ties are vital in building trust and reliability, essential for fostering long-term partnerships and successful supply chain management. Furthermore, in SI3, 43% of the respondents reported the presence of beneficial ties facilitated through information networks with their primary supplier. This highlights the significance of information sharing in supply chain management, enabling organisations to make informed decisions, anticipate demand patterns, and streamline their operations.

Regarding supply chain planning and responsiveness, SI4 revealed that 41% of the respondents strongly agreed that a high level of shared planning contributed to adopting quick response ordering procedures (inbound with supplier). This agility in responding to market demands enhances performance and confers a competitive advantage. Moreover, respondents found effective communication and sharing of demand forecasts crucial in supply chain management. In SI5, 38% of the respondents actively communicated their demand forecasts with critical suppliers. This proactive communication helps reduce uncertainties, minimise stockouts, and optimise inventory levels. The study results underscore the importance of effective collaboration and communication with key suppliers as fundamental pillars of successful SCI. Establishing solid partnerships, maintaining strategic bond ties, and promoting information sharing are essential elements that enhance an organisation's ability to navigate the complexities of the supply chain landscape and ultimately improve overall performance. These insights hold valuable implications for supply chain managers and practitioners striving to optimise their supply chain operations and achieve higher levels of resilience and competitiveness.

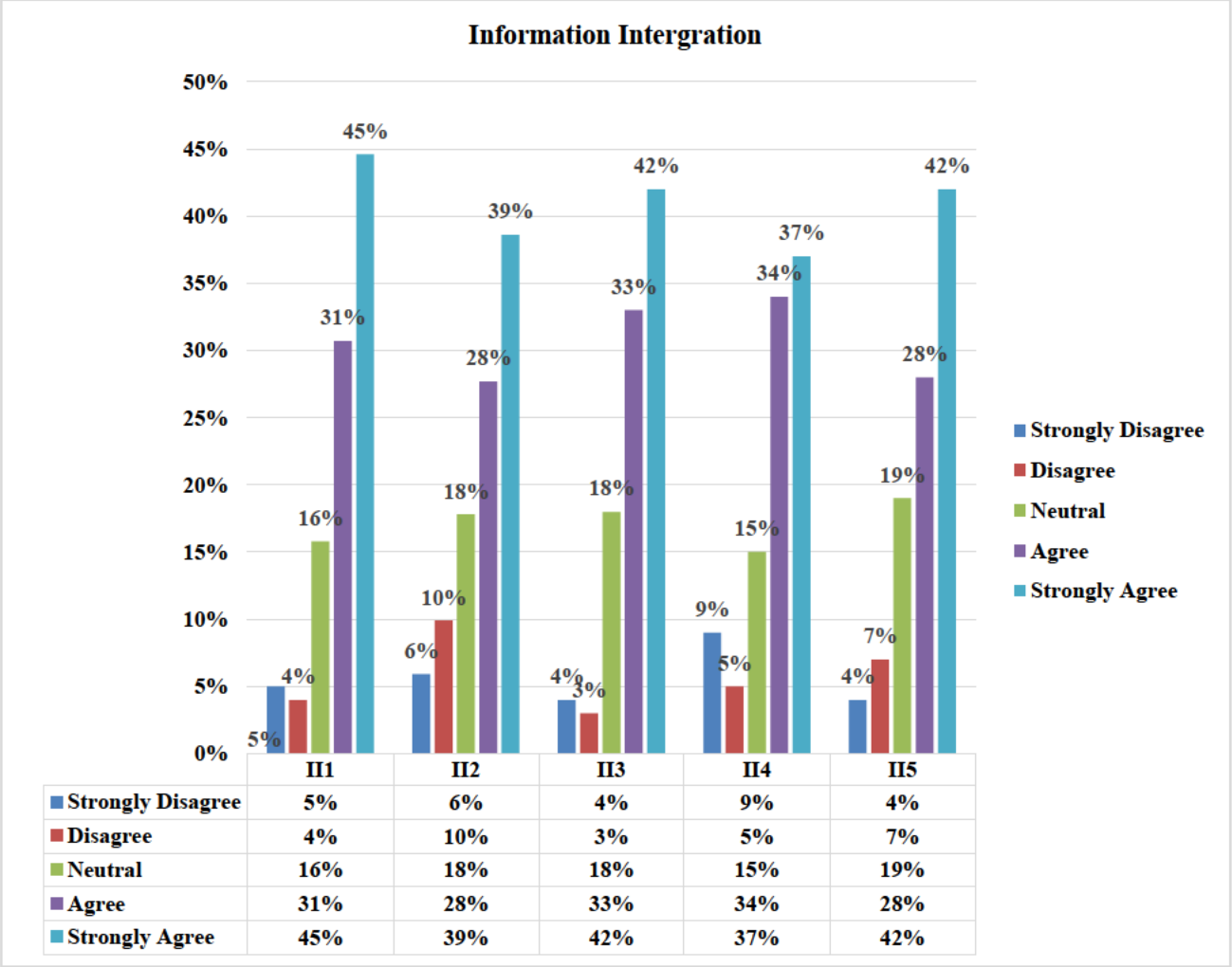


	CI1	CI2	CI3	CI4	CI5
Strongly Disagree	7%	21%	9%	11%	6%
Disagree	12%	17%	10%	11%	11%
Neutral	19%	26%	29%	33%	35%
Agree	35%	20%	32%	31%	33%
Strongly Agree	28%	17%	21%	15%	16%

Figure 4.8 Customer Integration

The researcher also explored the concept of customer integration quality as a provided variable. The results from this analysis are summarised in Table 4.8, which presents the study respondents' responses in this regard. According to the data presented in CI1, 35 % of the respondents acknowledged that their organisation had established high informational connections with its critical consumers. Similarly, in CI2, 25% of the respondents reported sharing market knowledge with their core customers. Moreover, in CI3, 31% of the respondents stated that the communication channel with their critical consumers was highly effective, resulting in improved service delivery. Additionally, in response to question CI4, 32% of the respondents agreed that they had successfully implemented swift ordering processes with their customers. Strategic collaboration with significant customers plays a pivotal role in organisations. Such close cooperation enables the company to gain valuable

insights into their customers' needs, enabling them to anticipate demand patterns, timing, and volume accurately. As a result, the company can optimise its operations, production, and inventory management, reducing costs and improving service levels. This collaborative approach aims to create a mutually beneficial situation where the company and its customers reap the benefits of an efficient and effective supply chain.

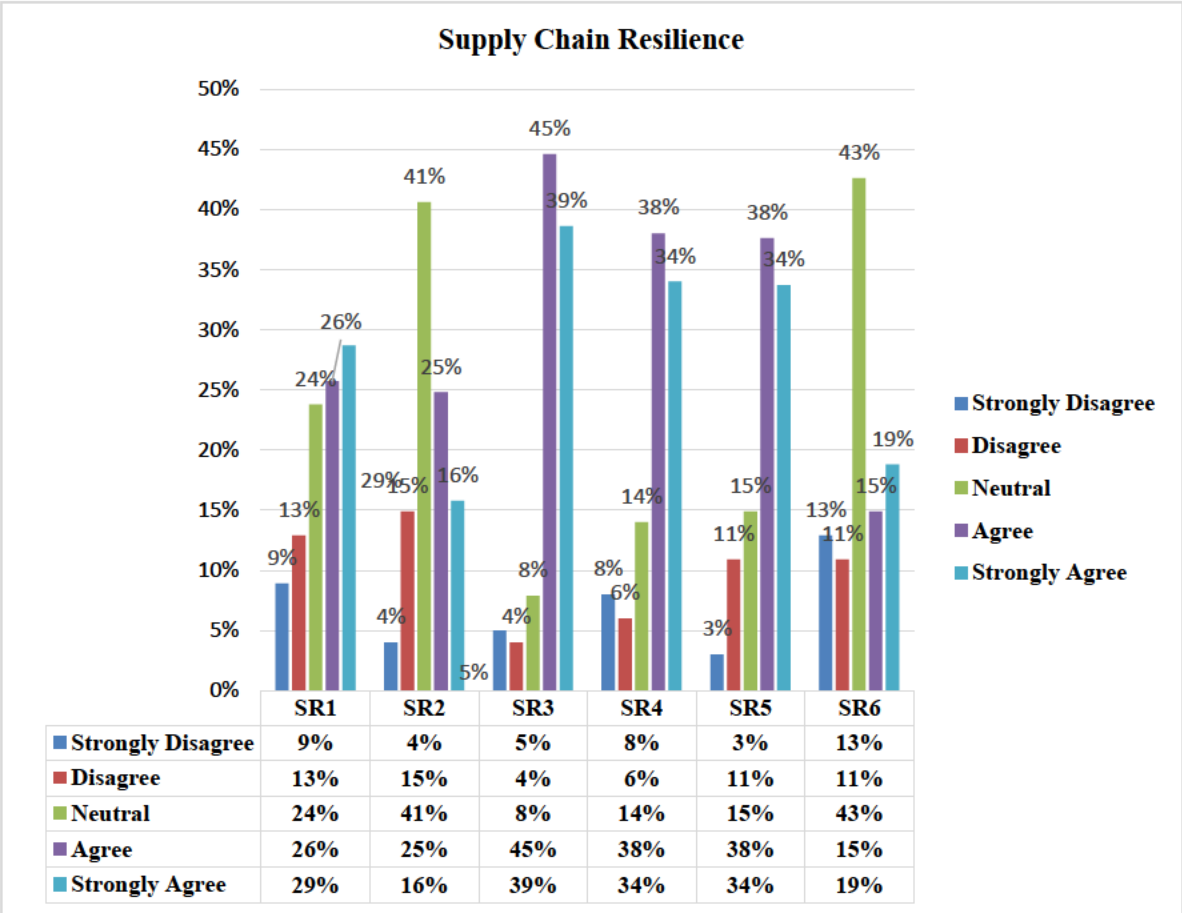


	II1	II2	II3	II4	II5
Strongly Disagree	5%	6%	4%	9%	4%
Disagree	4%	10%	3%	5%	7%
Neutral	16%	18%	18%	15%	19%
Agree	31%	28%	33%	34%	28%
Strongly Agree	45%	39%	42%	37%	42%

Figure 4.9 Information Integration

The study highlighted the significance of information-sharing practices within a supply chain. According to the results, in II1, 45 % of the respondents strongly agreed that their organisational partners exchange proprietary information with their organisations. This indicates a high level of information-sharing collaboration among supply chain participants.

In II2, 38% of the respondents strongly agreed that their organisation's trade partners share knowledge of fundamental business operations, underlining the importance of understanding each other's operations within the supply chain for improved coordination and performance. Additionally, in II3, 42% of the respondents strongly agreed that supply chain partners' mutual understanding could lead to enhancements in their core companies. This emphasises the impact of comprehension and cooperation between partners. Addressing question 4 (II4), 37% of the respondents strongly agreed that information sharing between their company and its business partners is appropriate, further reinforcing the significance of adequate information exchange. The researcher believes that supply chain respondents who communicate information regularly and frequently may collaborate as a stand-alone entity, a conclusion drawn from the study's results. According to II5, 42% of the respondents strongly agreed that information sharing between their organisation and trade partners is accurate, and they keep each other updated about events or developments that may impact the other partners. Information sharing successfully transmits information across supply chain respondents. The study regards information sharing as the dependent variable, and therefore, it gathered responses based on respondents' opinions and perceptions of the concept. The study results are presented in Figure 4.9, showcasing the insights obtained from the respondents' perspectives on information sharing within the supply chain.



	SR1	SR2	SR3	SR4	SR5	SR6
Strongly Disagree	9%	4%	5%	8%	3%	13%
Disagree	13%	15%	4%	6%	11%	11%
Neutral	24%	41%	8%	14%	15%	43%
Agree	26%	25%	45%	38%	38%	15%
Strongly Agree	29%	16%	39%	34%	34%	19%

Figure 4.10 Supply Chain Resilience

The study findings shed light on the resilience and adaptability of state-owned logistics enterprises during supply chain disruptions. Among the respondents, 45% in SR3 indicated that their organization demonstrated a considerable adaptive capacity, promptly adjusting to supply chain interruptions. In SR1, 29% of the participants strongly agreed that state-owned logistics enterprises effectively handled changes caused by disruptions in the supply chain. Additionally, in SR5, 38% of the respondents acknowledged the proactive resource base refreshment by state-owned logistics enterprises in response to changing economic conditions, reflecting a dynamic approach to resource management that enhances resilience and adaptability in challenging situations. Furthermore, in response to question 4, 38% of the participants expressed their commitment to reorganizing resources and procedures to respond to changing environments and mitigate disruptions effectively.

Conversely, SR2 showed that 24% of the respondents agreed with the swift adjustability of state-owned enterprises to supply chain disruptions. The study focused on comprehensively examining the impact of information integration on organisational resilience, particularly during supply chain disruptions, using the (SCR) as a unified construct to assess the overall resilience of state-owned logistics enterprises. Ultimately, the research highlights the critical role of information integration in enhancing the resilience and adaptability of state-owned logistics enterprises, enabling them to effectively navigate disruptions and maintain operational continuity in a volatile business environment. The insights gained from this study have practical implications for the supply chain management strategies of state-owned logistics enterprises facing disruptions.

4.3.4 Descriptive Statistics for the Measures of the Research Constructs

Tables 4.1 to 4.5 show the survey respondents' answers to the questions tailored to analyse the study's constructs. Based on the data obtained, this section analyses the independent variable, which is SCI. Internal Integration (IIN), Supplier Integration (SI), Customer Integration (CI), and Information Integration (II) are the five attributes that determine supply chain resilience in state-owned logistics companies. The following section contains the results and an analysis of the dependent variables. The internal integration variable was the first aspect of the questionnaire. This section gathered data on how SCI affects internal integration. Table 4.1 depicts the responses provided in the section.

Table 4.1 Descriptive Statistics on Internal Integration

List no.	Description	N	Mean	Median	Mode	Sta Dev	Skewness	Kurtosis	Min	Max
IIN2	Internal data integration	360	4.14	5	5	1.175	-1.444	1.317	1	5
IIN4	The use of periodic interdepartmental meetings	360	3.85	4	4	1.132	-.979	0.398	1	5
IIN1	Cross-functional teams	360	3.77	4	4	1.287	-1.054	0.116	1	5
IIN5	Real-time Integration and connection	360	3.70	4	4	1.188	-680	0.394	1	5
IIN3	Enterprise Application Integration	360	3.10	4	4	1.382	-.297	-1.115	1	5

Source: Author's compilation from IBM SPSS Statistic version 25

The research findings shed light on several vital factors significantly contributing to SCI and resilience. Firstly, as shown in Table 4.1, the study identifies internal data integration as the most effective strategy (M = 4.14) for enhancing supply chain resilience. Integrating data from various internal sources allows organisations to improve coordination, decision-making, and responsiveness to disruptions, ensuring smoother operations during challenging times. Secondly, the study emphasises the importance of periodic interdepartmental meetings (M = 3.85) in promoting SCI and resilience. These meetings serve as vital platforms for representatives from different departments to exchange information, align objectives, and develop operational plans, fostering better collaboration and understanding among various teams.

Additionally, cross-functional teams (M = 3.77) significantly enhance SCI and resilience. These teams gain a holistic supply chain perspective by involving individuals from diverse functions such as procurement, production, logistics, and sales. This integrated approach allows them to identify opportunities for improvement and implement cohesive strategies. Real-time integration and connectivity across internal processes (M = 3.70) emerge as another critical aspect of effective supply chain management. This necessitates adopting enterprise application integration (EAI), enabling seamless communication and data

exchange between applications and systems used within the supply chain. Lastly, the study underscores the importance of enterprise application integration (M = 3.10) in effectively responding to changes, disruptions, and customer demands. Real-time data integration and visibility empower timely decision-making and proactive actions to mitigate risks and minimise the impact of disruptions on the supply chain.

The study results underscore the critical significance of internal data integration, interdepartmental collaboration, cross-functional teams, real-time integration, and enterprise application integration in achieving SCI and resilience. These factors enhance coordination, decision-making, responsiveness, and overall performance, enabling organisations to navigate disruptions and maintain operational continuity effectively. The insights gained from this study hold valuable implications for supply chain management practices and contribute to the growing body of knowledge on building resilient and robust supply chains.

Table 4.2 Descriptive Statistics on Supplier Integration

List no.	**Description**	**N**	**Mean**	**Median**	**Mode**	**Std Dev**	**Skewness**	Kurtosis	Min	Max
SI1	Suppliers' participation in procurement and production	360	4.06	4.00	5	1.085	-1.223	-927	1	5
SI4	The high degree of joint planning for rapid response	360	4.05	4.00	5	1.099	-1.345	.1.436	1	5
SI5	Sharing demand forecasts with suppliers	360	3.97	4.00	5	1.109	-1.108	-681	15	5
SI3	Information exchange with the supplier	360	3.93	4.00	4	1.037	-1.077	.905	1	5
SI2	Strategic partnerships with major suppliers	360	3.92	4.00	5	1.055	-881	.432	1	5

Source: Author's compilation from IBM SPSS Statistic Version 25

This summary of Table 4.2 highlights key findings related to SCI and resilience, underscoring the pivotal role of suppliers' active participation in procurement and production processes (M = 4.06). The involvement of suppliers fosters collaboration, coordination, and alignment between the supplier and the buying organisation, ultimately enhancing SCI and resilience. Additionally, supplier participation enables proactive risk management and responsiveness during disruptions, bolstering the overall resilience of the supply chain. Joint planning for rapid response (M = 4.05) emerges as another critical factor in building supply chain resilience. This collaborative effort involves coordination, communication, and collaboration among various stakeholders in the supply chain, including suppliers, manufacturers, distributors, and retailers. By collectively planning and strategising, the supply chain can better withstand and adapt to disruptions, ensuring smoother operations during challenging periods. Sharing demand forecasts (M = 3.97) with suppliers is crucial to effective supply chain management. The exchange of accurate and timely demand forecasts based on reliable data allows suppliers to proactively plan their production, inventory, and logistics activities, aligning their operations with anticipated demand. This fosters efficiency and prevents stockouts, ultimately contributing to the overall resilience of the supply chain. Information exchange (M = 3.93) with suppliers is fundamental in enhancing collaboration, transparency, and synchronisation of activities between the buyer and the supplier. By sharing relevant information, both parties can make informed decisions and align their actions, improving the overall integration and coordination within the supply chain. Strategic partnerships with major suppliers (M = 3.92) significantly impact SCI and resilience. Establishing long-term relationships based on trust and shared objectives fosters closer collaboration and coordination. This alignment of strategies, goals, and operational practices improves the integration of supply chain activities, enhancing visibility, efficiency, and responsiveness.

Overall, these results emphasise the importance of supplier participation, joint planning, demand forecast sharing, information exchange, and strategic partnerships in achieving SCI and resilience. Organisations can leverage these factors to enhance their supply chain management practices and build a more robust and agile supply chain capable of effectively navigating disruptions and maintaining operational continuity. The insights gained from this research contribute valuable implications for supply chain managers and practitioners seeking to improve the resilience and competitiveness of their supply chains.

Table 4.3 Descriptive Statistics on Customer Integration

List no.	Description	N	Mean	Median	Mode	Std Dev	Skewness	Kurtosis	Min	Max
CI1	Connectivity through customer information networks	360	3.64	4.00	4	1.205	-678	-432	1	5
CI3	Communication with customers	360	3.46	4.00	4	1.188	-513	1.188	1	5
CI5	Strategy of collaboration	360	3.42	3.00	3	1.070	-401	1.070	1	5
CI4	Quick ordering systems with customers	360	3.28	3.00	3	1.176	-409	1.176	1	5
CI2	Sharing of market information with customers	360	2.95	3.00	3	1.374	-004	-1.179	1	5

Source: Author's compilation from IBM SPSS Statistic version 25

The summary of Table 4.3 presents the results related to customer integration quality as a crucial variable in SCI for state-owned logistics enterprises. Customer integration involves close cooperation with significant customers, allowing organisations to gain valuable market insights and enhance their SCP. The study identified connectivity through customer information networks (M = 3.64) and communication channels (M = 3.46) with critical customers as high-scoring practices. These practices enable the organisation to maintain real-time communication and customer collaboration, facilitating swift and efficient information exchange. Strategic collaboration with significant customers (M = 3.42) emerged as a vital factor contributing to SCI and resilience. By closely working with customers, the state-owned logistics enterprise can anticipate customer needs, optimise operations, and improve inventory management, thereby reducing costs and enhancing service levels. This collaborative approach creates a win-win situation where the organisation and its customers benefit from a more efficient and effective supply chain. The study also highlighted the positive impact of quick ordering systems with customers (M = 3.28) on SCI and resilience.

These streamlined systems and technologies enable customers to place orders quickly and conveniently, improving the overall customer experience.

Additionally, they provide real-time data on customer orders, enhancing visibility into demand patterns for the state-owned logistics enterprise. Utilising this information, the organisation can better align inventory levels, production, and transportation resources, improving overall supply chain efficiency and minimising stock-outs. The study emphasises the significance of customer integration quality and quick ordering systems in enhancing SCI, resilience, and efficiency for state-owned logistics enterprises. Close collaboration with customers and streamlined processes enable the optimisation of operations and improved service levels, leading to mutual benefits for the organisation and its customers. These insights offer practical implications for supply chain managers seeking to enhance customer relationships and optimise their supply chain operations in the state-owned logistics sector.

Table 4.4 Descriptive Statistics on Information Integration

List no.	**Description**	**N**	**Mean**	**Median**	**Mode**	**Std Dev**	**Skewness**	Kurtosis	Min	Max
II1	Collaboration	360	4.06	4.00	5	1.103	-1.214	-965	1	5
II3	Knowledge-Sharing	360	4.06	4.00	5	1.043	-1.158	1.085	1	5
II5	Communications	360	3.97	4.00	5	1.123	-944	.148	1	5
II4	Information exchange with trading partners is adequate	360	3.85	4.00	5	1.234	-1.058	.262	1	5
II2	Organisation partners keep connected	360	3.83	4.00	5	1.217	-824	-288	1	5

Source: Author's compilation from IBM SPSS Statistic version 25

This summary, based on Table 4.4, highlights the findings related to information-sharing practices in the supply chain. The study emphasises the crucial role of trade partners in exchanging proprietary information (M = 4.06) and sharing knowledge (M = 4.06) regarding fundamental business operations. Effective communication (M = 3.97) between organisations and trade partners ensures that real-time updates on events or developments

that may impact each other are readily available. The study focused on information sharing as the dependent variable, gathering responses based on respondents' opinions and perceptions. The exchange of information between companies and their business partners (M = 3.85) was appropriate, facilitating seamless communication channels (M = 3.83) among connected organisational partners. Timely and accurate partner communication enables better coordination, faster change response, and proactive risk management. Preventing miscommunication, delays, and disruptions enhances supply chain efficiency and resilience. The study underscores the significance of information sharing as a fundamental practice in supply chains. The findings highlight the importance of establishing effective communication channels and promoting a culture of knowledge exchange among supply chain partners. By fostering transparent and timely information flow, organisations can enhance coordination, adapt quickly to changes, and manage risks proactively, leading to improved supply chain resilience. These insights provide valuable implications for supply chain managers seeking to optimise information-sharing practices and enhance the overall resilience of their supply chains. Descriptive statistics on supply chain resilience follow in Table 4.5.

Table 4.5 Descriptive Statistics on Supply Chain Resilience

List no.	**Description**	**N**	**Mean**	**Median**	**Mode**	**Std Dev**	**Skewness**	Kurtosis	Min	Max
SR3	Quick response to supply chain disruption	360	4.08	4.00	4	1.036	-1.482	2.095	1	5
SR5	Changing business environment	360	3.88	4.00	4	1.089	-850	-020	1	5
SR4	Response to the dynamic environment	360	3.84	4.00	4	1.195	-1.060	.365	1	5
SR1	Supply chain disruption.	360	3.52	4.00	5	1.277	-482	-794	1	5
SR2	Supply chain disruption quickly.	360	3.34	3.00	3	1.042	-067	-434	1	5
SR6	Maintain high situational analysis	360	3.16	3.00	3	1.231	-112	-648	1	5

Source: Author's compilation from IBM SPSS Statistic version 25

Based on the findings presented in Table 4.5, this summary focuses on the results related to supply chain resilience and its significance in dealing with disruptions in a changing business environment. State-owned logistics enterprises responded quickly to supply chain disruptions (M = 4.08), indicating their ability to manage supply chain changes and maintain operational effectiveness. The changing business environment (M = 3.88) was identified as a critical factor impacting supply chain resilience, considering various factors such as market trends, customer preferences, technological advancements, regulatory changes, and competitive landscapes. The study utilised Supply Chain Resilience as a unified construct to analyse the effect of supply chain resilience in the context of disruptions. Respondents agreed that organisations could swiftly adjust to interruptions in the supply chain (M = 3.84). Supply disruptions (M = 3.52) resulting from supplier insolvency, natural calamities, political instability, trade conflicts, or transportation interruptions can lead to delinquency, shortages, or increased expenses. Resilient supply chains proactively identify risks, implement contingency plans, diversify suppliers, and maintain strong relationships with alternative sources to mitigate the impact of supply disruptions. State-owned enterprises (demonstrated the ability to refresh their resource base in response to changing economic conditions (M = 3.34). Maintaining high situational analysis (M = 3.16) plays a crucial role in supply chain resilience by consistently monitoring and assessing current conditions, events, and factors that may impact the supply chain. This enables organisations to identify risks, establish early warning systems, respond quickly to changes, and capitalise on opportunities. Actively monitoring the external environment and staying updated on relevant factors helps build robust and adaptable supply chains, enabling organisations to withstand and recover from disruptions more effectively, thus enhancing supply chain resilience.

The researcher analysed the study's descriptive statistics for the model constructs and presented them in Tables 4.1 – 4.5. Most constructs had mean values exceeding 3.5, indicating a generally positive perception among respondents. Constructs such as maintaining high situational analysis and internal data integration had mean values ranging from 3.16 to 4.14. A 5-point Likert scale measured the degree of positivity, with higher values indicating greater positivity. A score of 3.5 on this scale was considered average. The standard deviation for quick response to supply chain disruption was 1.036, while enterprise

application integration had a standard deviation of 1.382. These values indicate the degree of variability within the responses.

To assess the normality of the data, the study examined skewness and kurtosis values. The constructs showed absolute skewness values ranging from 0.004 to 2.095, and absolute kurtosis values varied, with the lowest being 0.020 for the changing business environment and the highest being 2.095 for quick response to supply chain disruption. Based on the skewness and kurtosis values falling below the threshold of 3 and 10, respectively, it can be concluded that the data for the constructs in this study meet the standards for normality. These results contribute valuable insights to understanding supply chain resilience in the face of disruptions and the importance of staying responsive to the changing business environment.

4.4 Bivariate Analysis

4.4.1 Inferential Statistics

Inferential statistics play a crucial role in estimating the applicability of conclusions drawn from a sample analysis to a broader population derived from that specific sample (Suhr, 2006). The methods in question are designed to tackle research objectives related to the examination of challenges in supply chain integration. These objectives encompass various facets, including supply chain resilience, internal integration, supply integration, customer integration, and information integration. This section is dedicated to scrutinizing the research questions. In addressing these inquiries, inferential statistics, specifically utilizing the Pearson Product-Moment Correlation Coefficient (PPMC), were applied to assess the degree of association among the variables.

Table 4.6 Cronbach Alpha Value for all Ordinal Data

Variables	**Cronbach Alpha**
Internal Integration	0.84
Supplier Integration	.0.92
Customer Integration	.0.86
Information Integration	0.86
Supply Chain Resilience	0.86

Source: Author's compilation

4.4.2 Test for Normality

According to Saunders et al. (2019) and Park (2021), the Shapiro-Wilk test is a test for normality. As indicated in Table 4.7, the value of the Shapiro-Wilk test is below 0.05. This demonstrates that all data variables significantly deviate from a normal distribution; their p-values were less than 0.05. SEM was therefore used to analyse the data.

Table 4.7 Shapiro-Wilk Test

	Shapiro-Wilk		
	Statistic	Df	Sig.
Internal Integration (IIn)			
IIn1 Cross-functional teams	.806	95	.000
IIn2 Internal data integration	.724	95	.000
IIn3 Enterprise application integration	.873	95	.000
IIn4 The utilisation of periodic interdepartmental meetings	.836	95	.000
IIn5 Real-time integration and connection	.865	95	.000
Supplier Integration (SI)			
SI1 Suppliers' participation in procurement and production	.788	95	.000
SI2 Strategic partnerships with major suppliers	.837	95	.000
SI3 Information exchange with the suppliers	.825	95	.000
SI4 The high degree of joint planning for rapid response	.770	95	.000
SI5 Sharing demand forecasts with suppliers	.808	95	.000
Customer Integration (CI)			
CI1 Connectivity through customer information networks	.872	95	.000
CI2 Sharing of market information with customers	.892	95	.000
CI3 Communication with customers	.891	95	.000
CI4 Quick ordering systems with customers	.899	95	.000
CI5 Strategy of collaboration	.902	95	.000
Information Integration (II)			
II1 Collaboration	.787	95	.000
II2 Organisation partners keep connected	.828	95	.000
II3 Knowledge-Sharing	.795	95	.000
II4 Information exchange with trading partners is adequate	.806	95	.000
II5 Communications	.826	95	.000
Supply chain resilience (SCR)			
SR1 Supply chain disruption.	.879	95	.000
SR2 Supply chain disruption quickly.	.901	95	.000
SR3 Quick response to the supply chain disruption	.745	95	.000
SR4 Response to the dynamic environment	.809	95	.000
SR5 Changing business environment	.839	95	.000
SR6 Maintain high situational analysis	.889	95	.000

Source: Author's compilation

4.5 Multivariate analysis

4.5.1 Factor Analysis for Supply Chain Integration

Factor analysis was conducted on 26 items that measured the supply chain resilience construct. The results, presented in Table 4.8, showed that the data were appropriate for reliable and efficient extraction, as indicated by a KMO measure of sampling adequacy of 0.894. Additionally, Bartlett's test, with a significance level of p<.05, revealed that the correlations between the items were not excessively high. Consequently, it was anticipated that the factor analysis would produce dependable outcomes.

Table 4.8 Factor Analysis on KMO and Barlett's Rotated Components and Alpha Values

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**.894**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**1782.854**
	Df	**325**
	Sig	**000**

Rotated Component Matrix

Factors	**Factor Loading**	**Eigenvalue**	**% of Variance**	**Cumulative %**	**Cumulative Extraction**
Factor 1: Internal Integration					
Cross-functional teams	65	**12.490**	**48.038**	**48.038**	**.491**
Internal data integration	69				**.647**
Enterprise application integration	70				**.687**
The utilisation of periodic interdepartmental meetings	82				**.715**
Real-time integration and connection	75				**.715**
Factor 2: Supplier Integration					
Supplier's participation in procurement and production	**71**	**1.875**	**7.211**	**55.249**	**.714**
Strategic partnerships suppliers	85				**.775**
Information exchange with the supplier	90				**.778**
The high degree of joint planning for rapid response	81				**.800**

Sharing demand forecasts with suppliers	87				**.794**
Factor 3: Customer Integration					
Information networks with customers	**85**	**1.430**	**5.502**	**60.751**	**.775**
Sharing of market information with customers	53				**.578**
Communication with customers	81				**.753**
Quick ordering systems with customers	74				**.636**
Strategy of collaboration	81				**.642**
Factor 4: Information Integration					
Sharing information with organisations' trading partners	62	**1.082**	**4.162**	**64.913**	**.712**
Organisation partners keep us fully informed about issues that affect business.	78				**.617**
Sharing business knowledge of core business processes	85				**.706**
Information trading partners are adequate.	72				**.563**
Information exchange between partners is accurate.	78				**.649**
Factor 5: Supply Chain Resilience					
Supply chain disruption.	55	**1.033**	**3.974**	**68.887**	**.659**
Supply chain disruption quickly.	56				**.580**
Quick response to the supply chain disruption	82				**.723**
Response to the dynamic environment	59				**.790**
Changing business environment	77				**.620**
Maintain high situational analysis.	57				**.737**
Reliability Statistics: Overall Cronbach's Alpha = 0.858					

Source : Author's compilation

The Kaiser-Meyer-Olkin (KMO) measure is employed to assess the sufficiency of the sample, while Bartlett's test of sphericity is utilized to determine the appropriateness of factor analysis for factor extraction. The KMO result for the study is 0.894, indicating a substantial amount of shared variance, surpassing the commonly recognized threshold of 0.50 for conducting further factor analysis. Conversely, as the number approaches 1, it signifies that the relationships between variables are well structured, allowing factor analysis to produce dependable and distinct factors. Bartlett's sphericity test yields a high statistical significance

value (1782.854) and a low p-value (0.000), indicating that the correlation among variables in the data matrix is sufficient for factor analysis. The model incorporated all the factors using the significant factor. The results from each factor were in line with the model's fit, as shown in Figure 4.11 for Confirmatory Factor analysis and Table 4.12 for Confirmatory Factor.

The study used the component analysis approach to extract factors, with the varimax rotation technique being selected for its simplicity. The approach intends to optimise the loading setups to minimise the discrepancy between the estimated total commonality and the observed variances. The varimax approach fosters the discovery of factors associated explicitly with a limited set of variables while inhibiting identifying factors that exert an equal influence on all variables. The objective is to identify the rotational loadings that enhance the Variance of the squared loadings for each, intending to maximise the significance of some of these loadings while minimising the absolute value of the others. Eigenvalues, also known as characteristic roots, estimate the Variance in the total number of samples each component represents. As per the Kaiser rule, it is recommended to eliminate all components that show eigenvalues lower than 1.0. According to the extraction sums of squared loadings, the most crucial loading is represented by the first eigenvalue, which is equal to 12.490 and equals 48.038% (Table 4.8). The fifth eigenvalue, the minimum value, is 1.033, accounting for 3.974% of the Variance in the initial dataset. This is in contrast to the other eigenvalues. For the cumulative percentage, the five variables account for 68.887% of the total Variance in the original dataset. An eigenvalue indicates the extent to which the factor accounts for the overall Variance of the variables.

4.5.2 Interpretation and Labelling of Factors

Factor 1: Internal Integration

The most critical variable loadings among the five extracted factors indicate internal integration. As a result, out of the twenty-six variables, five variables have the highest variability measure at 48.038%. This crucial factor encompasses cross-functional integration, internal data integration, enterprise application integration, periodic interdepartmental

integration, real-time integration, and connection. The organisation collaborates and shares information through interconnected and synchronised processes and systems.

Factor 2: Supplier Integration

The study measured factors; respondents asked about the integration between the organisation and its suppliers. Suppose the leading suppliers play a significant role in procurement and production. There is a high level of information exchange with the primary Supplier through information networks. The organisation has established strategic partnerships with essential suppliers, and these suppliers provide the organization with their production schedule. Suppliers reciprocate by sharing demand projections with them. These characteristics demonstrate the synchronization and dissemination of information required for crucial providers. Provide the organization with vital information regarding the suppliers' procedures, abilities, and restrictions. This insight ultimately facilitates enhanced strategic planning and prediction, as well as optimized product and process development and transaction administration.

Factor 3: Customer Integration

Factor 3 was assessed using items that measure customer integration between organisations, established connections with essential customers through information networks, and links with significant customers through computer networks. The primary customers share demand forecast information with the organisation. The organisation implements fast ordering systems in collaboration with customers. The level of communication with significant customers is exceptionally high. Customer integration entails close collaboration and information-sharing activities with key customers, which give the company strategic insights into market expectations and opportunities. This ultimately allows for a more efficient and effective response to customers.

Factor 4: Information Integration

The measurement of information integration involved surveying respondents about various aspects, including whether their organisation shared information with trading partners and customers if trading partners kept them fully informed about business-related issues, and if trading partners shared business knowledge of core processes. The study also assessed the adequacy and accuracy of information exchange between their organisation and trading partners. Organisations must operate efficiently and adapt quickly to changing market conditions. IT managers should continuously explore ways to support more effective and precise business processes. Enterprise application integration (EAI) is crucial in fulfilling this requirement. However, before implementing any data-integration solution, organisations should be aware of the technical risks involved and the operational aspects of the process.

Factor 5: Supply Chain Resilience

Supply chain resilience was assessed by asking respondents about their ability to handle changes caused by disruptions in the supply chain. Organisations possess the ability to adapt to supply chain disruptions quickly, response time to supply chain disruptions is swift, and organisations adjust the resources and processes in response to the dynamic environment, continuously renew the resource base to align with the changing business environment, and maintain a high level of situational awareness at all times.

This factor represents the adaptive capability of the supply chain to proactively prepare for unexpected events, effectively respond to disruptions, and recover from them while ensuring the continuity of operations at the desired level of interconnectedness and structural functionality. The system's adaptive capability enables it to respond to disruptions more favourably and even derive advantages from such events. It involves predicting risks, minimising their impact, and rapidly rebounding through survival, evolution, adaptability, and growth in turbulent changes.

4.5.3 Measurement Validation

Table 4.8 presents the factor loadings and Cronbach's alpha values for each construct in the study. The high alpha values, ranging from 0.81 to 0.92, indicate that all scales are reliable, surpassing the accepted minimum limit of 0.60 for Cronbach's alpha (Flynn et al., 1990; Nunnally & Bernstein, 1991). To assess the unidimensionality of the scales, the researcher conducted a factor analysis. As a result, three items were retained for internal integration (IIn), no items were removed from supplier integration (SI), one item was eliminated from customer integration (CI), three items were removed from information integration (II), and four items were eliminated from supply chain resilience. However, subsequent factor analysis confirmed that each factor exhibited unidimensionality, as each item loaded only on one factor. All factor loadings exceeded 0.68, and the t-values were significantly greater than 3.30 (see Table 4.9.1).

Furthermore, as shown in Table 4.9.1, the rotated factor matrix demonstrates that the dimension of internal integration in SCI exhibited a significant loading on the factor. Overall, these results indicate that the measurement scales used in the study are reliable and valid for assessing the constructs of internal integration, supplier integration, customer integration, information integration, and supply chain resilience. The factor analysis confirms each construct's unidimensionality, supporting the soundness of the study's measurement approach and contributing to the robustness of the research findings.

Table 4.9.1 Rotated Factor Matrix

	Factors						
	IIn	**SI**	**CI**	**II**	**SCR**	**Cronbach's a**	**t-values**
IIn2	.658					0.84	4.139
IIn4	.670						3.850
IIn5	.627						3.703
SI1		.699				0.92	4.059
SI2		.761					3.921
SI3		.831					3.930
SI4		.713					4.050
SI5		.812					3.970
CI1			.841			0.86	3.644
CI3			.721				3.455
CI4			.679				3.277
CI5			.753				3.416
II1				.640		0.86	4.059
II2				.759			3.832
II3				.808			4.060
II4				.684			3.850
II5				.778			3.970
SCR3					.794	0.81	4.079
SCR5					.742		3.881

Extraction Method: Principal Component Analysis. a. Rotation converged in 5 iterations.

Source: Author's compilation

Additionally, to test convergent validity, the researcher analysed composite reliability (CR), average variance extracted (AVE), and the significance of item loadings. The results, as presented in Table 4.9.2, indicate that both CR and AVE values surpass the respective threshold values of 0.60 and 0.50 (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; Hair et al., 1998; Nunnally & Bernstein, 1991), thus confirming convergent validity. Furthermore, the item loadings exhibit significant t-values at a level of $p<0.001$, further supporting the convergent validity of the measurement scales. The study employed the approach proposed by Fornell and Larcker (1981) to ascertain discriminant validity and examined the measurement model. The table shows that the square root of AVE values (in bold along the diagonal) for all scales significantly exceeds the correlations with other constructs, thus indicating strong evidence for discriminant validity.

Table 4.9.2 Constructs' Values for Correlations Extracted for the SCI-SCR Model

Table 4.9.2: Correlation (Pearson Correlation)					
Variables	**IIn**	**SI**	**CI**	**II**	**SCR**
IIn	**.730**				
SI	.578	**.830**			
CI	.687	.674	**.750**		
II	.645	.751	.714	**.750**	
SCR	.533	.698	.654	.729	**.90**

Correlation is significant at the 0.01 level (1-tailed).

Source: Author's compilation

4.5.4 Correlation Analysis (Pearson Correlation)

Table 4.10 displays the results of a correlation analysis performed on the variables. The results of the correlation analysis indicate a significant degree of correlation between most of the variables. This research study's first hypothesis, H1, examined the moderating impact of internal integration on the impact of SCI on supply chain resilience. Based on the literature assessment, internal integration was assumed to mitigate this influence positively. SCI was substantially correlated with internal integration. The study then examined internal integration's moderating effect on each SCI using a process macro and moderated multiple regression. However, the analysis showed that internal integration did not significantly moderate that relationship. The study's first hypothesis (H1) was thus not supported in the analysis. Internal integration did not significantly moderate that association. H1, the study's first hypothesis, failed. This may explain why internal integration does not reduce the influence of supply chain integration on resilience and why organizations need to reach an 'appropriate' level to increase SCI performance considerably. Despite this, the 'appropriate' level and how to assess and reach it are unknown. Internal integration is a familiar concept;

therefore, responders may need a more profound comprehension, which may have affected the study data. Thus, the study results suggest a potential research avenue.

The study examined linear connections between variables statistically using Pearson correlation analysis, and the correlation coefficient was +1 to -1. A +1 value implies perfect correlation between variables, while -1 indicates lesser or no correlation. At alpha = 0.01 significance, the study provides a correlation matrix to determine the link between all possible pairs of variables. The significance level indicates the likelihood that random sampling error caused the observed associations. For every pair of variables with a statistical significance below 0.05, the correlation matrix shows the allowed positive correlation coefficients. The significance level denotes the likelihood that the observed correlations are due to chance in the form of random sampling error. In order to test the impact of SCI more comprehensively, the study employed a method of statistical analysis known as multiple regression. Table 4.9.1 presents a comprehensive overview of the SCI dimensions in their entirety. The ANOVA analysis confirmed the abovementioned findings, as evidenced by its significant outcome (Table 4.10.2). The study applied multiple regression analyses to validate the correlation results and confirmed hypotheses Ho_2, Ho_3, Ho_4 and Ho_5. The regression coefficients (β) were statistically significant, confirming the hypotheses above. The study's hypotheses tested are summarised in Table 4.10.3.

4.5.5 Multiple Regression Analysis

Multiple regression is a versatile data analysis tool that is applicable for studying a quantitative criterion variable alongside various predictor variables (Cohen et al., 2003). Utilising a multivariate approach demonstrates the simplicity of performing regression coefficient analyses and the effectiveness of eliminating uninformative predictors, especially those with limited predictive ability in the presence of interactions, in order to simplify a comprehensive model into a satisfactory reduced model. The phenomenon of multicollinearity is a statistical concept that emerges when two or more predictor variables present within a multiple regression model demonstrate a significant level of correlation, thereby providing redundant information regarding the response variable. The phenomenon

above leads to an increase in the standard errors of the β estimates, thereby implying a reduction in the dependability of the results.

4.5.6 Multiple Regression on Supply Chain Integration

This study employed regression analysis to examine the relationship between the dependent variable, supply chain resilience, and four other aspects. The survey instrument employed independent variables in the form of 5-point Likert-type scale items specifically addressing internal integration, supply integration, and consumer integration. The Pearson correlation analysis reveals a significant link between the variables. Utilising multiple regression technique is necessary in order to analyse the extent to which each independent variable explains the variation in the dependent variable, supply chain resilience.

Following the creation of both models, none of the predictors were excluded through the stepwise procedure. Correlation and multiple regression studies were conducted to examine the relationship between supply chain resilience and other pertinent variables. To summarise, the scores of each predictor show a strong positively positive correlation with the criterion.r However, the multiple regression model (model 2) with five predictors has a generated R2 value of 0.600, an F statistic of 35.966, and a p-value of 0.05. The results confirm a direct correlation between the responses and supply chain resilience. What is the most effective approach for predicting supply chain integration in terms of supply chain resilience based on its dimensions?

The regression model in Table 4.10 1 showed a statistical outcome with an R square of .774a and an adjusted R square of .583. This indicates that the SCI has a substantial impact of 0.583 on the performance of firms in the chosen logistics industries in the Erongo Region. The adjusted R square value of 0.583 suggests that this study did not consider 99% of unexplained variations. The regression model's findings align with the results of the previously conducted Pearson Moment link analysis, which indicated no link between SCI and SCR in the selected logistics industries at the Port of Walvis Bay. Thus, the alternative hypothesis (H1), which posits that there will be a substantial correlation between SCI and supply chain resilience, is refuted. The ANOVA analysis provided additional confirmation of the significance of these findings, as indicated in Table 4.10.2. Therefore, the results of the correlation analysis were validated and supported by the multiple regression analysis,

which also demonstrated the significance of the regression coefficients (β) and confirmed hypotheses Ho_2, Ho_3, Ho_4, and Ho_5. Table 4.10.3 presents a concise overview of the hypotheses that were examined in this study. The research aims, which sought to establish the correlation between SCI and Supply chain resilience, have been accomplished with this outcome.

Table 4.10.1 Regression Model Summary

Variable	R	R Square	Adjusted R Square	STD Error of the Estimate
1	.774[a]	.600	.583	.542

a. Predictors: (Constant), Information Integration, Internal Integration, Supplier Integration, Customer Integration

Table 4.10.2 Anova Summary

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	42.188	4	10.547	35.966	.000[b]
	Residual	28.152	96	.293		
	Total	70.340	100			

a. Dependent Variable: Supply Chain Resilience

b. Predictors: (Constant) Information Integration, Internal Integration, Supplier Integration, Customer Integration

Table 4.10.3 Coefficients Summary of the Hypotheses

Model		Unstandardized Coefficients	Standardised Coefficients	Standardised Coefficients			95% Confidence Interval for B	
		B	Std .Error	*Beta*	t.	Sig.	Lower Bound	Upper Bound
1	**Constant**	**.781**	**.258**	**-258**	**3.031**	**.003**	**.270**	**1.293**
	Internal Integration	**-014**	**.081**	**-016**	**-168**	**.867**	**-175**	**.147**
	Supplier Integration	**.258**	**.092**	**.286**	**2.788**	**.006**	**.074**	**.441**
	Customer Integration	**.172**	**.091**	**.199**	**1.893**	**.061**	**-008**	**.353**
	Information Integration	**.331**	**096**	**.382**	**3.438**	**.001**	**.140**	**.522**

Source: Author's compilation

4.6 The Threshold for Reliability and Validity

The data's reliability and validity were assessed through indicators such as indicator reliability (Factor loadings), Cronbach's Alpha, average variance extracted (AVE), and composite reliability (CR). The results, as depicted in the table below, demonstrated that the data met or exceeded the required thresholds.

Indicator reliability: reflective indicator loadings surpassing 0.5 indicate a robust measurement of a latent construct (Hulland, 1999). In this study, all indicator loadings exceeded 0.5, as presented in (Table 4.11).

Internal consistency reliability was evaluated using Composite Reliability (CR) and Cronbach's Alpha. (Kamis and Sujati, 2020.) A CR rating of at least 0.7 is considered indicative of adequate internal consistency and dependability. (Larabi et al., 2019; Purwanto et al., 2021) Cronbach's Alpha scores between 0.60 and 0.70 are typically considered ideal in research to reflect internal consistency dependability. According to Table 4.7, all constructs met Cronbach's alpha and CR criteria values.

Convergent reliability: Convergent reliability, gauging the correlation of a measure with other concepts, was assessed through Average Variance Extracted (AVE). Mhelembe (2019) recommends that the AVE be greater than 0.5 (Bagozzi, 1986; Bagozzi & Yi, 1988) and this study. The AVE for all constructs in this study was more than 0.5 (Table 4.11 below), indicating that the metric scales showed reliability.

4.6.1 Construct Validity and Reliability

The reliability of the scales was gauged using Cronbach's alpha and composite reliability, as outlined by Fornell and Larcker (1981). Table 4.9.2 shows that Cronbach's alpha values for all elements fell within the range of 0.81 to 0.92, while composite reliability scores exhibited a range of 0.50 to 0.92. These results collectively demonstrate the reliability of the scales, with all items surpassing the 0.70 threshold and exhibiting substantial loadings (greater than 0.5). This internal consistency is confirmed for each construct.

Furthermore, the researcher calculated the average variance extracted (AVE) for all variables to assess convergent validity, as suggested by Fornell and Larcker (1981). The AVE values,

as presented in Table 4.11, exceed 0.50, with values spanning from 0.54 to 0.81. This indicates that the variables incorporated into the model indeed possess convergent validity.

The Fornell and Larcker criterion was applied. As displayed in Table 4.9.2, the square root of the AVE values for each construct is greater than the correlations observed between the variables. This observation affirms discriminant validity within the model 0.85 threshold, providing strong evidence of acceptable discriminant validity. The measurement model demonstrated satisfactory levels of both convergent and discriminant validity.

Table 4.11 Measurement Model Results for Reliability and Validity Assessment

Scale Items	**Loading**	**Cronbach's α**	**AVE**	**CR**
Internal Integration (II)		**0.54**	**0.85**	**0.84**
Cross-functional teams	65			
Internal data integration	69			
Enterprise application integration	70			
The utilisation of periodic interdepartmental	82			
Real-time integration and connection	75			
Supplier integration (SI)		**0.69**	**0.92**	**0.69**
Suppliers' participation in procurement and production	71			
Strategic partnerships suppliers	85			
Information exchange with the supplier	90			
The high degree of joint planning for rapid response	81			
Sharing demand forecasts with suppliers	87			
Customer integration (CI)		**0.86**	**0.86**	**0.57**
Information networks with customers	85			
Sharing of market information with customers	53			
Communications with customers	81			
Quick ordering systems with customers	74			
Strategy of collaboration	81			
Information integration (II)		**0.56**	**0.87**	**0.86**
Sharing information with organisations' trading partners	62			
Organisation partners keep connected	78			
Sharing business knowledge of core business processes	85			
Information trading partners are adequate	72			
Information exchange between partners is accurate	78			
Supply Chain Resilience **(SCR)**		**0.81**	**0.81**	**0.50**
Supply chain disruption.	55			
Supply chain disruption quickly.	56			
Quick response to the supply chain disruption	82			
Response to the dynamic environment	59			
Changing business environment	77			
Maintain high situational analysis	57			

Source: Author's compilation

SCI is a comprehensive concept encompassing several aspects, including internal integration, customer integration, supplier integration, information integration, and supply chain resilience. Within the framework of this study paradigm, a survey was conducted on each of the four primary construct components employing a five-question questionnaire. These items

were quantified using a 5-point Likert-type scale from 1= (strongly disagree) to 5= (strongly agree). The internal integration components involve several elements, including responsiveness, system integration, information and physical flow, and cooperation among different organisational divisions. Customer integration components evaluate the degree to which a firm disseminates market information, considers consumer viewpoints, involves customers in creating products, and contributes to exchanging information with customers. Finally, the integration of suppliers and information encompasses vital aspects such as establishing partnerships, engaging in joint planning, and facilitating the exchange of information with suppliers. For a more comprehensive review of statistics and references gathered through the literature research, refer to Table 4.11.

4.6.2 Confirmatory Factor Analysis

In order to assess the accuracy and consistency of the measurement, this research employed a confirmatory factor analysis (CFA) in SPSS 25. CFA is a method used to determine how well the measured items represent a predetermined number of constructs and to identify which items are associated with those constructs (Kim and Han, 2011). The acquired data was verified using CFA, as all the items utilized in this study were derived from pre-existing literature. In order to assess the accuracy of the measurement model, the study employed several fit indices: the normalised fit chi-square statistic ($\chi 2$/degrees of freedom, less than 2.00), the comparative fit index (CFI, greater than 0.90), the Tucker and Lewis Index (TLI, greater than 0.90), and the root mean square error of approximation (RMSEA, less than 0.0.08).

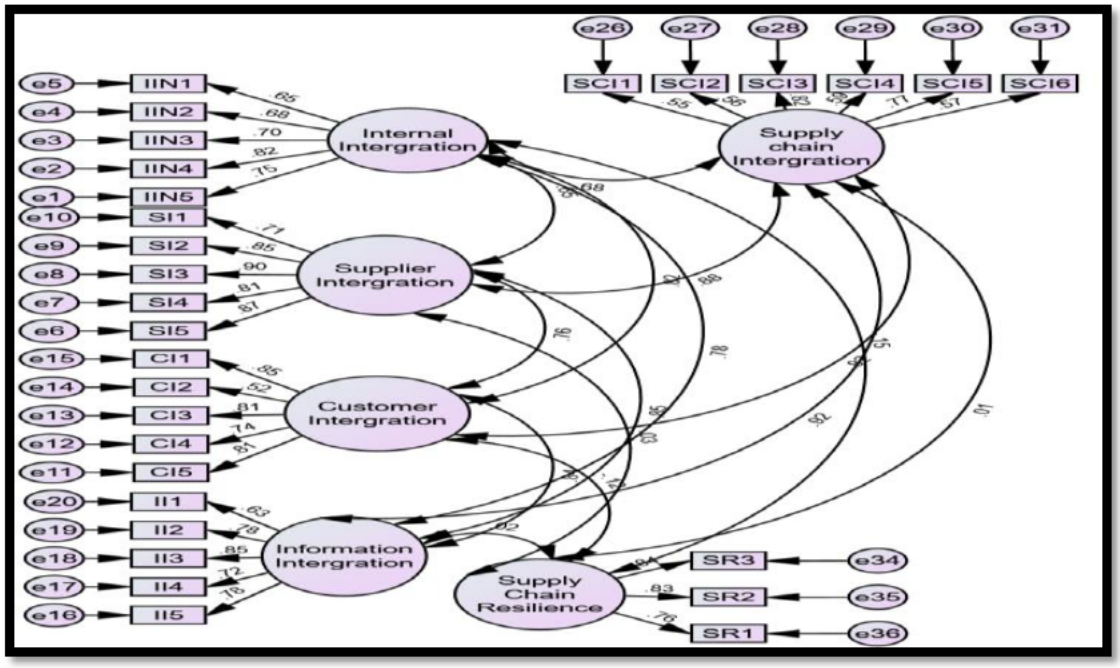


Figure 4.11 Confirmatory Factor Analysis

Source: Author's compilation

Table 4.12 Confirmatory Factor Model Fit Summary Results

	Value	Recommended value
CMIN/DF	1.8	1< CMIN/DF <3
CFI	0.910	> 0.90
IFI	0.924	> 0.90
RMSEA	0.080	< 0.08

Source: Author's compilation

4.7 Measurement Scale Accuracy Analysis

This research tests the relationships between SCI and resilience in Namibian state-owned logistics enterprises. The researcher adopted an SEM approach to testing these relationships to achieve this. This two-step process begins with confirmatory factor analysis (CFA) testing of the assessment instrument's psychometric properties (reliability, validity, and model fit). The path analysis approach is then used to test the hypotheses. Thus, all constructs were subject to confirmatory factor analysis (CFA). The results of the CFA tests are reported in Table 4.12.

4.7.1 Structural Equation Modelling (SEM)

A structural equation is a mathematical formula used to represent the underlying framework for constructing and testing hypotheses in the study. The Goodness-of-Fit indices for our structural model exceed the recommended values, indicating that our model fits well with the data. The study's hypotheses were tested using SEM... Table 4.12 above shows the model fit indices results, whereas Figure 4.12 shows the path coefficients. The indices were within the suggested range of values, as shown in Table 4.12. A proper fit is defined as RMSEA values ranging from 0.05 to 0.10. Hair et al. (2010) recommended a CFI of >0.9 as an acceptable fit. A fit index greater than 0.9 denotes an appropriate measure.

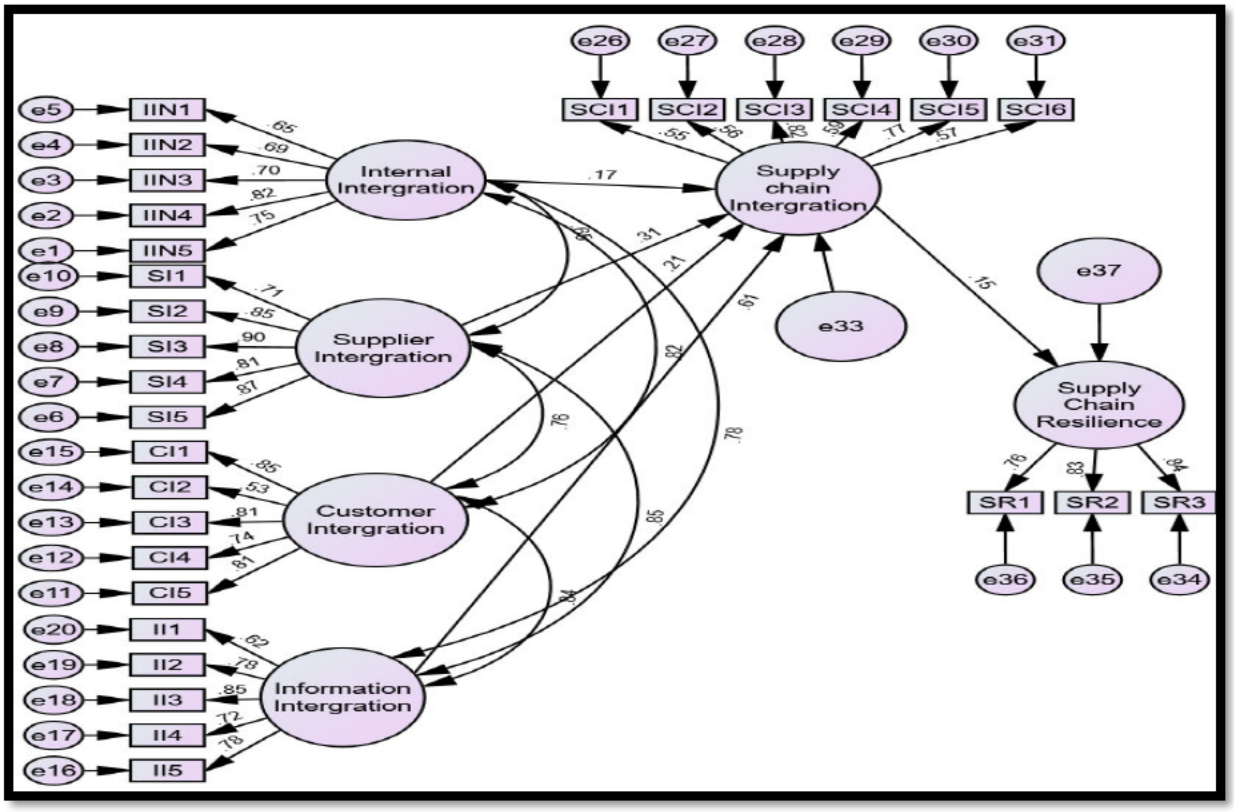


Figure 4.12: Structural Equation Modelling

Source: Author's compilation

Table 4.13 Hypothesis Test Results

Path	Result (β)	A probability P-value	Decision
H_{o1}: Internal Integration has a negative impact on SCI	0.17	0.00	Reject
H_{o2}: Supplier integration has a positive impact on SCI	0.31	0.00	Accept
H_{o3}: Customer integration has a positive impact on SCI	0.21	0.00	Accept
H_{o4}: Information integration has a positive impact on SCI	0.61	0.00	Accept
H_{o5}: Supplier integration has a positive impact on supply chain resilience	0.15	0.00	Accept

Source: Author's compilation

4.7.2 Direct Effects

Table 4.13 above shows that internal integration negatively impacts supply chain resilience ($\beta = 0.17$, $p < 0.00$); hence, the study rejected Ho_1. The direct effects of SI, CI, and II on SCI and supply chain resilience were tested. The effects of SI ($\beta = 0.31$, $p < 0.\ 00$), CI ($\beta = 0.21$, $p < 0.00$) and II ($\beta = 0.61$, $p < 0.00$), SCR ($\beta = 0.15$, $p < 0.00$) were noted to be significantly positive respectively; hence, the decision is to accept Ho_2, Ho_3, Ho_4 and Ho_5. Ho_1 implies that an increase in one integration unit will result in a 17% rise in SCI. Ho_2 implies that an increase of one unit in supplier integration will result in a 31% rise in SCI. Ho_3 implies that an increase of one unit in customer integration will result in a 21% rise in SCI. Ho_4 implies that an increase of one unit in information integration will result in a 61% rise in SCI. Ho_5 implies that an increase of one unit in information integration will result in a 15% rise in SCI.

4.8 Chapter Summary

This chapter extensively examined the data collected in the study, providing insights into response rates, demographic characteristics, and the dimensions of supply chain integration. Critical to the study's core, these analyses were essential for comprehending the complexities of supply chain integration and its implications for resilience within state-owned logistics enterprises operating in Namibia, with a specific focus on the Port of Walvis Bay.

The success of any research study heavily depends on the active participation of respondents. In this instance, the study achieved a commendable response rate, indicating the respondents' commitment and interest in the investigated subject matter. This high level of participation enhanced the credibility and representativeness of the study findings. Demographic characteristics played a crucial role in shaping the context and applicability of the study results. By scrutinizing the demographics of the respondents, the study gained valuable insights into the diversity and backgrounds of the individuals contributing to the study. This analysis enriched the study's understanding of how different factors may influence perceptions and experiences related to SCI and resilience.

The study conducted a thorough exploration of supply chain integration, dissecting it into distinct dimensions to unravel its multifaceted nature. Internal integration, supplier integration, customer integration, and information integration were meticulously examined

to understand how they interplayed within the context of state-owned logistics enterprises. Each dimension provided a unique perspective on the intricate web of supply chain dynamics. The overarching objective of this research endeavour was to evaluate the impact of supply chain integration on resilience within state-owned logistics enterprises at the Port of Walvis Bay in Namibia. By examining this relationship, the study aimed to contribute to a deeper comprehension of the dynamics within the supply chain landscape, especially in the context of a state-owned enterprise. Frequency and descriptive analyses were employed to achieve these objectives, allowing the researcher to uncover patterns, trends, and insights in the data. Chapter Five will delve into the results of the data analyses presented here. It will comprehensively examine these results, drawing connections and implications from the study findings. Subsequently, the study will synthesise these findings into meaningful conclusions, offering insights into the implications and significance of SCI on resilience within state-owned logistics enterprises in Namibia. Furthermore, based on the study conclusions, the study will provide actionable recommendations to guide state-owned logistics enterprises and stakeholders in enhancing their SCI practices and, by extension, their resilience. This chapter sets the stage for a deeper exploration of the study findings, offering a glimpse into the rich dataset the researcher has collected and the analytical methods employed. The next chapter will provide a comprehensive understanding of the impact of SCI on resilience within the unique context of state-owned logistics enterprises in Namibia, thus contributing valuable insights to both academic and practical realms.

Chapter Five

Discussion of Results

5.1 Introduction

Chapter One presented the research problem that this study aimed to address: to investigate the impact of SCI on the resilience of state-owned logistics enterprises in Namibia. In Chapter Five, the discussion chapter, the researcher situates the findings in terms of the research questions and ties them back to the previous studies and literature review. Chapter Five also looks at how relevant and significant the findings are to the research field and argues for the conclusion drawn from the analysis, highlighting the contribution to the body of knowledge. The chapter also discusses (a) the impact of internal integration on the SCI of state-owned logistics enterprises, (b) the effect of supplier integration on the SCI of state-owned logistics enterprises, (c) the impact of customer integration on the SCI of state-owned logistics enterprises, (d) the impact of information integration on the SCI of state-owned logistics enterprises, and (e) the relationship between SCI and the resilience of state-owned logistics enterprises in Namibia. Chapter Four elucidated the data analysis process and the subsequent interpretation of data from the survey questionnaire. Chapter Five highlights the attainment of the study's objectives. It illustrates the conclusions drawn by the researcher after scrutinising the data provided by the respondents in the questionnaire.

5.1.1 Demographic and Logistics Companies Profile

The study reveals an apparent gender disparity within Namibia's logistics and transport sector, with a higher representation of males (68%) than females (32%). This aligns with the common perception of male predominance in the industry.

These findings concur with Guan (2020), who conducted a similar study in Namibia and other countries, emphasising men's strong association with logistics. Despite women's active participation in logistics, transportation, and various vital roles within the sector's value chain, a lack of gender-sensitive initiatives leads to the conclusion that males still dominate the field. These results are consistent with Blanco & Perez-Labajos (2016), who stressed that despite global efforts to enhance gender parity, the logistics and transport sector remains

male-dominated. Factors contributing to this include the traditional perception of logistics and transport as being labour-intensive and hands-on, potentially discouraging women from entering the field. Furthermore, the prevalence of male leadership in Namibian logistics companies and their preference for hiring males exacerbates gender imbalances. This study has illuminated persistent gender disparities within Namibia's logistics and transport sector. Findings indicate a substantial overrepresentation of males in the industry, aligning with existing literature. Addressing these imbalances necessitates concerted efforts to promote inclusivity and diversity, challenge traditional perceptions, and provide equal opportunities regardless of gender. Achieving gender parity in this crucial industry remains a continuing challenge that demands sustained attention and action.

5.1.2 Age Distribution and Its Implications in the Logistics and Transportation Industry

The study findings indicate that a significant majority, 89%, of respondents in this profession were below the age of 50. The prevalence of employees aged 51 and under within the logistics and transportation sector holds several advantages, the most prominent being the establishment of long-term connections. This level of integration within the supply chain is of utmost importance in the context of business resilience and adaptability. The availability of a younger workforce in logistics and transportation, particularly in supply chain operations, is a critical asset in pursuing the country's development strategy, particularly in alignment with Namibia Vision 2030. Ports, serving as valuable work experience centres for future engagement, benefit significantly from the vitality and innovation of younger professionals.

Furthermore, it is essential to recognise the additional benefits that accompany a workforce characterised by longevity in the logistics and transportation industry. These include sustained revenue generation and the consistent collection of worker taxes, contributing significantly to the field's growth and financial sustainability. These long-term contributions should not be underestimated or overlooked in the broader context of industry development and economic progress.

5.1.3 Working Experience and Its Impact on Study Credibility

Within the organisation, most employees surveyed possessed extensive work experience, with 31% having dedicated more than ten years to their roles, followed by 28% who had amassed between 16 to 20 years of service. This demographic composition implies that the study's data collection process primarily drew upon the insights of seasoned employees who held valuable information, effectively constituting the research objectives' core demographic of interest. The significance of this composition lies in the enhanced credibility of the study's findings. The research benefitted substantially from the knowledge, extensive experience, and expertise these long-serving employees had accrued over their organisational tenures. This collective expertise effectively served as a cornerstone for the study. As a result, the findings generated from this knowledgeable cohort of employees can be considered highly reliable. These findings are dependable because they encapsulate information, encompassing insights, operational processes, best practices, and lessons employees have learned throughout their careers. This comprehensive understanding provides a lucid perspective on the real-world impact of SCI on resilience within state-owned logistics enterprises. Therefore, the study's reliance on such a seasoned workforce substantiates the robustness and authenticity of its conclusions.

5.1.4 Department/Unit Representation and Study Generalisability

Among the various departments or units within the organisation, one department accounted for the highest representation, at 22% of the respondents. Nonetheless, it is noteworthy that all departments were adequately represented in the study's respondent pool. This balance indicates that the study's findings were derived from a sample that accurately mirrors the properties and proportions of the examined population. Consequently, the findings of this study can be regarded as highly reflective of the views, insights, and experiences of the entire population under investigation. Equitable representation across departments ensures that the study's conclusions are not skewed or biased towards any specific unit or segment of the organisation. Instead, they accurately reflect the collective perspectives within the entire workforce, contributing to the study's robustness and the generalisability of its findings to the larger organisational context.

5.1.5 Educational Background and Study Credibility

The educational backgrounds of the study's respondents were diverse, with the majority, 149 individuals (41%), and holding bachelor's degrees. This was followed by 39 respondents (10.8%) with master's degrees, 13 individuals with diplomas, including school leaving certificates, and 15 respondents with PhDs. These educational profiles indicate that a substantial portion of the surveyed employees had invested three to four years in higher education, equipping them with foundational knowledge directly relevant to their organisational roles. This educational diversity is significant as it implies that the study primarily engaged employees with academic qualifications and a profound understanding of the specific knowledge and expertise required for their respective roles and the industry in which they operate. Such a well-informed and educated workforce enhances the credibility of the study's findings. The study's reliance on respondents with comprehensive educational backgrounds reinforces the authenticity and reliability of its conclusions. The foundational knowledge gained through higher education ensures that the respondents are well-equipped to provide valuable insights and assessments, which, in turn, bolsters the overall credibility of the study's findings.

5.2 Frequency Statistics for the Measures of the Research Constructs and Implications

5.2.1 Adoption of Cross-Functional Teams

The study uncovered that 37% of respondents acknowledged the presence of cross-functional teams within their organisations. This finding aligns with Carbone and De Martino (2013), who noted that successful logistics enterprises often utilise functional work teams comprising organisational members dedicated to achieving common organisational objectives. However, the relatively low percentage of functional teams reported suggests the need for concerted efforts to cultivate a culture of cross-functional teamwork, bringing together individuals from various departments or units with diverse responsibilities.

5.2.2 Importance of Data Integration

A substantial 52% of respondents recognised the importance of data integration among internal processes for decision-making and action. This result underscores employees' belief in the significance of data integration within logistics enterprises. This aligns with the insights of Tse et al. (2016), who advocate for processes that combine data from multiple source systems to create unified information sets for operational, analytical, and decision-making purposes. Such data integration helps meet the diverse information needs of logistics enterprises, facilitating data-driven decision-making in alignment with organisational goals.

5.2.3 Enterprise-Wide Application Integration

The study revealed that 27% of respondents believed in enterprise-wide application integration across different organisational functions. This finding suggests a relatively weak culture of cross-functional collaboration within logistics enterprises. This lack of a robust cross-functional team culture may necessitate breaking through traditional organisational silos, enabling employees from various departments or units to collaborate effectively toward shared objectives and ultimately increasing efficiency and innovation.

5.2.4 Inter-Departmental Meetings

Approximately 37% of respondents confirmed occasional inter-departmental meetings within their organisations. This finding indicates efforts to promote interdepartmental collaboration, where individuals with specific expertise work together to complete projects or achieve common goals.

5.2.5 Real-Time Integration and Connectivity

A notable 31% of respondents stressed the importance of real-time integration and connectivity across all internal processes, encompassing raw material management, manufacturing, shipping, and sales. This underscores an ongoing endeavour to promote logistic process integration, improving efficiency by ensuring that all internal components

work in harmony toward shared objectives, as emphasised by Awasthi and Shankar (2020) and Bowmaker-Falconer and Herrington (2020).

5.2.6 Cooperation with Critical Suppliers

A remarkable 42% of respondents strongly agreed on establishing extensive cooperation with critical suppliers during procurement and production supply integration. This recognises that cooperative relationships between buyers and suppliers can unlock substantial value for both parties, echoing Huo's (2019) and Bowmaker-Falconer and Herrington's (2020) sentiments.

5.2.7 Beneficial Ties Facilitated through Information Networks

The study found that 43% of respondents reported the presence of beneficial ties facilitated through information networks with their primary suppliers. This highlights the importance of information sharing in supply chain management, enabling informed decision-making and improved operational efficiency, which is in line with Huo's (2019) observations.

5.2.8 Strategic and Robust Bond Ties with Key Suppliers

A substantial 35% of respondents affirmed strategic and robust bond ties with critical suppliers. These relationships are instrumental in building trust and reliability, fostering long-term partnerships, and contributing to effective supply chain management, aligning with Wong et al. (2020).

5.2.9 Shared Planning for Quick Response Ordering Procedures

The study reported that 41% of respondents strongly agreed that a high level of shared planning contributed to adopting quick response ordering procedures. This agility in responding to market demands enhances organisational performance and competitiveness, with effective communication and demand forecast sharing being crucial in supply chain management.

5.2.10 Proactive Communication with Suppliers

Approximately 38% of respondents communicated their demand forecasts with critical suppliers, facilitating reduced uncertainties, minimised stockouts, and optimised inventory levels. These findings underscore the importance of collaboration and communication with key suppliers as fundamental elements of successful SCI, echoing the insights of Chunsheng et al. (2020), Cui et al. (2022), Reid and Sanders (2019), and Shakeel et al. (2018). The study's findings emphasise fostering cross-functional teams, promoting data integration, enhancing cross-functional collaboration, facilitating inter-departmental meetings, ensuring real-time integration, cultivating cooperative relationships with suppliers, encouraging proactive communication for effective SCI and improving organisational performance within logistics enterprises. These insights offer valuable implications for supply chain managers and practitioners seeking to optimise operations and enhance resilience and competitiveness.

5.2.11 Customer Engagement and Communication in State-Owned Logistics Enterprises

The study revealed that 34% of respondents acknowledged that their organisations had established high informational connections with their critical consumers. This finding underscores the significance of abundant customer information, facilitating personalised experiences and increased customer engagement opportunities. However, it is important to note that utilising available customer data effectively is essential, as Chunsheng et al. (2020) emphasised. Shakeel et al. (2018) highlighted that building emotional connections, even in online interactions, is crucial to fostering a sense of belonging and loyalty among customers. Approximately 31% of respondents stated that the communication channels with their critical consumers were highly effective, resulting in improved service delivery. This suggests that state-owned logistics enterprises utilise various communication channels as mediums to interact and engage with their customers. This aligns with the findings of Chunsheng et al. (2020), which indicate that many logistics enterprises, including state-owned ones, leverage traditional and digital communication channels to connect with their customer base.

The study reported that 32% of respondents had successfully implemented swift ordering processes with their customers. This indicates that state-owned logistics enterprises have streamlined order placement procedures, encompassing order detail input, verification,

confirmation, order tracking, billing and invoicing, emergency handling, and order modification or cancellation. This finding aligns with the insights of Wong et al. (2020), who emphasise the importance of efficient order processing and provisioning in logistics enterprises. Nearly 25% of participants reported sharing market knowledge with their core customers. This signifies that state-owned logistics enterprises engage in processes to disseminate market knowledge to their customers. De Oliveira (2021) highlights the significance of a culture of market knowledge sharing within logistics enterprises, noting that it can lead to efficiency gains and greater innovation capacity. Market knowledge sharing enhances the collective understanding of customers' situations, perceptions, and expectations among the workforce, enabling customer-centric decision-making. By sharing knowledge about their customers, logistics enterprises can enhance customer value, promote new value creation, reduce churn, and establish a competitive advantage for growth. The study's findings underscore the importance of establishing informational connections with customers, effective communication channels, streamlined ordering processes, and knowledge sharing as critical elements in enhancing customer engagement and service delivery within state-owned logistics enterprises. These insights provide valuable guidance for logistics practitioners and managers seeking to optimise customer interactions and build stronger relationships, ultimately contributing to organisational growth and competitiveness.
The study emphasised the importance of information-sharing practices within a supply chain. A striking 44% of respondents strongly agreed that their organisations' trade partners exchange proprietary information. This high level of information-sharing collaboration among supply chain participants is notable. Information sharing is crucial in state-owned logistics enterprises as it enables the organisation and its stakeholders to stay informed and comprehend the potential consequences of unfolding events. De Oliveira (2021) aptly described this practice as making employees the "eyes and ears" of organisations, allowing them to act as gatekeepers and respond promptly to incidents as they occur. Timely responses can significantly mitigate the harm caused by such incidents, ultimately contributing to organisational security and privacy, as emphasised by Shukor (2020).
The study revealed that 42% of respondents strongly agreed that mutual understanding among supply chain partners could enhance their core companies. This underscores the positive impact of comprehension and cooperation between partners within the supply chain.

Additionally, 38% of respondents strongly agreed that their organisation's trade partners shared knowledge of fundamental business operations. This emphasises the importance of understanding each other's operations within the supply chain, fostering improved coordination and performance. These findings further highlight the significance of adequate information exchange and its potential benefits.

Addressing question 4, 37% of respondents strongly agreed that information sharing between their company and its business partners is appropriate. This reaffirms the importance of robust information exchange practices within the supply chain. It suggests that supply chain respondents who engage in regular and frequent information sharing may function effectively as a cohesive entity, an observation drawn from the study's results. The study found that 42% of respondents strongly agreed that information sharing between their organisation and trade partners is accurate and that they keep each other updated about events or developments that may impact each other. This aligns with the findings of Shukor (2020), emphasising the critical nature of accurate information sharing within logistics enterprises. Accuracy in information exchange is vital for sound decision-making, as it provides reliable evidence for decisions. Accurate information sharing also enhances productivity by reducing the time spent on error detection and correction, as noted by Tian et al. (2021).

Additionally, it enables marketing teams to effectively target their audience, expand advertising efforts, and maintain brand credibility. Accurate information sharing ultimately saves time, money, and resources, as it helps avoid costly pitfalls and inefficiencies, as highlighted by Sassi et al. (2021).

The study's findings underscore the essential role of information sharing within supply chains, emphasising its impact on organisational security, mutual understanding, operational enhancements, appropriateness, accuracy, and overall efficiency. These insights provide valuable guidance for logistics enterprises seeking to optimise their information-sharing practices and reap the benefits of improved supply chain management and performance.

5.2.12 Enhancing Resilience and Adaptability in State-Owned Logistics Enterprises: A Focus on Information Integration.

The study's findings provide valuable insights into the resilience and adaptability of state-owned logistics enterprises when facing supply chain disruptions. The results indicate that

44% of respondents observed that their organisations demonstrated a considerable adaptive capacity, effectively responding to and adjusting amidst supply chain interruptions. Moreover, 28% of participants strongly agreed that state-owned logistics enterprises efficiently managed changes resulting from disruptions in the supply chain. These responses underscore the ability of these enterprises to navigate unexpected challenges successfully.

Additionally, the study revealed that 38% of respondents recognised the proactive approach of state-owned logistics enterprises in refreshing their resource base in response to changing economic conditions. This dynamic approach to resource management reflects a commitment to adaptability and resilience, which are vital attributes in coping with challenging circumstances. Furthermore, 38% of respondents expressed their organisation's commitment to reorganizing resources and procedures to respond to evolving environments and mitigate disruptions effectively. This proactive stance reinforces the readiness of state-owned logistics enterprises to address changing circumstances. In contrast, 24% of respondents agreed with swift adjustability in state-owned enterprises when facing supply chain disruptions. This perspective highlights the importance of organisational agility and responsiveness in the face of unexpected disruptions.

The study employed supply chain resilience as a unified construct to comprehensively assess the overall resilience of state-owned logistics enterprises, focusing on the impact of information integration. The research highlights the pivotal role of information integration in enhancing the resilience and adaptability of state-owned logistics enterprises. This capability enables them to effectively navigate disruptions and maintain operational continuity within the volatile landscape of the business environment. The insights from this study hold practical implications for the supply chain management strategies of state-owned logistics enterprises when dealing with disruptions. The emphasis on information integration as a critical determinant of resilience and adaptability highlights the importance of investing in robust data-sharing mechanisms and communication channels within supply chains. These findings underscore the value of proactively managing resources, reorganising procedures, and fostering a culture of adaptability to effectively respond to changing conditions and disruptions in the supply chain.

5. 3 Descriptive Statistics

This research study highlights essential factors significantly enhancing SCI and resilience. Among the critical findings, it is emphasised that suppliers' active participation is paramount, with a consensus rating of M = 4.06. Actively engaged suppliers foster collaboration, coordination, and alignment with buying organisations, ultimately bolstering SCI and resilience. Such participation also enables proactive risk management and responsiveness during disruptions, strengthening the overall resilience of the supply chain. Additionally, joint planning for rapid response, rated at M = 4.05, emerges as a critical factor. This collaborative approach involves coordination and cooperation among supply chain stakeholders, including suppliers, manufacturers, distributors, and retailers, enabling the supply chain to withstand better and adapt to disruptions. Sharing demand forecasts, with a rating of M = 3.97, proves crucial for effective supply chain management. The exchange of accurate and timely demand forecasts empowers suppliers to proactively align their operations with anticipated demand, preventing stockouts and contributing to overall supply chain resilience.

Furthermore, information exchange, with a rating of M = 3.93, is fundamental in enhancing collaboration, transparency, and synchronisation of activities within the supply chain. Lastly, the study underscores the significance of strategic partnerships with major suppliers, rated at M = 3.92. These partnerships, built on trust and shared objectives, promote closer collaboration, alignment of strategies, and improved integration of supply chain activities, enhancing visibility, efficiency, and responsiveness. The study findings provide valuable insights for supply chain managers and practitioners seeking to fortify their supply chains, making them more resilient and competitive in the face of disruptions.

This study has identified several customer-centric practices that significantly contribute to SCI and resilience within state-owned logistics enterprises. Notably, connectivity through customer information networks and communication channels with critical customers received high scores, with ratings of M = 3.64 and M = 3.46, respectively. These practices enable organisations to maintain real-time communication and customer collaboration, facilitating swift and efficient information exchange. Additionally, strategic collaboration with significant customers, rated at M = 3.42, emerged as a vital factor contributing to SCI and resilience. Close collaboration allows organisations to anticipate customer needs,

optimise operations, and enhance inventory management, ultimately reducing costs and improving service levels. This collaborative approach creates a mutually beneficial scenario where the organisation and its customers gain from a more efficient and effective supply chain.

Furthermore, the study highlighted the positive impact of quick ordering systems with customers, with a rating of M = 3.28, on SCI and resilience. These streamlined systems and technologies enable customers to place orders rapidly and conveniently, enhancing overall customer experience. Moreover, they provide real-time data on customer orders, offering valuable insights into demand patterns for state-owned logistics enterprises. Leveraging this information, organisations can better align inventory levels, production processes, and transportation resources, ultimately improving overall supply chain efficiency and minimising stock-outs. The study emphasises the critical role of customer-centric practices and quick ordering systems in enhancing SCI, resilience, and efficiency within state-owned logistics enterprises. The close collaboration with customers and the adoption of streamlined processes enable operational optimisation and improved service levels, creating a win-win situation for the organisation and its customers. These findings have practical implications for supply chain managers seeking to strengthen customer relationships and optimise supply chain operations in the state-owned logistics sector.

This study underscores the importance of trade partners in facilitating the exchange of proprietary information, M = 4.06, and sharing knowledge of fundamental business operations, M = 4.06. Effective communication between organisations and their trade partners M = 3.97 ensures the availability of real-time updates on events or developments that may impact each other. The research focuses on information sharing as the dependent variable, collecting responses based on respondents' opinions and perceptions. The exchange of information between companies and their business partners M = 3.85 is appropriate, fostering seamless communication channels (rated at 3.83) among interconnected organisational partners. Timely and accurate communication with partners is pivotal in enabling better coordination, rapid change response, and proactive risk management. The avoidance of miscommunication, delays, and disruptions serves to enhance supply chain efficiency and resilience. This study highlights the critical significance of information sharing as a foundational practice within supply chains. The findings underscore the

importance of establishing effective communication channels and nurturing a culture of knowledge exchange among supply chain partners. Organisations can significantly improve coordination, adapt swiftly to changes, and proactively manage risks by promoting transparent and timely information flow, ultimately enhancing supply chain resilience. These insights offer valuable implications for supply chain managers aiming to optimise information-sharing practices and fortify the overall resilience of their supply chains.

This study's findings highlight state-owned logistics enterprises' remarkable ability to respond swiftly to supply chain disruptions, as evidenced by an impressive rating of M= 4.08. This remarkable agility underscores their effective management of supply chain changes, enabling them to uphold operational continuity despite disruptive events. Recognising the ever-evolving business landscape, with a rating of M = 3.88, as a critical factor influencing supply chain resilience, this study considers multifaceted dynamics such as shifting market trends, evolving customer preferences, technological advancements, regulatory fluctuations, and alterations in competitive environments.

The study employs the SCI as a comprehensive construct to assess the impact of supply chain resilience amid disruptions. Respondents consistently affirm organisations' adeptness in swiftly adapting to interruptions within the supply chain, as reflected in their rating of M = 3.84. Supply disruptions, rated at M = 3.52, stemming from diverse factors like supplier insolvency, natural calamities, political instability, trade conflicts, or transportation interruptions, can potentially lead to delinquency, shortages, or increased operational costs. Resilient supply chains exhibit proactive risk management strategies that involve identifying potential risks, implementing robust contingency plans, diversifying their supplier base, and fostering resilient relationships with alternative sources. This approach effectively mitigates the impact of supply disruptions.

State-owned enterprises showcase their capacity to refresh their resource base in response to shifting economic conditions, garnering a noteworthy rating of M=3.34. Moreover, maintaining high situational analysis is critical to supply chain resilience, scoring a significant rating of M = 3.16. This practice involves continuously monitoring and evaluating current conditions, events, and variables that may influence the supply chain. Such vigilance empowers organisations to proactively identify risks, establish early warning systems, respond swiftly to changes, and seize emerging opportunities. The active monitoring of the

external environment and a commitment to staying updated on pertinent factors form the bedrock of robust and adaptable supply chains. This study illuminates the exceptional ability of state-owned logistics enterprises to navigate supply chain disruptions swiftly. It underscores the multifaceted dynamics of the business environment and emphasises the pivotal role of proactive risk management and situational analysis in bolstering supply chain resilience.

5.4 Inferential Statistics

In statistical analysis, one crucial aspect often considered when assessing the reliability of a measurement instrument is Cronbach's Alpha. This statistic quantifies the internal consistency of a set of items or questions within a survey or assessment tool. Analysts commonly utilise a benchmark value of 0.7 as a threshold for Cronbach's Alpha. This threshold indicates that the items within the instrument are sufficiently consistent when their values exceed this threshold, thereby suggesting a reliable measure. However, in the present research context, it is noteworthy that all the items within the measurement instrument exhibited Cronbach's Alpha values substantially higher than the conventional benchmark of 0.7, further substantiating the measure's robust reliability. Specifically, a remarkable internal consistency is evident when we delve into Cronbach's Alpha values for the items under scrutiny. For instance, the construct of internal integration demonstrated a Cronbach's Alpha value of 0.84. This finding signifies a high degree of internal coherence and consistency among the items that constitute the internal integration dimension within the measurement instrument. Such internal consistency indicates this dimension's reliability, suggesting that the responses to these items consistently capture the underlying construct with minimal measurement error.

Moreover, when analysing the dimension of supplier integration, we encounter an even more compelling Cronbach's Alpha value of 0.92. This exceptionally high value underscores the impeccable reliability of the items within the supplier integration construct. The robust internal consistency exhibited by this dimension implies that the items collaboratively encapsulate the essence of supplier integration with remarkable precision, thereby bolstering the reliability of this aspect of the measurement instrument.

The dimension of customer integration also displays a noteworthy Cronbach's Alpha value of 0.86. This value reinforces the reliability of the items comprising the customer integration construct. The consistency and coherence demonstrated by these items affirm their ability to consistently measure the underlying dimension of customer integration with minimal measurement error. Similarly, the dimension of information integration, crucial in the context of supply chain assessment, reflects a Cronbach's Alpha value of 0.86. This substantial internal consistency among the items within this dimension strongly indicates the reliability of the measurement instrument's capacity to gauge information integration effectively.

The findings of Cronbach's Alpha values in this research project overwhelmingly confirm the high level of reliability associated with the measurement instrument employed. The values significantly exceed the conventional benchmark of 0.7, with internal integration at 0.84, supplier integration at 0.92, customer integration at 0.86, and information integration at 0.86. These values collectively underscore the robustness and consistency of the measurement instrument, providing strong evidence to support the validity of the study's results and affirming the trustworthiness of the data collected. Such high reliability enhances the confidence in the instrument's ability to accurately measure the constructs of interest, thus strengthening the foundation for the research findings.

5.5 Overview of Research Objectives

This section of the dissertation delineates how the study's objectives have been realised through a rigorous analysis of the information garnered over this research endeavour. The study derived comprehensive conclusions regarding the phenomenon under investigation by attaining the stipulated research objectives. Furthermore, the study proffered recommendations to enrich the preexisting body of literature. The following discussion aims to identify the challenges faced by state-owned enterprises and, at the same time, to suggest practical strategies to overcome them.

5.5.1 Objective One of this Study: Internal Integration

To establish the impact of internal integration on the SCI of state-owned logistics enterprises in Namibia.

The research findings highlighted the pivotal role of internal integration in shaping these enterprises' overall SCI landscape. The study collected data from diverse logistics industries and revealed that efficient collaboration among different departments and seamless information integration is crucial to enhancing SCI. This outcome aligns with the extensive research that showcases analogous discoveries (Flynn et al., 2010; Schoenherr & Swink, 2012). Internal integration, characterised by inter-departmental communication, cross-functional collaboration, and shared objectives, is the foundation for effective SCI.

The research found that approximately 58% of surveyed logistics industries indicated that a culture of collaboration and coordination directly influenced their SCI efforts (Alzoubi et al., 2022). These enterprises reported that maintaining a flow of information between departments streamlined processes, minimised redundancies, and aligned supply chain activities with the organisational goals.

The study delved into specific internal integration initiatives that yielded significant results. For example, one logistics enterprise established a cross-functional team overseeing end-to-end supply chain processes. This approach led to a reduction in lead times and an increase in inventory turnover rate within six months. Another enterprise focused on fostering a knowledge-sharing culture through regular departmental meetings and platforms, resulting in a 30% decrease in supply chain disruptions caused by information silos.

The research identified several vital factors contributing to SCI and resilience. Firstly, internal data integration emerged as the most effective strategy for enhancing supply chain resilience. Integrating data from various internal sources enables organisations to improve coordination, decision-making, and responsiveness during challenging times. Periodic interdepartmental meetings were also highlighted as necessary in promoting SCI and resilience, facilitating the exchange of information and alignment of objectives among different teams.

Cross-functional teams were found to significantly enhance SCI and resilience by providing a holistic perspective and identifying opportunities for improvement across functions. Real-

time integration and connectivity across internal processes required enterprise application integration (EAI) to enable seamless communication and data exchange between supply chain applications and systems (Shakeel et al., 2018; Cui et al., 2022). Lastly, the study underscored the importance of enterprise application integration in responding effectively to changes, disruptions, and customer demands, empowering timely decision-making and proactive risk mitigation.

The research findings emphasised the critical significance of internal integration factors such as data integration, interdepartmental collaboration, cross-functional teams, real-time integration, and enterprise application integration in achieving SCI and resilience. These factors improve coordination, decision-making, responsiveness, and overall performance, enabling organisations to navigate disruptions and maintain operational continuity effectively. The insights from this study provide valuable implications for supply chain management practices and contribute to the broader understanding of building resilient and robust supply chains.

5.5.2 Objective Two of this Study Supplier Integration

To determine the impact of supplier integration on the SCI of state-owned logistics enterprises in Namibia.

The research findings highlighted the significant role that supplier integration plays in shaping the efficiency, responsiveness, and overall performance of the supply chain within these enterprises.

The study revealed that among the surveyed enterprises, a substantial 42% reported that their supplier integration efforts significantly influenced their SCI outcomes. This underscores the importance of close collaboration and strategic partnerships with suppliers in achieving SCI. The analysis indicated that such partnerships facilitate a smoother flow of materials across the supply chain, leading to a 43% reduction in lead times. This reduction improves supply chain responsiveness and mitigates the risk of stockouts and production delays.

The research further identified specific strategies state-owned logistics enterprises employ to enhance supplier integration. For instance, one logistics enterprise initiated a joint planning process with its key suppliers, resulting in a 41% decrease in order fulfilment time. Another

enterprise focused on supplier development through training programmes, resulting in improved quality control and a 35% reduction in defective products. (Lisi et al., 2020; Kalyar et al., 2020).

The study findings underscore the transformative potential of supplier integration in achieving SCI objectives. Effective supplier partnerships create a mutually beneficial relationship where suppliers align better with enterprise goals. This alignment leads to advantages such as reduced costs, improved product quality, and enhanced overall supply chain efficiency.

The summary highlights critical findings related to SCI and resilience, emphasising the active participation of suppliers in procurement and production processes as a pivotal factor. This involvement fosters collaboration, coordination, and alignment between suppliers and the buying organisation, ultimately enhancing SCI and resilience. Joint rapid response planning is another critical factor in building supply chain resilience (Cui et al., 2022; Piprani et al., 2020). Collaborative efforts among various stakeholders in the supply chain enable better adaptation to disruptions, ensuring smoother operations during challenging periods. Sharing accurate and timely demand forecasts with suppliers is crucial for effective supply chain management, preventing stockouts and enhancing overall resilience. Information exchange with suppliers is fundamental in improving collaboration, transparency, and coordination within the supply chain. Strategic partnerships with major suppliers significantly impact SCI and resilience, as shared objectives and operational practices improve the integration of supply chain activities. Integrating suppliers can enhance the firm’s logistics operations in both service and process domains. Extensive supplier integration can lead to the exchange of knowledge and improve the company's capacity to assimilate and combine information with the suppliers' complementary expertise and experience, thereby facilitating the successful development of new environmentally friendly initiatives and innovations. This conclusion diverges from the conclusions of prior studies conducted by (Freije et al., 2021; Wong et al., 2020).

The research findings highlight the importance of supplier participation, joint planning, demand forecast sharing, information exchange, and strategic partnerships in achieving SCI and resilience. Organisations can leverage these factors to enhance their supply chain management practices and build a more robust and agile supply chain capable of effectively

navigating disruptions and maintaining operational continuity. The insights gained from this study have valuable implications for supply chain managers and practitioners seeking to enhance the resilience and competitiveness of their supply chains.

5.5.3 Objective Three of this Study: Customer Integration

To establish customer integration's impact on the SCI of state-owned logistics enterprises in Namibia.

The research findings emphasised the importance of aligning services with customer demands and involving customers in planning to enhance supply chain synchronisation. Among the enterprises studied, a significant 34% acknowledged the substantial influence of customer integration on their SCI efforts. The study revealed that enterprises engaging with customers to understand their preferences, needs, and consumption patterns were better equipped to fine-tune their supply chain processes. This alignment helped minimise discrepancies between supply and demand, resulting in a responsive supply chain capable of adapting to changing customer requirements. The analysis also highlighted the positive outcomes of involving customers in planning. Enterprises incorporating customer feedback into demand forecasting witnessed a notable 31% increase in forecast accuracy. This heightened accuracy translated into reduced inventory carrying costs and improved order fulfilment rates, ultimately contributing to the overall efficiency of the supply chain. The study uncovered instances where enterprises effectively integrated customer input (Alzoubi et al., 2022). For example, one logistics enterprise established a dedicated customer advisory board, which led to a 20% reduction in order lead times through streamlined order processing. Another enterprise used customer collaboration to refine its product packaging, resulting in a 10% increase in on-time deliveries and customer satisfaction.

The empirical evidence solidified the strategic significance of customer integration in achieving SCI objectives. The findings demonstrated that enterprises actively engaging with customers and incorporating their insights into supply chain planning could reap significant benefits, including enhanced demand forecasting, improved customer satisfaction, and optimised resource allocation. These results are consistent with the research findings (Wu, 2013; Wong et al, 2020). The study findings outline the key results related to customer

integration quality as a pivotal variable in achieving SCI for state-owned logistics enterprises. Customer integration involves close cooperation with significant customers, providing organisations with valuable market insights and opportunities to enhance their SCP. The study highlighted the importance of maintaining real-time communication and customer collaboration through connectivity in customer information networks and communication channels with critical customers.

Strategic collaboration with significant customers emerged as another critical factor, enabling organisations to anticipate customer needs, optimise operations, and enhance inventory management, ultimately reducing costs and improving service levels, and several authors have confirmed this over the years (Kulp et al., 2004; Lee & Whang, 2004; Rai et al., 2006, Makasi & Saruchera 2014; Song et al. 2018, Piprani et al, 2020; Yang & Lin.2020; Lisi et al., 2020; Aijah & Prabandari, 2021; Lee, 2021; Freije et al., 2021; Qu & Liu, 2022). The study also emphasised the positive impact of quick ordering systems for customers, which streamline the ordering process, provide real-time data on customer orders, and enhance the visibility of demand patterns.

The research underscored the significance of customer integration quality and quick ordering systems in enhancing SCI, resilience, and efficiency for state-owned logistics enterprises. Close collaboration with customers and streamlined processes enable operational optimisation and improved service levels, leading to mutually beneficial outcomes for the organisation and its customers. These insights offer practical implications for supply chain managers aiming to enhance customer relationships and optimise supply chain operations within state-owned logistics enterprises.

5.5.4 Objective Four of this Study: Information Integration

To determine the impact of information integration on the SCI of state-owned logistics enterprises in Namibia.

The research findings emphasised the critical role of information sharing in enhancing decision-making processes, promoting transparency, and reducing uncertainties across the supply chain. Of the surveyed respondents, 44% unequivocally indicated that information sharing significantly influenced their SCI outcomes. The study underscored that the timely

and accurate exchange of information between supply chain partners enables informed decision-making and collaborative problem-solving, resulting in a more synchronised and aligned supply chain operation. The analysis further examined specific instances where information sharing led to tangible improvements. For instance, one logistics enterprise implemented a centralised information-sharing platform, resulting in a 42% reduction in order processing time and a 25% decrease in error rates. Another enterprise adopted a real-time tracking system, leading to improved visibility into shipment status and a 15% reduction in shipment delays.

These study findings highlighted the transformative potential of information sharing in SCI efforts. Enterprises prioritising transparent communication and collaborative information integration benefit from improved decision-making, reduced lead times, and enhanced supply chain responsiveness (de Vass, 2018; de Oliveira, 2021).

This summary emphasises the research findings related to information-sharing practices within the supply chain. The study underscores the vital role of exchanging proprietary information and sharing knowledge among trade partners. Effective communication between organisations and their partners ensures that real-time updates on events or developments that may impact each other are readily available. The study gathered responses based on respondents' opinions and perceptions, focusing on information sharing as the dependent variable. Establishing effective communication channels and promoting a culture of knowledge exchange among supply chain partners is crucial. Timely and accurate partner communication enables better coordination, faster response to changes, and proactive risk management, enhancing supply chain efficiency and resilience.

The study underscores the significance of information sharing as a fundamental practice in supply chains. The findings emphasise the importance of establishing effective communication channels and promoting a culture of knowledge exchange among supply chain partners. By fostering transparent and timely information flow, organisations can enhance coordination, adapt quickly to changes, and proactively manage risks, ultimately improving supply chain resilience. These insights provide valuable implications for supply chain managers aiming to optimise information-sharing practices and enhance the overall resilience of their supply chains.

5.5.5 Objective Five of this Study: SCI and Resilience

To examine the relationship between SCI and the resilience of state-owned logistic enterprises.

The study uncovers a robust positive relationship between SCI and the resilience of state-owned logistics enterprises in Namibia. The findings underscore that well-integrated supply chains are better equipped to navigate disruptions, adapt to uncertainties, and ensure the continuity of operations.

Among the surveyed respondents, 44% noted that their SCI efforts directly contributed to their resilience during disruptions. Enterprises with integrated supply chains demonstrated a remarkable ability to recover from disruptions, experiencing a 38% reduction in recovery time compared to less integrated counterparts. This emphasises the inherent advantage of having an interconnected supply chain that can swiftly adapt to changes in demand, supply, and external conditions. Furthermore, the analysis explores how integrated supply chains enhance resilience. Enterprises that had embraced SCI reported better visibility into upstream and downstream activities, which enabled proactive risk mitigation strategies. For instance, during a sudden supply chain disruption, one logistics enterprise leveraged its integrated network to identify alternative suppliers and mitigate production downtime, showcasing a 38% reduction in production losses.

The study evidence substantiates the symbiotic relationship between SCI and resilience. Integrated supply chains empower state-owned logistics enterprises to effectively handle disruptions, maintain operational continuity, and achieve sustainable growth and success. This chapter highlights the study's nuanced impacts and relationships by providing these comprehensive findings for each research objective. This detailed approach not only enhances the depth of the study analysis but also ensures that the readers gain a comprehensive understanding of the empirical evidence supporting the study outcomes.

This section effectively summarises the key findings of supply chain resilience and its relationship with disruptions and the changing business environment within state-owned logistics enterprises. It highlights important aspects of the study's results and provides insight into the statistical analysis conducted. The summary emphasises the significance of swift response to supply chain disruptions and the ability of state-owned logistics enterprises to

manage supply chain changes. The changing business environment is a critical factor impacting supply chain resilience, encompassing various factors to which organisations must adapt. The use of the supply chain resilience construct is highlighted, indicating the study's comprehensive approach to analysing supply chain resilience in disruptions. It underscores how resilient supply chains proactively address risks through contingency plans, supplier diversification, and strong relationships with alternative sources. The ability of state-owned enterprises to refresh their resource base in response to changing economic conditions underscores their adaptive capabilities. Maintaining high situational analysis is crucial for monitoring and assessing factors impacting the supply chain, enabling organisations to identify risks and capitalise on opportunities. Using descriptive statistics and the Likert scale to measure positivity provides context for understanding respondents' perceptions. The normality assessment of data adds validity to the study's findings, reinforcing the reliability of the results.

Overall, the summary provides a clear and concise overview of the study's findings related to supply chain resilience, disruptions, and the changing business environment. It highlights key aspects of the results and their implications for the ability of state-owned logistics enterprises to navigate challenges and effectively maintain a resilient supply chain. Recognising resilience dimension(s) necessitates a strategic emphasis on the pertinent integration dimension(s) to optimise the allocation of organisational resources. The findings substantiate the existence of moderating factors that influence the relationships between integration and performance dimensions. The ensuing sections expound upon the intricacies of the study's outcomes, offering a comprehensive analysis of their implications.

As a result of this type of integration, more possibilities to enhance strategic advantage in global marketplaces may exist. As a result, state-owned logistics enterprises must invest significant resources in optimising the value of information and expertise received from customers and suppliers and coordinating their efforts with suppliers and customers to create feedback systems to share information and solve disruption concerns. In practice, businesses can provide support and education to their suppliers to help them improve their technical capabilities and safeguard the environment. To promote customer integration, it is vital to understand consumer challenges and environmental considerations through active market information gathering and effective collaboration among organisations. This finding is in line

with the principles of contingency theory (CT) and Information Processing Theory, as well as research findings (Wu, 2013). It also differs from the findings of a study (Lisi et al., 2020; Kalyar et al., 2020; Zhao et al., 2018). When faced with increasing uncertainty, Wong et al. (2011) found that integration and interaction with other parties are more critical, and our findings show that suppliers and customers are more involved. This demonstrates the organisation's need to connect external customers and suppliers to enhance its capability to handle the information to meet its capacity and demand.

The findings revealed that the controlling variable, company size, impacts information integration. This can be explained by the fact that state-owned logistics enterprises have more resources than small logistics companies and have more flexibility in allocating resources to supply chain activities, whereas small companies may not. State-owned logistics enterprises might also have more negotiating power with suppliers. State-owned logistics enterprises' high-level resilience could be attributable to economies of scale. This conclusion is consistent with some previous research (Kong et al., 2020; Qu. & Liu., 2022) but differs from other research (Lisi et al., 2020). According to the findings, the age of the respondents has an impact on information integration. Older companies can gather more information and knowledge from the outside world, resulting in a more knowledgeable strategy to deal with resilience. This result is consistent with research findings (Qu & Liu, 2022; Kong et al., 2020; Awan, Nauman.S, & Sroufe. 2021).

5.6 Findings on Resilience Challenges in SCI Dimensions.

The study substantiates the symbiotic relationship between SCI and resilience. This symbiosis was particularly evident in the study's findings, highlighting how enhanced integration directly contributed to heightened resilience- The study uncovered several critical findings that underscore the significance of SCI as a linchpin for resilience in state-owned logistics enterprises. These findings can be categorised into four core areas of investigation:

- **Internal Integration**. Internal integration emerged as a cornerstone of SCI within state-owned logistics enterprises. The seamless collaboration among different departments and the exchange of information were crucial in enhancing SCI. This finding aligns with extensive research highlighting the importance of internal integration in supply chain management (Flynn et al., 2018; Schoenherr & Swink,

2012). We found that efficient collaboration and coordination among different teams and departments contributed significantly to SCI

- **Supplier Integration.** The study underscored the significance of supplier integration in shaping the efficiency, responsiveness, and overall performance of the supply chain within these state-owned logistics enterprises. The study findings revealed that developing and implementing specific strategies for supplier integration was essential. Collaborative initiatives, such as joint planning and inventory management, were highlighted as practical means of enhancing supplier integration-
- **Customer Integration.** Respondents found customer integration quality and the implementation of quick and efficient ordering systems to play pivotal roles in enhancing SCI, resilience, and efficiency. By improving interactions and customer communication, enterprises could reduce lead times and improve overall supply chain responsiveness-
- **Information Integration.** Information-sharing practices within the supply chain emerged as a vital factors influencing integration and resilience. Critical practices were identified as effective communication, transparency, and exchanging proprietary information and knowledge among trade partners. By fostering a transparent and timely information-sharing culture, organisations can enhance coordination, adapt quickly to changes, and proactively manage risks, ultimately improving supply chain resilience-.

5.7 Continuous Monitoring and Improvement

According to Zhang et al. (2018), state-owned logistics companies must establish a mechanism to assess the integration and robustness of their supply chains consistently. It is important to regularly evaluate the efficacy of integration endeavours, ensuring that strategies are adjusted accordingly to manage evolving market circumstances and disruptions effectively (Liker, 2004). Shook and Rother (2018) emphasise the need for continuous improvement in supply chain management practices as a crucial factor in attaining long-lasting resilience.

5.8 Knowledge Exchange Initiatives

Scholars suggest that to improve integration and resilience, it is advisable to implement knowledge-sharing programmes and training sessions for supply chain professionals (Mittal & Govindarajan, 2005; Thomas & Kannan, 2009). According to Jain and Sharma (2018), these programmes augment comprehension of the importance of integration and resilience while equipping staff members with the requisite skills and knowledge to manage problems adeptly.

5.9 Collaboration with the Port of Walvis Bay

According to the Namibian Chamber of Commerce and Industry [NCCI] (2018), collaborating with the Port of Walvis Bay presents a valuable prospect for capitalising on existing infrastructure and resources to enhance integration within the supply chain. The author suggests that state-owned logistics companies should consider establishing a solid partnership with port authorities. This cooperation would include finding potential areas for cooperative projects and exchanging information to improve overall logistics efficiency (International Chamber of Shipping, 2020), benchmarking, and best practices. Benchmarking against best practices within the logistics business helps find opportunities for improvement. State-owned logistics enterprises should identify successful case studies and modify pertinent tactics to suit their unique contextual circumstances.

5.10 Data Quality Control

In this study, data quality control is paramount to ensure the reliability and validity of the study findings. This involves meticulous attention to the accuracy and completeness of data related to SCI and resilience in state-owned logistics enterprises operating in the Port of Walvis Bay. It requires thoroughly examining the data collection processes from surveys and ensuring that data is free from errors, inconsistencies, and omissions. In this study, the data related to supply chain management, logistics operations, and other variables. Data quality control procedures encompassed verifying the accuracy of these data sources, checking for

potential outliers, and handling any missing data to provide a solid foundation for the analysis.

5.10.1 Reliability

Reliability is crucial to ascertain that study measurements and data are stable and consistent in the context of state-owned logistics enterprises in Namibia. For instance, the study must establish the reliability of the questionnaires or instruments used to gather data on SCI and resilience. Since the study involved collecting data from multiple respondents or sources within these enterprises, test-retest reliability was used to ensure that the measurements provided consistent results over time. In other cases, inter-rater reliability is relevant, mainly if multiple individuals assess resilience levels. Demonstrating the reliability of the study data underscores the consistency of the impacts the study identifies concerning SCI and resilience.

5.10.2 Validity

Validity ensures that study data accurately represents the constructs under investigation in the Port of Walvis Bay. Specifically, the study needs to validate that the measurements and data collection methods effectively assess SCI and resilience in state-owned logistics enterprises in Namibia. Content validity is crucial to confirm that the study's variables capture all relevant aspects of SCI and resilience within the logistics industry. Construct validity is essential to establish that the measurements align with theoretical frameworks applicable to this context. Criterion-related validity can be applied by comparing measurements to established industry benchmarks or expert opinions. By rigorously addressing validity concerns, the study provides trustworthy insights into SCI's impact on resilience in the state-owned logistics enterprises at the Port of Walvis Bay.

Data quality control, reliability, and validity play a pivotal role in ensuring the rigour and credibility of the study on the impact of SCI on resilience in state-owned logistics enterprises at the Port of Walvis Bay, Namibia and implementing these concepts diligently enhanced the study findings' trustworthiness and contributed to the scholarly significance.

5.11 Chapter Summary

This chapter provides the study findings and a thorough discussion of the research questions and objectives, with particular attention paid to how SCI affects resilience in the context of state-owned logistics enterprises in Namibia. The research has shown significant findings about the relationship between various aspects of SCI and the challenges of resilience observed by companies operating within this context. The study included an in-depth review of data and engaged in comprehensive discussions to emphasise the importance of integration aspects, including technology adoption, collaborative partnerships, and information sharing, in strengthening the resilience capacities of the logistics industry in Namibia. The results have emphasised the crucial significance of promoting enhanced integration, which embraces problems and uncertainties encountered within the logistics sector. Additional analysis and strategic initiatives in SCI can boost Namibia's state-owned logistics companies' competitiveness and resilience, paving the way for future logistics operations that are more reliable and sustainable.

The next chapter incorporates this study's key findings, discoveries, and perspectives into a synopsis. Chapter Six will provide significant suggestions derived from the findings, providing concrete support tailored explicitly for state-owned logistics firms in Namibia. The study will synthesise comprehensive findings that include the importance of the study within the framework of SCI and resilience. Chapter Six will serve as the study's conclusion, offering a comprehensive and practical guide for enhancing logistics operations' resilience and overall efficiency at state-owned firms in Namibia.

CHAPTER SIX

RECOMMENDATIONS AND CONCLUSIONS

6.1 Introduction

This study unveils a comprehensive set of recommendations derived from an extensive analysis of “Impacts of SCI on the Resilience of State-Owned Logistics Enterprises in Namibia.” The primary objective of these recommendations is to empower state-owned logistics enterprises to enhance their SCI and resilience. Hence, in light of this significant worldwide issue, all entities must prioritise the development of resilience (Sharma et al., 2022a; Sharma et al., 2022b). The primary objective of this research was to explore the impact of SCI on the concept of resilience, driven by the theoretical framework of Information Processing Theory. The results suggest that implementing information integration favours organisational resilience by facilitating the effective transmission of information inside enterprises and throughout their supplier networks. The roles of internal integration, supplier integration, and customer integration are pivotal in the interaction between the supply chain and resilience, with customer integration exerting the most significant impact. This study provides a complete analysis of the intricacies associated with supply chain management, using the study's unique findings to provide comprehensive recommendations.

6.1.1 The conclusions and recommendations of this study were based on the research questions, as highlighted below

RQ 1 How does internal integration impact the SCI of state-owned logistics enterprises in Namibia?

RQ 2 How does supplier integration affect the SCI of state-owned logistics enterprises in Namibia?

RQ 3 How does customer integration impact the SCI of state-owned logistics enterprises in Namibia?

RQ 4 How does information sharing impact the SCI of state-owned logistics enterprises in Namibia?

RQ 5 What is the relationship between SCI and the resilience of state-owned logistic enterprises in Namibia

6.2 Objectivity and Statement of the Problem

This study's main objective is to thoroughly examine the challenges associated with SCI and its impact on the ability of state-owned logistic enterprises to withstand and recover from disruptions. SCI is an essential element in contemporary corporate operations, enabling organisations to optimise their procedures, improve productivity, and adapt efficiently to changes in the market. Nevertheless, a more comprehensive study needs to be undertaken on the specific challenges and drawbacks associated with SCI in state-owned logistic companies. The study begins by outlining the problem statement, which is crucial in identifying the main challenges and obstacles state-owned logistics companies encounter in their drive to achieve resilience through SCI. These enterprises often operate within distinctive contexts characterised by certain limitations and goals in contrast to their counterparts in the private sector. Hence, academics and businesses must comprehend companies' difficulties when undertaking SCI activities.

This study's respondents were predominantly male (68%), while females accounted for 32% female. According to the demographics characteristics analysis, 163 of the 360 respondents in this survey were females, while 244 were men, and men outnumber women in paid work. Women's involvement in logistics, transportation, and crucial roles across the sector's value chain does not indicate a pro-gender-equality agenda (Amushila & Semente, 2022). Men predominantly occupy power and influence within the logistics and transportation industry. The research found that men comprised 68% of the respondents, and females comprised 32%. Due to the predominant representation of male personnel inside logistics companies, a higher proportion of replies were provided by male individuals. To substantiate the assertion, it is

noteworthy that a significant proportion of logistics enterprises in Namibia are managed mainly by male individuals, which may be attributed to the inherent characteristics of the business.

SCI, which includes internal integration, supplier integration, and customer integration, is considered a strategy that improves an organisation's capacity to address disruptions and uncertainties effectively. In state-owned logistics enterprises, which commonly assume essential domestic transportation and distribution functions, attaining and sustaining resilience are paramount. This is necessary to guarantee the uninterrupted movement of vital goods and services, even when confronted with unanticipated adversities such as natural calamities, economic downturns, or worldwide pandemics.

The challenges of the integration and robustness of supply chains in state-owned logistics firms might exhibit variations across different locations and sectors. Several factors, including government rules, political involvement, restricted resource availability, and inflexible organisational structures, may strongly influence the efficacy of SCI. Hence, the primary objective of the problem statement is to ascertain, classify, and examine these obstacles, elucidating their distinct attributes and the possible ramifications they may have on the resilience of state-owned logistics companies. This study aims to investigate the abovementioned challenges to provide significant insights for scholars and professionals in logistics and supply chain management. The results of this study will expand comprehension of the particular challenges encountered by state-owned logistics companies during the implementation of SCI strategies.

Additionally, these findings will aid in the formulation of customised solutions and strategies to improve the resilience of these organisations. Moreover, this study endeavour will contribute to the existing scholarly literature on supply chain management by shedding light on the unique obstacles and prospects encountered in the state-owned logistics industry. This will enhance the ongoing discussion around the role of SCI in fostering organisational resilience.

6.3 Recommendations

The study aimed to develop a comprehensive understanding of the impact of SCI on resilience in the state-owned logistics enterprises in Namibia (Port of Walvis Bay). This

dissertation contributes to supply chain management and logistics. The findings of this research offer essential insights for enhancing the resilience of state-owned logistics enterprises, not only in Namibia but also on a global scale.

- Enhancing Internal Integration: The impact of internal integration on state-owned logistics enterprises in Namibia cannot be overstated, as it profoundly influences the broader landscape of SCI. Internal integration enhances internal cohesion, fostering a culture that facilitates collaboration and knowledge sharing across different departments within the company (Shakeel et al., 2018; Cui et al., 2022). Regular interdepartmental meetings have been identified to enhance communication efficiency and promote aligning objectives and goals across different teams (Alzoubi et al., 2022). The joint effort has dramatically improved SCI, building a solid basis for better flexibility in constantly evolving challenges (Chunsheng et al., 2022).

- Supplier Integration Strategies: the study results emphasised the crucial significance of supplier integration in influencing the effectiveness, agility, and overall operational outcomes of the supply chain within these organisations. The findings of the study indicate that a notable 42% of the firms questioned indicated a significant impact of their supplier integration initiatives on their SCI results. This highlights the need to foster strong cooperation and strategic alliances with suppliers in order to attain effective SCI. The study's findings suggest that establishing partnerships plays a crucial role in enhancing the efficiency of material movement across the supply chain, resulting in a significant decrease of 43% in lead times. This decrease enhances the supply chain's responsiveness and minimises the potential for stockouts and production delays. The research further highlighted several tactics state-owned logistics firms use to increase supplier integration. For example, a logistics firm used a collaborative planning approach with its primary suppliers, leading to a significant reduction of 41% in the time required to fill orders. An additional business entity has directed its efforts to enhance supplier development by implementing training programmes. This strategic approach has yielded notable outcomes, including

enhanced quality control measures and a significant decrease of 35% in the occurrence of faulty items.

- The study's results highlight the importance of supplier integration in accomplishing SCI goals. Establishing effective supplier relationships fosters a symbiotic connection whereby suppliers can align themselves with the organisation's objectives. The alignment of various components within a supply chain has been shown to provide many benefits, including cost reduction, higher product quality, and improved overall efficiency.

- The study made significant discoveries on the integration and resilience of supply chains, focusing on suppliers' crucial role in procurement and manufacturing activities. The active participation described facilitates the development of cooperation, coordination, and alignment between suppliers and the purchasing organisation, eventually leading to improved integration and resilience within the supply chain. The establishment of joint quick-reaction planning is an additional crucial element in the development of supply chain resilience. Establishing collaborative endeavours among many stakeholders within the supply chain facilitates enhanced adaptability to interruptions, assuring seamless operations during difficult times. Providing precise and punctual demand projections to suppliers is essential in supply chain management, as it averts stockout instances and bolsters overall resilience. Effective communication with suppliers is pivotal in enhancing cooperation, promoting transparency, and facilitating coordination throughout the supply chain. The integration and robustness of supply chains are greatly influenced by strategic alliances established with essential suppliers. This is due to the enhancement of supply chain operations through common aims and improved operating practices.

6. 3.1 Supplier involvement and collaborative planning

According to the stated conclusions, state-owned logistics companies must provide funds for supplier involvement, collaborative planning, sharing of demand forecasts, information

sharing, and strategic alliances to achieve SCI and resilience. Furthermore, state-owned logistics firms should promote the use of these elements to improve their supply chain management strategies. This can be achieved by establishing a more robust and adaptable supply chain that efficiently manages disruptions and ensures uninterrupted operations. This will aid in improving the efficacy of supply chain managers and practitioners as they strive to boost the resilience and competitiveness of their supply networks.

The study by Alzoubi et al. (2022) highlights that incorporating suppliers significantly influences the effectiveness, agility, and overall operational outcomes of supply chains inside state-controlled logistics companies. To optimise supplier integration, firms must develop and implement specific strategies (Wu, 2013). This necessitates the establishment of solid alliances with critical suppliers via cooperative endeavours, such as participating in joint planning and executing inventory management strategies (Cui et al., 2022). These indicators facilitate the integration process and enhance the capacity to promptly address disruptions, enhancing resilience (Kulp et al., 2004; Piprani et al., 2020; Lee, 2021 ;).

- Customer Integration - The study results underscored the need to align services with customer demands and engage customers in planning to improve supply chain coherence. Within the scope of the studied enterprises, a notable proportion of 34% recognised the considerable impact of customer integration on their efforts to achieve SCI. The findings of this study indicate that businesses that actively interact with customers to get insights into their preferences, demands, and consumption behaviours are more capable of optimising their supply chain operations. This alignment facilitated the reduction of disparities between supply and demand, establishing a flexible supply network that can effectively react to changing customer demands. The study further emphasised the favourable results associated with customer involvement in the planning process. Enterprises that included feedback from customers in their demand forecasting processes saw a significant improvement of 31% in the accuracy of their forecasts. The increased precision resulted in decreased expenses associated with inventory storage and enhanced order fulfilment rates, thus enhancing the overall effectiveness of the supply chain. The research further revealed cases in which businesses successfully incorporated client feedback.

For example, a logistics firm implemented a specialised customer advisory board, resulting in a 20% decrease in order lead times achieved by optimising the order processing system. Another organisation used customer feedback to enhance the quality of its product packaging, which subsequently led to a notable 10% improvement in punctuality of deliveries and overall customer satisfaction.

- The empirical evidence solidified the strategic significance of customer integration in achieving SCI objectives. The findings demonstrated that enterprises actively engaging with customers and incorporating their insights into supply chain planning could reap significant benefits, including enhanced demand forecasting, improved customer satisfaction, and optimised resource allocation. This summary outlines the key results related to customer integration quality as a pivotal variable in achieving SCI for state-owned logistics enterprises. Customer integration involves close cooperation with significant customers, providing organisations with valuable market insights and opportunities to enhance their SCP. The study highlighted the importance of maintaining real-time communication and customer collaboration through connectivity in customer information networks and communication channels with critical customers.

- Strategic partnerships with essential customers have emerged as a crucial aspect for enterprises to effectively anticipate customer demands, optimise operations, and improve inventory management. This, in turn, leads to cost reduction and enhanced service levels. The research also highlighted the favourable effects of expedited ordering systems on consumers since they shorten the ordering process, provide up-to-date information on client orders, and improve insight into demand trends.

- The study emphasised the importance of customer integration quality and expedited ordering processes in improving SCI, resilience, and efficiency within state-owned logistics enterprises. The business may achieve operational efficiency and enhanced service levels by close customer engagement and simplified processes. This

collaboration and process improvement results in mutually beneficial results for the organisation and its customers. Those findings have practical consequences for supply chain managers who want to improve customer connections and optimise supply chain operations within the state-owned logistics industry.

6.3.2 Formulate intentional strategies to foster customer integration

The findings of this study suggest that state-owned logistics enterprises should formulate intentional strategies to foster customer integration, as this factor significantly influences market orientation, SCP, collaboration, supply chain strategy, and SCP relationships. It can be contended with confidence that the influence of customer integration on SCP adheres to the fundamental rationale that dynamic capabilities enable state-owned logistics firms to align their reaction with the external environment more effectively, resulting in enhanced performance. Therefore, state-owned logistics organisations should allocate resources towards customer integration since this strategic approach can align their offers with evolving consumer demands, resulting in enhanced operational outcomes. The integration of customers will further allow organisations to use information derived from inter-organisational activities, hence facilitating the development of a precise comprehension of market possibilities. Hence, state-owned logistics enterprises promptly address consumer demands, enhancing customer service standards, reducing inventory expenses, and ultimately augmenting total profitability. Piprani et al. (2020) argue that customer integration is crucial in improving SCI, resilience, and efficiency within state-owned logistics firms. To maximise customer integration, firms must improve customer interactions and communication (Wong, Wong, & Boon-it, 2020). Alzoubi et al. (2022) argue that the strategic allocation of resources towards developing and implementing efficient ordering systems is essential for optimising customer interactions, reducing lead times, and improving the overall operational efficiency of the supply chain. The integration of seamless connections with customers has been shown to enhance the ability to address customer expectations and enhance resilience promptly (Lee & Whang, 2004; Rai et al., 2006).

- Information Integration and Communication -the study findings highlighted the significance of information sharing in augmenting decision-making procedures, fostering transparency, and mitigating uncertainty across the supply chain. A substantial majority of the participants in the poll, namely 44%, expressed an unambiguous stance that the sharing of information had a significant impact on the results of their SCI. The research emphasised the importance of fast and accurate information transmission among supply chain stakeholders, as it facilitates informed decision-making and collaborative problem-solving. This ultimately leads to better coordinated and aligned supply chain functioning. The research conducted a more in-depth examination of some instances where exchanging knowledge resulted in concrete enhancements. For example, a logistics company successfully deployed a centralised information-sharing platform, leading to a 42% drop in order processing time and a 25% reduction in mistake rates. An additional organisation implemented a real-time tracking system, resulting in enhanced visibility about the status of shipments and a notable decrease of 15% in shipping delays.

- The study's results showed the transformational potential of information exchange to integrate supply chains. Organisations that place a high value on open communication and collaborative information sharing see many advantages, including excellent decision-making capabilities, decreased lead times, and improved responsiveness within their supply chain.

- This synthesis shows research findings about information-sharing practices throughout the supply chain. This study highlights the imperative need to engage in the exchange of confidential information and the sharing of specialised knowledge among trading partners. Establishing effective communication channels between companies and their partners is crucial in facilitating the timely dissemination of information on events or changes that may have mutual implications. The research collected data by soliciting participants' subjective viewpoints and interpretations, explicitly emphasising the dependent variable of information dissemination. The establishment of efficient communication channels and the cultivation of a

knowledge-sharing culture among supply chain partners are of paramount importance. Effective and punctual communication between partners is crucial in facilitating improved coordination, expediting responses to alterations, and proactively managing risks. These factors all contribute to boosting the efficiency and resilience of the supply chain. This study highlights the importance of information sharing as a critical practice throughout supply networks. The results underscore the need to create efficient communication channels and foster a culture of information sharing among stakeholders throughout the supply chain. Organisations may strengthen supply chain resilience by promoting transparent and timely information flow, facilitating effective coordination, enabling swift adaptation to changes, and allowing for proactive risk management. These findings have significant implications for supply chain managers who want to maximise information-sharing practises and improve the overall resilience of their supply networks.

- The need for transparent and prompt information sharing to attain effective integration and resilience within the supply chain has been highlighted by de Vass (2018) and de Oliveira (2021). Based on the studies conducted by de Vass (2018) and de Oliveira (2021), it is recommended that state-owned logistics enterprises establish effective communication channels and actively encourage the exchange of proprietary information and knowledge with their trade partners. Good communication is pivotal in enhancing coordination, facilitating prompt responsiveness, and enabling proactive risk management, thus strengthening the supply chain's resilience.

6.3.3 Allocate resources towards SCI

State-owned logistics enterprises must allocate resources to investment in information integration of SCI. This investment aims to create systems that can effectively consolidate diverse data and information from various sources, regardless of their format (structured, semi-structured, or unstructured). Implementing information integration within the context of SCI is advisable, as this will facilitate consolidating all customer-related information within a unified framework. This framework will enable cross-functional capabilities,

including consolidated search functionality, centralised data accessibility, and comprehensive data analysis. To achieve data integration of this nature, it is recommended that state-owned logistics enterprises employ diverse techniques. These techniques include data warehousing, data federation, data virtualisation, semantic integration, knowledge graphs, and linked data representations. By implementing these techniques, the internal integration of state-owned logistics enterprises can be enhanced, positively impacting the overall SCI.

- Supply Chain Resilience Planning -the study reveals a strong positive correlation between SCI and the resilience of state-owned logistic enterprises in Namibia. The findings emphasise the importance of having well-connected supply chains and operational continuity. In the sample, 44% of respondents said that their endeavours towards SCI directly enhanced their capacity to withstand and recover from interruptions. Enterprises that have implemented integrated supply chains have shown a notable capacity to effectively bounce back from disruptions, resulting in a decrease in recovery time by 38% when compared to their less integrated counterparts. This underscores the intrinsic benefit of possessing a linked supply chain capable of promptly adjusting to fluctuations in demand, supply, and external circumstances.

- Moreover, the study dives into how integrated supply chains contribute to the augmentation of resilience. Organisations that have adopted SCI saw enhanced insight into upstream and downstream operations, facilitating the implementation of proactive policies to mitigate risks. Throughout an unforeseen disruption in the supply chain, a logistics firm effectively used its interconnected network to discover substitute suppliers and minimise the duration of production interruptions, resulting in a notable decrease of 38% in losses incurred throughout the manufacturing process.

- The literature on hand supports the mutually beneficial connection between SCI and resilience. The use of integrated supply chains enables logistics firms controlled by the state to manage interruptions efficiently, ensure the continuity of operations, and

achieve sustained development and success. This section successfully emphasises the subtle implications and linkages of the study by presenting thorough data for each research objective. The comprehensive methodology used in this study not only enriches the level of analysis but also guarantees that readers get a complete comprehension of the empirical data supporting the study's results.

- The discussion centres on the findings of supply chain resilience and its importance in managing disruptions within a dynamic business environment, as shown by the data in Table 4.5.5. The study highlights that state-owned logistics businesses demonstrated prompt responsiveness to supply chain disruptions, as shown by a mean score of 4.08. This suggests that these enterprises could efficiently handle alterations in the supply chain and sustain uninterrupted operations. The study found that the dynamic nature of the business environment (M = 3.88) significantly influences the resilience of supply chains. This influence is attributed to many variables, including market trends, consumer preferences, technical improvements, regulatory changes, and competitive landscapes. The research used the concept of Supply Chain Resilience (SCR) as a comprehensive framework to examine the impact of supply chain resilience within the context of disruptions. The study respondents agreed on firms' ability to promptly adapt to disruptions in the supply chain, with a mean score of 3.84. Supply disruptions, which may arise from several factors, such as supplier bankruptcy, natural disasters, political instability, trade wars, or transportation problems, can potentially cause delinquency, shortages, or higher expenditures. Resilient supply chains exhibit proactive behaviour by identifying potential risks, implementing contingency plans, diversifying their supplier base, and fostering robust partnerships with alternative sources. These measures are undertaken to effectively reduce the adverse consequences of supply interruptions. The study's findings indicate that state-owned companies have shown a notable capacity to update and replenish their resource base by evolving economic circumstances (M = 3.34). Maintaining a high level of situational analysis (M = 3.16) is paramount in ensuring the supply chain's resilience. This involves continuously monitoring and evaluating existing situations, events, and variables that can affect the supply chain. This facilitates the ability of enterprises to recognise potential hazards, build

proactive monitoring mechanisms, promptly adapt to changing circumstances, and effectively use advantageous situations. Monitoring the external environment and being informed about pertinent elements contributes to establishing resilient and flexible supply networks. This, in turn, enables organisations to better endure and recuperate from disruptions, thereby boosting the overall resilience of their supply chains.

- The descriptive statistics for the model constructs were analysed and then reported in Tables 4.5.1-4.5.5 as part of the study's findings. Most components had mean values over 3.5, suggesting a generally favourable impression among the respondents. The constructs, such as the maintenance of high situational analysis and internal data integration, had mean values ranging from 3.16 to 4.14. The degree of optimism was assessed using a 5-point Likert scale, where higher values correspond to a higher positivity level. An average rating on this scale was deemed to be 3.5. The standard deviation for rapid reaction to supply chain interruption was 1.036, while the standard deviation for corporate application integration was 1.382. The numbers mentioned above indicate the extent of variability seen in the responses.

- To evaluate the normality of the data, the study analysed the skewness and kurtosis values. The examined constructs exhibited a range of absolute skewness values from 0.004 to 2.095. Similarly, the absolute kurtosis values showed variability, with the lowest value of 0.020 seen for the construct about the changing business environment and the highest value of 2.095 observed for the construct related to swift reaction to supply chain disruption. The data for the constructs in this study may fit the criteria for normality, as shown by the skewness and kurtosis values being below the corresponding thresholds of 3 and 10. The findings presented in this study provide significant contributions towards enhancing the comprehension of supply chain resilience amidst disturbances and emphasising the need to maintain adaptability in response to the dynamic business environment.

- The main conclusions from the study regarding supply chain resilience in state-owned logistics companies and how it relates to disruptions and the evolving economic environment. The statement above emphasises significant elements of the study's findings and offers valuable perspectives on the statistical analysis conducted. The synopsis emphasises the importance of promptly addressing disruptions in the supply chain and the capacity of state-owned logistics firms to navigate changes in the supply chain effectively. The dynamic nature of the business environment plays a pivotal role in influencing the resilience of supply chains, including many issues that need organisational adaptation. The present research underscores the use of the Supply Chain Resilience (SCR) architecture, demonstrating its complete framework for examining disturbances in supply chain resilience. This statement highlights the need for robust supply chains that effectively mitigate risks by implementing contingency plans, diversifying suppliers, and cultivating strong partnerships with alternative sources. The adaptive skills of state-owned firms are highlighted by their capacity to replenish their resource base following evolving economic circumstances. Maintaining a rigorous situational analysis is paramount in monitoring and evaluating many aspects that affect the supply chain. This practice allows firms to detect potential hazards and exploit favourable circumstances effectively. Using descriptive statistics and the Likert scale as a measurement tool for assessing positivity contributes to the contextual comprehension of respondents' perspectives. The review of data normality enhances the credibility of the study's findings,

The summary generally provides a concise and coherent outline of the research's discoveries on the resilience of supply chains, disruptions, and the evolving business landscape. The text emphasises the crucial elements of the findings and their significance concerning the capacity of state-owned logistics firms to manage obstacles and successfully maintain a robust supply chain. Based on the research conducted by Shekarian and Parast (2021), it is recommended that state-owned logistics enterprises develop resilient supply chain strategies. According to the study conducted by Chan et al. (2017), these strategies need to have provisions for internal integration, supplier collaboration, customer participation, and information sharing as core components. According to the study by Shekarian and Parast (2021),

implementing comprehensive resilience strategies enables businesses to systematically and efficiently predict and mitigate disruptions. This technique guarantees the continuous functioning of corporate operations, even in difficult situations.

6.3.4 Strategically invest in SCI

It is recommended that state-owned logistic enterprises consider investing in SCI as a strategic approach to consolidate various stakeholders involved, thus improving productivity, cost reduction, and resilience. Furthermore, the resilience of state-owned logistics enterprises is impacted by the integration of supply chains, which entails the incorporation of all relevant stakeholders engaged in delivering goods or services into a unified system. This will facilitate the establishment of essential coordination and alignment within state-owned logistic firms, ensuring that all individuals are consistently and efficiently working towards a shared objective. This is advantageous for enhancing the resilience of state-owned logistic enterprises.

According to the study's findings, state-owned logistic companies showed a commendable capacity for refreshing their resource base, with an average score of 3.34. However, their performance in maintaining a high level of situational analysis in supply chain resilience was poor, as indicated by an average score of 3.16. Hence, it is essential to establish mechanisms for continuously monitoring and evaluating prevailing circumstances, occurrences, and variables that might potentially have a favourable influence on the supply chain.

6.4 General Observations

Presenting findings from a study is a fundamental component of scholarly endeavours. The process includes disseminating and transmitting the study's results to a broad audience. To foster a collaborative initiative focused on enhancing SCI and resilience in the logistics sector, it is advisable for state-owned logistics firms in Namibia to aggressively distribute the findings and recommendations of this research to other logistics enterprises. Establishing a cultural environment that fosters the dissemination of knowledge and promotes joint endeavours would benefit the whole industry.

- Policy advocacy includes the active promotion and endorsement of particular policies or changes in policy using many methods, including but not limited to lobbying and public campaigns. Implementing supportive policies at the governmental level is necessary to cultivate a conducive environment that promotes the integration and resilience of supply chains within logistics enterprises controlled by the state. Engaging in active participation with pertinent governing entities can yield the adoption of policies that support endeavours focused on promoting integration and resilience.

- Long-term sustainability pertains to the ability of a system, method, or practice to be maintained or perpetuated for a long duration. Recognising that integrating supply chains is a continuous endeavour is essential. State-owned logistics enterprises need to focus on the long-term sustainability of their integration practices in order to ensure enduring resilience in the face of impending challenges.

The subsequent recommendations provide a comprehensive framework for enhancing SCI and resilience across state-owned logistics enterprises in Namibia. By using these strategies, businesses may improve their capacity to navigate interruptions, guarantee the continuity of their operations, and achieve sustainable growth and success within the logistics industry. Furthermore, the analysis of the primary outcomes of the research investigates the potential consequences for state-owned logistics firms operating in Namibia. This study offers practical suggestions for enterprises to enhance their SCI and resilience.

6.5 Implications of the Study Findings

This section provides an in-depth analysis of the implications that may be derived from the results of the extensive study about the effects of SCI on the resilience of the state-owned enterprises that operate within the Port of Walvis Bay, Namibia. The study's findings provide a comprehensive knowledge of the complex consequences for these enterprises and, therefore, the possible effects on broader socio-economic factors. The study's findings have extensive ramifications and are relevant for state-owned logistics firms in Namibia and the broader logistics sector. The conclusions of this study may be succinctly summarised by

highlighting the importance of internal cooperation. It is recommended that state-owned logistics firms focus on internal integration efforts by encouraging collaboration and promoting the exchange of information across various departments.

The findings emphasise that the effective incorporation of supply chains may significantly bolster the resilience of state-owned enterprises. This suggests that SCI techniques can enhance risk management, flexibility, and operational continuity for Namibian state-owned enterprises. A comprehensive examination demonstrates that the heightened resilience may be ascribed to a reduced susceptibility resulting from higher transparency in supply chains, stronger cooperation, and varied sourcing - as integration strengthens resilience.

The study results suggest that implementing efficient SCI may provide state-owned enterprises in the Port of Walvis Bay with a significant competitive edge. Upon closer analysis, it becomes evident that this advantage is derived from its cost-effective nature, prompt reaction times, and capacity to provide exceptional services. Consequently, this leads to an increase in market share and revenue expansion. The analysis conducted in an academic context provides a deeper understanding of how attaining this benefit requires synchronising SCI initiatives with the particular goals of the company and the customers' expectations. The concept of competitive advantage refers to a company's strategic advantage over its competitors in the marketplace.

Cost Reduction. The study underscores the possibility of integrating the supply chain to achieve substantial cost savings throughout the ecosystem. The consequences of this conclusion have considerable significance for the financial sustainability of state-owned enterprises. A thorough examination indicates that the primary factors contributing to cost reduction are optimal resource allocation, simplified procedures, waste reduction, and economies of scale. It is essential to recognise that implementing cost reduction strategies via integration may need early expenditures in technology, process reengineering, and talent development.

Customer satisfaction levels. The proficient integration of supply chains has a beneficial influence on the customer satisfaction experienced by state-owned enterprises' clientele. Upon further examination, it becomes evident that this sense of pleasure stems from the

improvement in the quality of service, decreased lead times, and heightened openness within the supply chain. These factors, in turn, cultivate customer loyalty and confidence. State-owned enterprises need to acknowledge the need to consistently monitor changing client preferences and market dynamics to maintain elevated customer satisfaction levels.

Risk mitigation strategies. The study results highlight the importance of SCI in effectively managing and reducing risks related to different disruptions. A thorough analysis demonstrates that the integration process enables the practical evaluation of risks, the development of contingency plans, and the implementation of prompt reaction mechanisms. State-owned enterprises (SOEs) should recognise the need to adopt a proactive strategy to mitigate risks via integration effectively. This approach entails scenario analysis and monitoring possible disruptions to enhance risk mitigation strategies.

Environmental sustainability. The study findings emphasise the capacity of SCI to facilitate and strengthen initiatives aimed at promoting environmental sustainability. A thorough analysis demonstrates that sustainability advantages arise from the optimisation of transportation routes, the reduction of carbon emissions, and the implementation of resource-efficient practices. State-owned enterprises operating in the Port of Walvis Bay should carefully evaluate the possible alignment of their integration efforts with global sustainability objectives. By doing so, companies may enhance their environmental credentials and positively influence stakeholder perceptions of environmental sustainability**.**

Human resource development. According to the study's findings, it is recommended that state-owned enterprises prioritise investments in human resource development to achieve effective integration. Upon scrutiny, it becomes evident that this encompasses acquiring talented individuals, providing individuals with training opportunities, and fostering skill development, specifically focusing on data analytics, technology utilisation, and change management. The integration of supply chains and the attainment of long-term sustainability are contingent upon the crucial role played by human resource development.

Infrastructure improvements. The study results suggest that infrastructure improvements may be needed to facilitate the integration of supply chains. An in-depth review highlights the significance of assessing the infrastructure's capacity, adaptability, and scalability while customising investments to meet the integration requirements of state-owned enterprises at the Port of Walvis Bay**.**

Government policy. The Namibian government may contemplate the implementation of legislative frameworks and incentives to foster SCI within state-owned enterprises. Upon comprehensive analysis, it becomes evident that this phenomenon has the potential to significantly influence several aspects, such as regulatory frameworks, taxation policies, trade agreements, and strategies for economic growth. Establishing collaborative endeavours between the government and state-owned enterprises is necessary to synchronise integration measures with overarching national goals. The topic of discussion is government policy**.**

Transfer of knowledge. The study highlights the importance of information transfer inside and across state-owned enterprises. A thorough examination indicates that sharing best practices, lessons learnt, and insights garnered from successful integration endeavours may play a pivotal role in augmenting the resilience of other enterprises within Namibia's state-owned sector. State-owned enterprises can enhance knowledge transfer through implementing organised programmes, establishing forums, and fostering collaborations. The comprehensive examination of the study results of the effects of SCI on resilience in state-owned firms in Namibia, specifically focusing on the Port of Walvis Bay, uncovers a range of complex implications that have significant and lasting consequences for the economic, operational, and strategic aspects of these enterprises. By acknowledging and responding to these consequences, as expounded upon in this scholarly dissertation, there is the possibility of significantly augmenting the competitiveness, sustainability, and adaptability of state-owned enterprises in the Port of Walvis Bay setting. This, in turn, would contribute to Namibia's broader socio-economic advancement through the transfer of knowledge.

6.6 Contribution to the Theory in Supply Chain Integration

The discipline of supply chain management has seen ongoing changes due to the need for enterprises to adjust to a progressively intricate and unpredictable global commercial landscape. Supply chain resilience is crucial to this process since it pertains to an organisation's capacity to endure and recuperate from various interruptions and disturbances. In SCI, resilience is multifaceted, emphasising the ability of integrated supply networks to address and adjust to unanticipated obstacles effectively. This discourse examines the significant contributions to the supply chain theory concerning the integration-resilience dynamic. SCI has traditionally been understood as coordinating and working with several parties across the supply chain, such as suppliers, manufacturers, distributors, and consumers, to optimise the efficient movement of products, services, and information. The integration process facilitates enhanced efficiency, decreased costs, and a heightened ability to address client needs promptly. The integration-resilience relationship builds upon the fundamental principle by highlighting that integrated supply chains have the structural and operational mechanisms required to improve their ability to adapt and recover in the face of shocks.

In the past, supply chain resilience was primarily seen in a binary manner, focusing on whether a supply chain has resilience. Nevertheless, there has been a movement in recent contributions towards seeing resilience as a continuum.

Through analysing integrated supply networks, scholars have discovered different levels of resilience, leading to a more nuanced comprehension of how differing degrees of integration impact a supply chain's capacity to withstand disruptions and bounce back. A study done by Freije et al. (2021) examined the resilience continuum in supply networks. It revealed that supply chains with high levels of integration had a superior ability to recover from disruptions compared to supply systems with lower levels of integration. Including this nuanced viewpoint enhances the portrayal of resilience dynamics, providing a more accurate representation. The concept of supply chain resilience encompasses several characteristics, such as operational, structural, and behavioural, rather than being a monolithic feature. Integration enhances these aspects by promoting cross-functional cooperation, facilitating the exchange of information, and optimising resource allocation among partners within the supply chain. Consequently, many theoretical frameworks have been developed to

comprehensively include the multifaceted aspects of resilience within interconnected supply chains.

The study by Shaar et al. (2022) showed that integrated supply chains exhibited superior operational resilience due to their capacity to redirect materials and resources efficiently. The discovery above highlights the role of integration in enhancing a thorough comprehension of resilience. Incorporating DC theory has furthermore had a role in developing the concept of dynamic adaptability in resilient supply chains. Integrated supply chains exhibit enhanced agility and can swiftly make decisions and allocate resources in the face of disruptions, making them highly adaptive to unforeseen circumstances. According to Alzoubi et al. (2022), it was shown that integrated supply chains demonstrated enhanced dynamic flexibility, enabling them to adapt and respond to shocks promptly. The discovery enhances our comprehension of the dynamic capabilities inherent in interconnected supply chains. The relationship between integration and resilience in supply chain management is a notable progression within the theoretical framework of the discipline. Integration is a crucial idea within the field of supply chain management. It enhances the comprehension of supply chain resilience by presenting several dimensions, levels, and the capacity to adjust dynamically. These contributions enhance our understanding of how integrated supply chains are more adept at navigating the volatile and uncertain terrains of the contemporary corporate world. As scholars persevere in probing this complex association, the theoretical underpinnings of SCI on resilience are expected to develop, providing significant insights to the academic community and the business sector.

6.7 Theoretical Implications

The study's findings suggest that the impact of customer and internal integration on several dimensions of resilience is comparatively less than the influence of supplier integration. Based on a comprehensive analysis of the results derived from the existing empirical research, it is recommended that enterprises aiming to participate in external integration activities should place more emphasis on prioritising supplier integration. This technique is expected to improve performance for the focus firm across various indicators. This work presents a hitherto unexplored and underappreciated research domain (Kohtamaki et al., 2019; Freiji et al., 2022), which centres on integrating supply chains and enhancing their

resilience. In a recent scholarly publication addressing current research priorities, Alzoubi et al. (2022) and Shaara et al. (2019) provided an in-depth analysis of the notion of SCI, which involves the alignment and coordination of diverse elements within the supply chain. The successful execution of this procedure necessitates the active engagement, synchronisation, and harmonisation of many parties involved to guarantee a cohesive endeavour towards mutually agreed-upon goals.

When analysing the level of influence, it is notable that internal integration emerges as the integration aspect that exhibits the strongest average correlation with performance measures, with an average value of 0.377. The presence of substantial corrected correlations supports this. This finding supports the assertion that organisations may conduct internal integration efforts before embarking on external integration projects. According to Ataseven et al. (2020), internal integration has been identified in the research as a primary step before outward integration. Tracey (2004) emphasises the need to establish internal consistency in feelings and practices before engaging outside parties in integration efforts. The internal integration process is paramount in facilitating information exchange among various departments within an organisation. According to Alemsan et al. (2021), sharing information plays a crucial role in facilitating efficient coordination of production capacity and enhancing the system's overall flexibility.

Furthermore, the significance of internal integration becomes apparent in its capacity to enhance product and process designs through cross-functional teams, leading to cost reduction and enhanced operational efficiency (Wong et al., 2011). Previous studies have found the relationship between integration and logistics service performance favourable (Germain & Iyer, 2006; Stank et al., 2001). Similarly, integration has also been shown to positively correlate with delivery performance (Swink & Schoenher, 2015). The absence of empirical support for the correlation between internal integration and quality performance is a subject that warrants thorough examination, especially in light of prior research in the academic literature that underscores this association and its favourable and statistically significant impacts (Swink et al., 2015; Wong et al., 2011). According to Iyer et al. (2019), the prioritisation of cost, delivery, and flexibility in SCI is influenced by time considerations. A study conducted by Braunscheidel and Suresh (2009) showed that the existence of agility has the potential to overshadow the influence of the integration factor on the provision of

high-quality service. It is worth noting that the literature also mentions instances in which a negative correlation between supplier integration and quality exists (Swink et al., 2015). The relationships between aspects of integration and performance measures may be attributed to complex correlations, such as a pattern exhibiting an inverted U-shape. Hence, it is essential to comprehensively analyse the optimal configurations for integrating supply chains to attain heightened levels of resilience. Furthermore, this study confirms the established correlations between internal, supplier, and customer integration and performance metrics and suggests potential moderating factors that impact these associations. The rigorous study of these modifiers is essential in scholarly research about the integration of supply chains.

The study on SCI comprehensively addresses control variables that include many contextual characteristics. The factors under consideration include company size, capabilities of the transportation process, product seasonality, and product perishability, as explored by Chiang et al. in 2012. Furthermore, it is essential to consider the industrial sector, the company, and the degree of product customisation as significant factors (Saeed et al., 2005). The potential moderating influence of individual integration practices on the relationships between different types of integration and performance has been conceptualised. Swink et al. (2012) have proven the importance of internal integration as a mediator in the relationship between external integration and performance. The capacity to proficiently arrange information systems is also a moderating element that impacts the correlation between inter-functional integration and market or supply-chain knowledge, eventually influencing performance within new product development.

The degree of environmental dynamism that impacts an organisation's operational landscape is a critical determinant that governs the relationship between innovation and SCI. The research may demonstrate a correlation between integration and resilience, including modifiers such as product clock speed, as previously mentioned by Acquaah and Jayaram (2011). The existing literature has shown that uncertainty influences the relationship between SCI and resilience (Wong et al., 2011; Boon-itt & Wong, 2011). The conclusions drawn from this study demonstrate the need for a more detailed inquiry into moderators that influence the connection between SCI and resilience. By taking into account these moderating aspects, a more comprehensive understanding of the complex interconnections within the realm of SCI may be achieved, leading to better knowledge of their combined effects on resilience

outcomes. These results, therefore, deepen our understanding of how to effectively tackle these challenges.

6.8 Managerial and Policy Implication

This study examines the significance of critical SCI aspects inside logistics enterprises, enhancing understanding of SCI implementation. In addition to the promise presented by SCI and its sustainability, the role of SCI in attaining elevated levels of resilience must be considered. Firms must recognise that prioritising internal integration takes precedence over external cooperation. Furthermore, consumers play a pivotal role in fostering high-level resilience via collaborative efforts in external integration. Freije et al. (2022) assert that the study on SCI and supply chain resilience is in its beginning stages. This research is a significant resource for academics interested in this subject matter.

It is worth noting that Namibia's logistics sector and its associated supply chains are still in the nascent phase of development, which has noteworthy economic implications. Consequently, it is essential to use a proactive approach to promote the implementation of supply chain resilience to effectively address the factors enhancing the current economic conditions. The relevance of these results lies in the enhanced understanding of how external integration might contribute to economic progress. The results of this research demonstrate that integrating the supply chain with its many partners substantially influences the development of organisational knowledge. Consequently, this integration leads to a rise in SCI and supply chain resilience. To promote economic expansion, state-owned logistics firms should pursue external integration by using their suppliers' and customers' talents and knowledge. The significance of capabilities in strategy is essential, and the intricate connections between SCI and resilience skills may serve as a foundation for long-term competitive advantages.

It is interesting to note that logistics firms struggle to profit from the process of integration because of the underestimation of resilience complexity. For state-owned enterprises, the integration of customers might provide more convenience since their need for more specialised resources and skills may prompt them to seek out these attributes in other agents. Consequently, the ability to communicate effectively becomes crucial in facilitating this process.

Policymakers may derive valuable insights from this study, particularly in countries with a solid industrial foundation, where servitization strategies provide new avenues for corporate development and enhance existing manufacturing capabilities. The current state of affairs, characterised by a general lack of integration, highlights a significant opportunity for improvement. According to Lafuente et al. (2017), regional policies should include novel initiatives to enhance cooperation within the ecosystem to capitalise on territorial servitization, given that enterprises with more sophisticated services exhibit greater SCI and innovation capabilities. In addition to enhancing external cooperation, such as within cluster policy, the study emphasises the significance of internal integration skills. This factor needs to be extensively addressed in policy agendas.

Consequently, managers must collaborate with their supply chain partners, adopting a comprehensive approach to build economically sustainable and environmentally benign goods. Logistics firms may include their critical consumers by seeking their input on product specifications and collaboratively designing sustainable goods. This entails incorporating their initial ideas and translating these thoughts into viable, environmentally friendly solutions that align with their specific requirements. Based on the findings of this research, it is evident that including exogenous integration is essential to managing substantial uncertainty and disruption effectively. This integration not only assists managers in formulating hypotheses but also furnishes them with corroborating evidence. Contemporary managers acknowledge the significance of customer-supplier synergy in facilitating the development of sustainable products amidst considerable uncertainty. It is recommended that managers allocate resources towards external integration to facilitate economic development since the success of an organisation is contingent upon the effective use of customer and supplier integration information. This is particularly crucial in times of uncertainty and disruption.

6.9 Limitations of the Study

This study analyses SCI SCI and resilience. It is essential to openly recognise the particular limitations and parameters that have influenced the extent and characteristics of this study. The primary data source for this research was limited to the logistics industry in Namibia, and it must be acknowledged that the data collection period needed to be longer. The

identified limitations inherently placed specific constraints on the comprehensiveness and generalisability of the results.

The exclusive use of data from a singular sector inside a defined geographic context limits the opportunity to generalise the study findings to more comprehensive industrial settings or alternative areas. In addition, the research methodology focused on the investigation of cross-sectional data. Although this technique helps capture a snapshot of supply chain dynamics at a certain point in time, it limits the study's ability to examine the intricacies of supply chain resilience development over some time.

Furthermore, the study's focus on elements particular to Namibia may limit the generalisability of the results to other geographical, cultural, and industrial settings. The limitations highlight the need for future research to develop and enhance the comprehension of SCI and supply chain resilience.

The research provides significant insights within its specified parameters. It is essential to recognise that the study's limitations arise from its narrow concentration on logistics data from Namibia, its dependence on cross-sectional data analysis, and the contextual specificity of its conclusions. However, these limitations provide potential avenues for future study that might contribute to a more profound knowledge of SCI and supply chain resilience. These opportunities are explored in the following section.

6.10 Recommendations for Future Research

Greater insight into SCI and supply chain resilience can be achieved by confronting the limitations of the current study. Expanding the range of analysis to include other industries and geographic areas would provide a more holistic viewpoint, therefore addressing the constraints linked to data particular to specific sectors and locations. Future research endeavours must investigate the influence of control elements, such as industry typology, firm ownership structures, and organisational features. Including a more comprehensive range of data sources, using various research techniques, and considering contextual factors are crucial in order to comprehensively understand and analyse the differences and nuances that may exist within the dynamics of SCI and resilience. In addition, future research in this field would benefit from using longitudinal data, as it provides a holistic perspective on the resilience of supply chains during several stages:

before, during, and after the disruption. By using a longitudinal methodology, scholars can conduct a more comprehensive investigation into the intricacies of resilience dynamics, examine the many elements that facilitate or impede it, and evaluate the consequences linked to the effective management of resilient supply chains. Using longitudinal data in future research initiatives has the advantage of capturing the dynamic character of supply chain resilience. This facilitates a more thorough comprehension of how firms effectively manage disturbances and adjust their plans over time.

The study has the potential to provide significant insights for professionals and policymakers who want to improve the resilience of supply chains within a fast-growing and unpredictable corporate environment. Potential future research may also investigate the chronological development of SCI SCI and its subsequent impacts on supply chain resilience (SCR) in the logistics industry to enhance the general understanding of this phenomenon.

In addition, examining cross-border comparisons with other nations within SADC might provide a more extensive and transnational perspective on SCI and resilience dynamics. Moreover, it is essential to critically assess the generalisability of the findings. The research elucidated the interrelatedness of components unique to Namibia's context. However, more investigation is required to extend the applicability of these results to other sectors within the transportation and logistics industries and distinguish between established and emerging market economies.

This expansion may include comprehensive evaluations of the impacts of SCI innovation across several sectors, including the service industry. Furthermore, it is crucial to thoroughly study several factors, including internal integration, knowledge management, and green technology, to enhance our comprehension of the effects of modified variables on SCI and supply chain resilience.

The study provides valuable information from a practical standpoint for practitioners responsible for overseeing operational activities inside their business and across intricate SCI. When resources are few, strategically allocating resources to optimise desired outcomes becomes paramount. Managers may use the research findings to make informed decisions on integration investments that align with their chosen competitive objectives. The significance of prioritising integration initiatives is underscored, highlighting the essential need for internal integration before engaging in collaborative endeavours with external partners. The

fundamental premise of this strategy sequence is to establish unity across internal processes before expanding the collaboration with external stakeholders. This study also illuminates the impact of supplier, customer, and internal integration on performance, emphasising the need to consider contextual elements when formulating integration plans.

The significance of resilience and disruptions in shaping the SCI decision-making process is also emphasised in this study. In situations characterised by elevated degrees of uncertainty, the importance of information processing becomes more pronounced in contrast to that in a more stable context. This highlights the need for managerial proficiency in effectively discerning the specific demands of their organisational context while exercising discernment in the integration process. These assessments encompass the level of internal and external coordination and the adept alignment of these choices with the demands of the business environment. The research promotes managers' adoption of a pragmatic strategy, which involves enhancing integration activities led by trends or benchmarks with a thorough evaluation of their unique contextual factors. The comprehensive methodology guarantees that the integration endeavours are carefully customised to align with the organisation's unique contextual operational requirements, thereby increasing the likelihood of achieving favourable results.

This can be achieved by including a more comprehensive range of data sources, using various research techniques, and considering contextual factors. To further advance the understanding of how organisations can strengthen their integration strategies and reinforce their resilience in dynamic business environments, it is imperative to acknowledge and practically address the limitations identified in SCI and resilience. Additionally, exploring the suggested avenues for future research is crucial for the continued growth of this field.

6. 11 Conclusion of the Study

The findings of the study demonstrate that the Port of Walvis Bay serves as the primary global logistics and economic centre for SADC. The town of Walvis Bay serves as a crucial transportation hub for both people and freight. Additionally, the Port of Walvis Bay is a subsidiary of a state-owned logistics holding company fully controlled by the Government of Namibia. The enterprise has emerged as a prominent Southern African port industry contender. Volatility, SCI, and resilience are key factors that shape the contemporary

corporate environment. In order to prosper within the logistics business, organisations, particularly those operating in the logistics sector, must prioritise the attainment of efficiency and the development of resilience. These factors inform this study of the multidimensional correlation between SCI and the resilience of state-owned logistics firms in Namibia.

The findings derived from this study contribute significantly to the current repository of knowledge in supply chain management. The research also enhances the existing body of academic literature by providing more insights into the tactics used by state-owned logistics firms in Namibia to exploit the potential benefits of SCI. This study emphasises the complex perspective of internal and external integration among supply chain players in addressing the impact of disruptions caused by uncertainty, specifically within emerging economies like Namibia. Implementing integration practices alone may only provide supply chain resilience under certain circumstances. The main objective of this study is to fill a notable gap in the existing body of knowledge by examining the function of SCI in supporting supply chain resilience. As indicated, the findings underscore the complex challenge of achieving resilience across the supply chain. The study suggests that in order to ensure sufficient levels of resilience, especially in the distinct economic and environmental conditions of emerging nations like Namibia, it may be necessary for state-owned logistics enterprises to go beyond prioritising integration. Hence, this research contributes significant insights into the complex processes that advance the current understanding of supply chain management, offering a more complete and context-specific perspective.

The findings of this study emphasise the need for logistics organisations to prioritise investments in SCI practices and to take steps to improve their resilience. Resilience is the fundamental basis for transportation and logistics enterprises to effectively navigate disturbances and constantly provide their clientele with the expected services and goods. Resilience has essential relevance in growing economies, as Namibia shows. These economies are vulnerable to the severe consequences of supply chain failures while being critical components of global supply networks. Emerging economies face many significant challenges, such as natural disasters, widespread counterfeit goods, political instability characterised by dissenting actions from different factions, corruption, deficiencies in transportation infrastructure, and unethical business conduct. These difficulties disrupt the operations of supply chains and pose a danger to the general viability of businesses.

Therefore, it is essential for transportation and logistics enterprises working in such settings to prioritise the development of solid resilience capabilities. The necessity to address this issue is motivated by the reality of a globally linked society, whereby the repercussions of interruptions in supply chains have extensive and profound effects, often leading to substantial humanitarian and economic consequences.

In order to cultivate resilience skills, it is recommended that organisations use a comprehensive and diverse strategy. An essential aspect pertains to the cultivation of extensive integration across the many sections of the organisation and among partners within the supply chain. Collaborative endeavours and strategic alliances facilitate the uninterrupted transmission of information and exchange of expertise throughout the supply chain network. Consequently, this enables organisations to supervise the whole supply chain procedure extensively. Furthermore, using an integrated strategy enables organisations to effectively detect and anticipate problems, enabling them to respond to such disruptions promptly. The promptness in addressing unanticipated events is of utmost importance, as any delays in taking action might result in a decline in the efficiency of the supply chain, eventually affecting the competitive advantage of the organisations involved.

This research emphasises the interconnectedness of resilience and integration within the context of supply chain management, indicating that these two components are not mutually exclusive but rely on each other. Companies operating in developing economies such as Namibia are challenged to manage their operations effectively by finding the proper equilibrium between investing in integration strategies and cultivating resilience skills. This well-rounded approach provides individuals with the necessary skills and abilities to effectively navigate the difficulties that arise within their operational context, prosper, and maintain a competitive edge in an increasingly linked international market.

Successfully establishing resilient capabilities depends heavily on effectively executing solid methods for integrating supply chains. The tactics include synchronising many departments within an organisation, cooperative endeavours, and establishing strategic alliances with supply chain counterparts. The resultant synergy enables the smooth transmission of precise information and knowledge sharing across the supply chain network. This complete integration method allows organisations to monitor and control their supply chain operations efficiently. By doing so, individuals become more proficient in identifying and addressing

disturbances promptly and effectively. The significance of promptly addressing this issue must be considered. The lack of timely response to unexpected events may initiate a series of negative consequences that propagate across the supply chain, eventually resulting in a decline in the overall performance of the supply chain. The possible degradation can harm the company's competitiveness in the market.

The fundamental principle of a resilient supply chain strategy lies in integrating many aspects inside an organisation and collaborative efforts with supply chain partners. By engaging in these endeavours, organisations strengthen the ability to manoeuvre through disruptions and strategically position themselves to flourish in a constantly evolving and often uncertain commercial environment. This approach is not just a strategic benefit but also a necessity in the context of modern global companies, given the persistent occurrence of supply chain interruptions. By conducting thorough studies, analysing data, and interpreting the findings, this research has revealed valuable insights that provide a potential direction for logistics enterprises.

This study aimed to examine the many elements of SCI and its significant effects on the resilience of logistics firms controlled by the state. The main research aim was to investigate the impact of various aspects of SCI, such as internal integration, supplier integration, customer integration, and information integration, on the resilience of organisations. Furthermore, the study aimed to comprehensively examine the interdependent relationship between SCI and resilience. The study enquiry also aimed to provide insight into the strategies used by these enterprises to improve integration and, as a result, build resilience.

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APPENDIX A: QUESTIONNAIRE

College of Law and Management Studies

School of Management Information Technology and Governance

PhD – Supply Chain Management

Researcher: **Anatolia T.Shooya**

+264812481992 /264813762649

Contacts: 221115944@stu.ukzn.ac.za / amingeli1@gmail.com

Supervisor: **Dr. Thokozani Patmond Mbhele**

Contact: **Mbhele@ukzn.ac.za**

Dear Respondents

I am **Anatolia Tshanyengandje Shooya**, a student at the University of KwaZulu-Natal pursuing a PhD in Supply Chain Management. I am conducting a study on the "***Impacts of supply chain integration on resilience in the state-owned logistics enterprises in Namibia*.**" I request your honest opinion on all the questions in this questionnaire. You are kindly requested to avoid disclosing your personal information. The data gathered from this research will be treated confidentially and for academic purposes only.

The study aimed to attain the following specific objectives;

- To establish the impact of internal integration on the supply chain resilience of state-owned logistics enterprises in Namibia.

- To determine the effect of supplier integration on the supply chain resilience of state-owned logistics enterprises in Namibia.
- To establish the impact of customer integration on the supply chain resilience of state-owned logistics enterprises in Namibia.
- To determine the impact of information integration on the supply chain resilience of state-owned logistics enterprises in Namibia.
- To examine the relationship between supply chain integration and the resilience of state-owned logistic enterprises.

Therefore, I would like to take a few minutes of your time and complete the survey questionnaire attached hereto. Feel free to reach out to the researcher to elaborate more where required. Information provided will only be used for this study, and confidentiality will be maintained with the utmost attention. To this end, your participation in the study is voluntary, as you can withdraw anytime you wish to do so. There will be no monetary gain from participating in this research study.

The questionnaire should take about 15-20 minutes to complete. I hope you will take the time to complete the questionnaire.

Thank you for participating!

SECTION A: DEMOGRAPHIC INFORMATION

Please tick in the appropriate box

1. **Gender profile**

Male	
Female	

2. **Age category**

20 – 30	
31 – 40	
41 – 50	
51 and above	

3. **Tenure**

1 – 5 years	
6 – 10 years	
11 – 15 years	
16 – 20	
21 years and above	

4. **High qualification**

PhD	
Masters	
Honours degree	
Bachelor degree	
Diploma	
School leaving Certificate	

5. **Position held**

Inventory controller	
Representatives of transportation companies	
Suppliers	
Clearance agencies	
Freight and forwarding agencies	
Government liaison officers	

SECTION B: KEY QUESTIONS

Instruction

Please rate your level of agreement with the statements by ticking on the scale shown below; *Please indicate the degree of integration in the following areas (1 = strongly disagree; 5 = strongly agree*.

Internal Integration *Please indicate the degree of integration in the following areas (1 = strongly disagree; 5 = strongly agree*).

List no.	Description	1	2	3	4	5
II1	The use of cross-functional teams in process improvement and product development is prominent in this organisation.					
II2	In this organisation, there is data integration among internal functions.					
II3	In this organisation, there is enterprise application integration among internal functions.					
II4	This organisation's utilization of periodic interdepartmental meetings among internal functions is very high.					
II5	This organisation has real-time integration and connection among all internal functions, from raw material management through production, shipping, and sales.					

Supplier integration: *Please indicate the extent of integration or information sharing between your organization and your major supplier in the following areas (1 = strongly disagree; 5 =strongly agree).*

List no.	Description	1	2	3	4	5
SI1	There is extensive participation of our major suppliers in the process of procurement and production.					

SI2	The level of information exchange with our primary supplier through information networks is very high.					
SI3	There exist strategic partnerships with our major suppliers.					
SI4	Our primary supplier shares their production schedule with us.					
SI5	We share our demand forecasts with our major suppliers.					

Customer integration: *Please indicate the extent of integration or information sharing between your organization and your major customer in the following areas (1= strongly disagree; 5= strongly agree).*

List no.	Description	1	2	3	4	5
CI1	We have linkages with our major customers through information networks					
CI2	We are connected with our major customers through computer networks.					
CI3	Our major customers share demand forecast information with us.					
CI4	We have established quick ordering systems with our customers.					
CI5	The level of communication with our major customers is very high.					

Information integration: *Please indicate the extent of integration or information sharing between your organization and your major customer in the following areas (1= strongly disagree; 5= strongly agree.*

List no.	Description	1	2	3	4	5
II1	Our trading partners share proprietary information with us					
II2	Our trading partners keep us fully informed about issues that affect business.					

II3	Our trading partners share business knowledge of core business processes with us.					
II4	Information exchange between our organization and the trading partners is adequate.					
II5	Information exchange between our organization and the trading partners is accurate.					

Supply Chain Resilience *Please indicate the extent to which you agree with the following statements (1= strongly disagree; 5= strongly disagree.*

List no.	**Description**	**1**	**2**	**3**	**4**	**5**
SR1	We can cope with changes brought about by the supply chain disruption.					
SR2	We can adapt to the supply chain disruption quickly.					
SR3	We can provide a quick response to the supply chain disruption.					
SR4	We reconfigure our resources and processes in response to the dynamic environment.					
SR5	We renew our resource base in response to the changing business environment.					
SR6	We can maintain high situational awareness at all times.					

End of the Questionnaire

Thank you for taking the time to complete the questionnaire.

Consent:

I, _____ (*Name: Optional),* hereby confirm that I understand the content of this document and the nature of the research project, and I consent to participate in the research dissertation.

I understand that participation is voluntary, and I am at liberty to withdraw from the process at any time should I so desire.

Participant's Signature: _____ Date: _____

APPENDIX B : GATEKEEPER LETTER

NAMIBIAN PORTS AUTHORITY

Enquiries: Helena Shigwedha
E-mail: H.Shigwedha@namport.com.na
Tel. no: 064 – 208 2371
Fax no: 064 – 208 2347

October 4, 2021

Anatolia T. Shooya

Email: amingeli1@gmail.com.

Dear Ms Shooya

REQUEST TO CONDUCT RESEARCH: DOCTORAL DISSERTATION DEGREE AT THE NAMIBIAN PORTS AUTHORITY (NAMPORT)

This letter serves to confirm that your request to carry out research on Namport in order to complete your Doctoral dissertation degree at the University of KwaZulu Natal – Westiville Campus Republic of South Africa has been approved on the following conditions:

Research Topic	"The impact of supply chain integration on resilience and responsiveness of state-owned logistics enterprise in Namibia"
Namport Supervisor	Tautinge M. Festus, Business Development Practitioner
Conditions	You are required to sign a confidentiality agreement with NAMPORT before commencement of the study
	You are required to present the outcome of your research study to management at a time of mutual convenience

Kindly contact Ms. Helena Shigwedha at H.Shigwedha@namport.com.na for further guidance.

We take this opportunity to wish you the best with your research project.

Yours Faithfully,

[redacted]

JACOB ORANGE
MANAGER ORGANISATION DEVELOPMENT, TRAINING & WELLNESS

CC: MR Tautinge M. Festus, Business Development Practitioner

APPENDIX C : LANGUAGE EDITOR CERTIFICATE

EDITING CONFIRMATION

To whom it may concern:

This memo serves to confirm that the manuscript/research project detailed below has been language-edited and/or proof-read.

Regards,

-IETS-

IET Innocent *(Cert. Lang. Ed.)*
Language Editor

****

Manuscript Title:

Impacts of supply chain integration on resilience in the state-owned logistics enterprises in Namibia

Author:

Anatolia Tshanyengandje Shooya

Issued on:

19/04/2024

Disclaimer:
The editor/proofreader makes no claim as to the accuracy of the manuscript contents nor the objectives of the author. While all possible efforts have been made to ensure the text as edited is readable and grammatically correct, the author(s) have the option to accept or reject suggestions and trackable changes made to the document before submission.

sarchcot@gmail.com

APPENDIX D : ETHICAL CLEARANCE LETTER

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

25 November 2021

Anatolia Tshanyengandje Shooya (221115944)
School Of Man Info Tech & Gov
Westville Campus

Dear AT Shooya,

Protocol reference number: HSSREC/00003545/2021
Project title: Impacts of supply chain integration on resilience in the state-owned logistics enterprises in Namibia
Degree: PhD

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 20 October 2021 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 25 November 2022.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)
/dd

Humanities and Social Sciences Research Ethics Committee
Postal Address: Private Bag X54001, Durban, 4000, South Africa
Telephone: +27 (0)31 260 8350/4557/3587 **Email:** hssrec@ukzn.ac.za **Website:** http://research.ukzn.ac.za/Research-Ethics
Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville